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Psychopathology among Patients with Obesity Who Are Candidates to Bariatric Surgery

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Keywords
Psychopathology · Obesity · Bariatric surgery · Treatment impact

Abstract

Introduction: Obesity is often associated with disturbed eating patterns and disorders, as well as mental health issues such as personality disorders, and psychological diseases. This is often described as psychopathology of obesity. In this work, we attempted to establish the prevalence of certain psychopathological traits in patients with obesity (PwO) who were candidates for bariatric surgery when compared to lean controls: (1) obsessivity-compulsivity, (2) depression/anxiety, (3) cravings, and (4) impulsivity. ***Methods:*** A cross-sectional study was performed by asking patients and controls to fill out the Yale-Brown Obsessive-Compulsive Scale, the Hospital Anxiety and Depression Scale, the State and Trait Food-Cravings Questionnaires, and the Barrat Impulsiveness Scale. ***Results:*** We included 253 PwO and 52 lean controls. Obsessive-compulsive (OC) traits, anxiety, cravings, and impulsiveness were more prevalent in the group of PwO, even after adjusting for the age and gender differences between the groups. Anxiety and impulsivity were both correlated with emotional eating, and cravings were associated with emotional and night eating. ***Conclusion:*** Most of our results are in line with the literature in this area. However, the high expression of OC traits in this population of PwO might be due to the high prevalence of depression. Surprisingly, high attentional impulsivity (that is reported to be really expressed in PwO) was not observed in our cohort. It is of interest the association observed for most of the psychopathological traits with emotional eating.

Introduction

Obesity is a chronic and relapsing disease, defined by the World Health Organization (WHO) as an abnormal or excessive fat accumulation that may impair health [1]. To quantify the amount of body fat, WHO recognizes the use of body mass index (BMI); obesity is present when

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BMI is ≥30 kg/m^2 [1]. Obesity is a worldwide epidemic, with its prevalence almost tripled between 1975 and 2016. Obesity is an important risk factor for several noncommunicable diseases, namely from the metabolic and cardiovascular fields [1].

Obesity results from an energy imbalance of calories consumed and expended. Although obesity is a multifactorial disease, lifestyle options have an impact on a certain genetic background. Indeed, some eating patterns and disorders, such as binge eating, night eating, and emotional eating, are often associated with overweight and obesity [2–5]. The concept of food addiction associated with specific cravings has also been described in the pathogenesis of obesity [6]. The reward mechanisms related to the ingestion of some products show similarities with other addiction problems [6, 7]. This evidence highlights the importance of the behavioral component in the pathogenesis of obesity.

These disturbed eating patterns and disorders are often associated with mental health issues (disorders or personality traits) such as depression [2, 3, 8] or impulsive behavior [9]. Furthermore, obesity is associated with a variety of psychiatric conditions, in association with or regardless of disturbed eating patterns [10–12]. The most frequent psychiatric conditions are depression and anxiety, but personality disorders, eating disorders, attention deficit hyperactivity disorder, and alcohol abuse are very common [11, 12]. Altogether, these psychiatric conditions can be referred to as psychopathology of the patient with obesity (PwO). This seems to be a two-way association, with psychiatric conditions being involved in the development of obesity, but also emerging as a complication of the disease.

Moreover, this psychopathology of the PwO has an important impact on obesity treatment. Firstly, there is a difference in the patients' profiles seeking surgical or conventional treatments, with the former presenting more psychopathological issues [12, 13]. Secondly, bariatric surgery (the most effective and long-lasting treatment for the more severe clinical cases of obesity) has shown contradictory results in solving pre-existing psychopathological conditions; for some, it is shown a transitory increase in those conditions [14], and for others a long-term reduction [15]. Lastly, psychopathology has an important role in predicting the success after bariatric surgery, although results sometimes remain conflicting [16]. Nevertheless, psychopathological, psychiatric, personality, and eating disorders should all be addressed in the multidisciplinary management of the PwO, in order to optimize treatment results. The aim of this work was to assess the overall prevalence of psychopathological conditions in a cohort of patients who were candidates for bariatric surgery, compared to lean individuals, and to correlate those conditions with their eating patterns.

Methods

The current work is a cross-sectional observational study performed at a Multidisciplinary Bariatric and Metabolic Surgery Unit, with PwO patients who were candidates for bariatric surgery. All patients admitted to the unit between January 2020 and December 2021 were invited to participate in the study and included if acceptance was obtained. To establish a control cohort, lean individuals from 18 to 65 years old were also recruited. All participants (patients and controls) signed an informed consent, and their data was anonymized. The project had the approval of the Hospital's Ethics Committee. Participants filled out a series of validated questionnaires for the Portuguese language, regarding several areas of psychopathology:

1. for obsessive-compulsive (OC) disorder and traits, the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) [17, 18];
2. for anxiety and depression screening, the Hospital Anxiety and Depression (HAD) scale [19, 20];
3. for food cravings assessment, the State and Trait Food-Cravings Questionnaires (FCQ-S and FCQ-T) [21, 22];
4. for impulsiveness assessment, the Barrat Impulsiveness Scale (BIS-11) [23, 24].

Further data were collected regarding demographics, anthropometric measurements (weight and height to determine BMI), and comorbidities associated with obesity (such as hypertension, type 2 diabetes, dyslipidemia, sleep apnea, osteoarticular disease, depression/anxiety, venous insufficiency, and liver steatosis). Considering the PwO, data was also collected regarding the eating patterns (sweet eater, volume eater, snacking, night eating, nibling/picking, emotional eating, compulsive eating, and binge eating), and motivation for surgery (issues with body image, health issue, mobility/daily functioning, and quality of life improvement), as assessed by psychologists and nutritionists from our team.

Data were analyzed comparing the PwO group with the non-obese controls. For obsessive compulsive traits, Y-BOCS established severity categories (subclinical, slight, moderate, severe, and extreme); though it was also analyzed as a continuous variable, comparing scores for obsession, compulsion, and the total score. Anxiety and depression were assessed both in prevalence (as established by the HAD scale) and average score. Cravings were evaluated by their dimension as well as in their state and trait according, respectively, to the FCQ-S and FCQ-T questionnaires. Finally, impulsivity using the BIS-11, was assessed globally and likewise by its second-order factors: attentional, motor, and non-planning impulsiveness.

Table 1. Demographic, anthropometric, and clinical data regarding both PwO and controls

Demographics	PwO	Controls	Total	*p* value
Age	45.2 (10.5)	40.2 (14.5)	44.4 (11.4)	0.04
Gender				0.01
Female	197 (78%)	32 (62%)	229 (75%)	
Male	56 (22%)	20 (38%)	76 (25%)	
Total	253 (83%)	52 (17%)	305	
Anthropometrics				
Weight	120.4 (22.2)	65.2 (12)	110.1 (29.5)	<0.001
Height	1.65 (0.09)	1.68 (0.08)	1.65 (0.09)	0.04
BMI	44 (6.5)	23 (3)	40.4 (10)	<0.001
Comorbidities				
Hypertension	139 (56%)	1 (2%)	140 (46%)	<0.001
Diabetes mellitus	48 (19%)	0 (0%)	48 (16%)	<0.001
Dyslipidemia	90 (36%)	5 (9.6%)	95 (31%)	<0.001
Sleep apnea	70 (28%)	0 (0%)	70 (23%)	<0.001
Osteoarticular disease	180 (72%)	0 (0%)	180 (59%)	<0.001
Depression/anxiety	155 (62%)	2 (4%)	157 (52%)	<0.001
Venous insufficiency	115 (46%)	0 (0%)	115 (38%)	<0.001
Liver steatosis	90 (36%)	0 (0%)	90 (29%)	<0.001

In addition to establish, the prevalence of these psychopathological traits in the PwO, when compared to non-obese controls, we assessed how they were correlated with the patient's eating patterns. We describe our sampling plan, all data exclusions (if any), all manipulations, and all measures in the study, and we adhered to the American Psychologist Association methodological checklist. Analysis code, research materials, and data are not available due to their proprietary nature. This study's design and its analysis were not preregistered.

Parametric data are expressed as mean (standard error of the mean, SEM), nonparametric data as median (interquartile range, IQR). We performed *t* test or Wilcoxon test, or ANOVA for parametric data, and chi-square test for nonparametric and Spearman test for correlations. Logistic regression was performed to control for bias. Statistical analysis was performed using STATA (StataCorp. Stata statistical software: release 14. College Station, TX: StataCorp LP). A p value <0.05 was considered statistically significant.

Results

A total of 253 PwO who were candidates for bariatric surgery were recruited, alongside 52 lean controls. Controls were younger (45.2 ± 10.5 years old vs. 40.2 ± 14.5 years old, $p = 0.04$), and presented a lower female prevalence (78% vs. 62%, $p = 0.01$) (Table 1).

Albeit the randomization of our control group, with the intention of similarity to our cohort, demographic characteristics showed differences in age (with PwO patients being older) and gender (with higher prevalence of female gender in the PwO group). These differences might lead to biased results for our psychopathologic evaluation, in particular gender, which has been described as having a major influence on psychological issues among PwO [25]. For this reason, we performed logistic regression to account for these confounders.

Obviously, controls presented lower weight (120.4 ± 22.2 kg vs. 65.2 ± 12 kg, $p < 0.001$) and BMI (44 ± 6.5 kg/m^2 vs. 23 ± 3 kg/m^2, $p < 0.001$). Comorbidities commonly associated with obesity were also more prevalent in the PwO group, the most frequent being osteoarticular disease (72%), depression/anxiety (62%) and hypertension (56%) (Table 1).

Regarding the patients' eating patterns, the most common were volume eating (72%), sweet eating (66%), and emotional eating (50%) (Fig. 1). PwO motivations for surgery were mostly related to improvement in health issues (65%) and mobility/daily functioning (50%) (Fig. 2).

OC traits were significantly more prevalent in the group of PwO, exhibiting 33% of slight traits (vs. 15% control group) and 13% of moderate traits (vs. 6%) ($p = 0.003$) (Fig. 3). This was confirmed by higher scores in obsessive traits (5.2 ± 3.9 vs. 2 ± 2.9, $p < 0.001$), compulsive traits (3.8 ± 3.8 vs. 1.6 ± 2.5, $p < 0.001$), and overall score (9 ± 7.3 vs. 3.6 ± 5, $p < 0.001$) on Y-BOCS. There was no correlation with eating patterns or motivation for surgery, and there was no observed effect of gender on this difference between groups (Table 2).

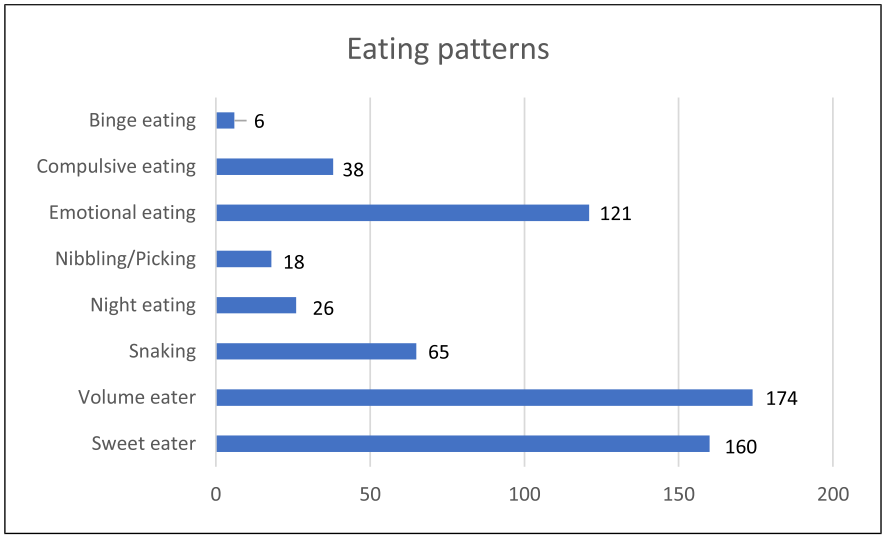

Fig. 1. Eating patterns of the PwO.

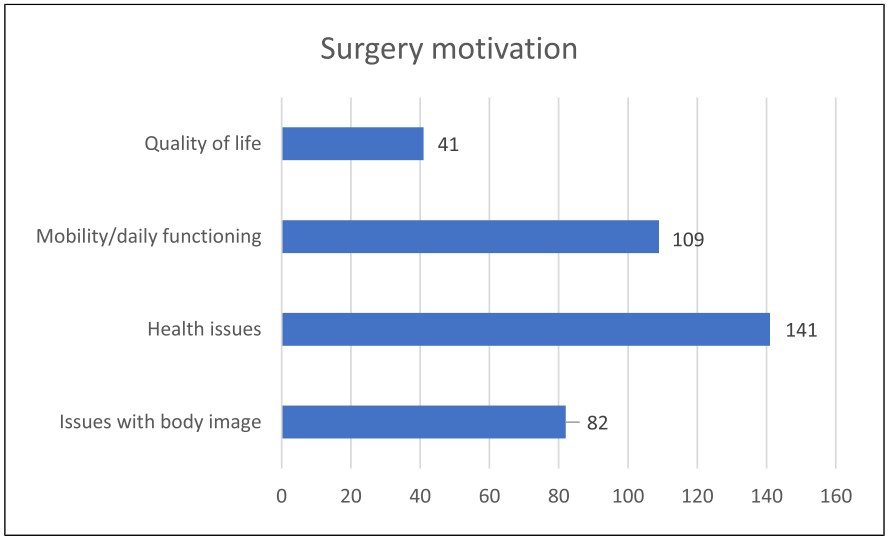

Fig. 2. Motivation for surgery of the PwO.

Anxiety was more predominant in the PwO group (36% vs. 12%, $p < 0.001$), with higher HAD scores (7.6 ± 4.5 vs. 3.8 ± 2.9, $p < 0.001$) (Fig. 4). It was correlated with emotional eating pattern (coefficient 0.2, $p = 0.002$), and it was not affected by gender or motivation for surgery (Table 2).

Depression was also more prevalent in the group of PwO (33% vs. 0%, $p < 0.001$), with higher scores (6.9 ± 4 vs. 2.7 ± 2, $p < 0.001$). However, when adjusted for gender differences between the two samples, this higher prevalence was no longer significant. There was also no correlation to eating patterns or motivation for surgery (Table 2).

Cravings were overall more frequent in the group of PwO, both traits and state, despite gender differences between PwO and controls. There was a correlation between craving traits and craving state with night eating (coefficient 0.15, $p = 0.01$ and coefficient 0.17, $p = 0.008$) and with emotional eating (coefficient 0.26, $p < 0.001$ and coefficient 0.17, $p = 0.008$). All dimensions of cravings were significantly higher scored in the PwO group, with the exception of the "hunger as physiological state" dimension, which did not reach significance (7.9 ± 3.1 vs. 7.1 ± 3.6, $p = 0.07$). There was no correlation with motivation for surgery (Table 2).

Overall, patients exhibited significantly higher impulsiveness scores (61.2 ± 10.5 vs. 55.8 ± 7.3, $p < 0.001$), regardless of gender differences; those scores were in correlation with emotional eating (coefficient 0.14; $p = 0.04$). The greater impulsiveness of the PwO group, was also observed in the second-order factors of BIS-11 of

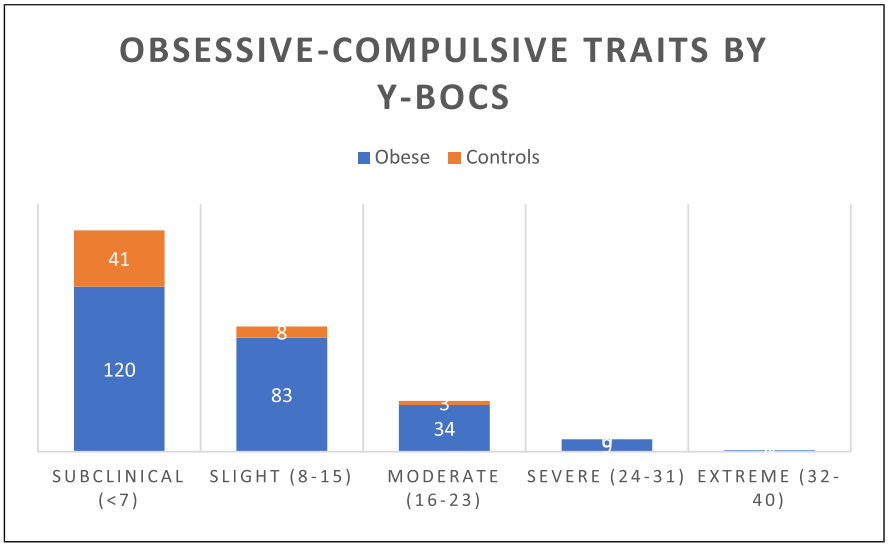

Fig. 3. OC traits prevalence as assessed by Y-BOCS.

motor (19.7 ± 4.6 vs. 14.4 ± 2.7; $p < 0.001$) and non-planning impulsiveness (25.3 ± 4.6 vs. 23.2 ± 3.8, $p = 0.002$). However, attentional impulsiveness was, in contrast, higher in the control group (16.2 ± 3.9 vs. 18.2 ± 3, $p < 0.001$). There was no correlation with motivation for surgery (Table 2).

Discussion

Regarding eating patterns, frequency, volume eating, sweet eating, and emotional eating are the most frequent and binge eating the least. We are not aware of this having been previously reported. Indeed, most studies focus on dietary, not eating, patterns. The ones reporting the association of specific eating patterns with overweight or obesity development usually describe eating patterns related to "loss of control" such as night eating, compulsive eating or binge eating [26]. Despite the lower frequency of night eating in our cohort, it remains significant when PwO exhibit cravings. This suggests that in a certain subtype of patients, it may be relevant in the etiopathogenesis of obesity. It was interesting to observe that the main correlation in psychological traits was with emotional eating, although not unexpected.

Also of interest, the motivation for surgery in these patients is mostly related to health and mobility/daily functioning issues, with body image issues and improvement in quality of life seemingly being less important for them. These data are in line to current literature [27, 28]. However, motivation for surgery did not correlate with any of the assessed psychopathology's prevalence. To our knowledge, this is unreported data. We had expected patients with depression and/or anxiety to have some association with certain motivators for surgery [29].

As for our psychopathology assessment, we observed changes in all the evaluated areas: OC behavior, depression/anxiety, food cravings, and impulsivity. The Y-BOCS questionnaire showed high scores of obsessive and compulsive traits and, more importantly, higher prevalence of clinical OC traits. We did not find any correlation to any eating pattern nor influence of gender. OC traits and OC disorder have been associated with addiction behavior [30]; when considering the role of food addiction in the development of obesity, one could speculate its higher prevalence. However, studies assessing OC trait/disorder in PwO often show a negative correlation, with lower rates of obesity in these patients, except when depression is also present [31]. Therefore, we hypothesize that our contradictory results, of higher prevalence of OC traits in the PwO compared to lean subjects, might be related to the higher prevalence of depression in the PwO group.

Our HAD questionnaire results were overall compatible with existing literature, showing an association of obesity with depression and anxiety [8, 10]. We observed a correlation between anxiety and emotional eating, but none with depression and emotional eating. Interestingly, previous studies showed an association of emotional eating with depression, rather than with anxiety [3, 8]. As previously discussed, there was an expected influence of gender on depression prevalence [25], and so we have performed logistic regression to adjust. Anxiety remained more frequent in the PwO group when adjusted for gender, but depression lost its significance, revealing the influence of gender on this difference.

Table 2. Psychopathology of the PwO: Y-BOC, HAD, FCQ-T and -S, and BIS-11 questionnaires results for PwO and controls

Psychopathology	PwO	Controls	Total	*p* value
Y-BOCS				
Subclinical (<7)	120 (47%)	41 (79%)	161 (53%)	
Slight (8–15)	83 (33%)	8 (15%)	91 (30%)	
Moderate (16–23)	34 (13%)	3 (6%)	37 (12%)	
Severe (24–31)	9 (4%)	0 (0%)	9 (3%)	
Extreme (32–40)	1 (0.4%)	0 (0%)	1 (0.3%)	
				0.003
Obsessions	5.2 (3.9)	2 (2.9)	4.6 (3.9)	<0.001
Compulsions	3.8 (3.8)	1.6 (2.5)	3.4 (3.7)	<0.001
Total	9 (7.3)	3.6 (5)	8 (7.2)	<0.001
HAD				
Anxiety score	7.6 (4.5)	3.8 (2.9)	6.9 (4.5)	<0.001
Anxiety prevalence	87 (36%)	6 (12%)	93 (32%)	<0.001
Depression score	6.9 (4)	2.7 (2)	6.2 (4.1)	<0.001
Depression prevalence	80 (33%)	0 (0%)	80 (27%)	<0.001
Cravings				
FCQ traits				
Intention to eat	9.1 (3.3)	7.2 (2.4)	9.8 (3.3)	<0.001
Positive anticipation	14.9 (5.5)	12.4 (4.8)	14.5 (5.5)	0.003
Negative anticipation	8.1 (3.8)	5.4 (2.9)	7.6 (3.8)	<0.001
Lack of control	15.7 (6.7)	10.7 (5.2)	14.9 (6.8)	<0.001
Thoughts	15 (7.3)	9.6 (2.8)	14.1 (7)	<0.001
Intense desire	10.8 (4.3)	9.3 (2.8)	10.5 (4.2)	0.007
Emotions	11.1 (5.3)	6.9 (3.6)	10.4 (5.3)	<0.001
Triggers	11.5 (4.9)	9.5 (3.3)	11.1 (4.7)	0.003
Guilt	9.5 (4.6)	5.2 (3.1)	8.8 (4.7)	<0.001
Total	106.7 (37.1)	76.3 (20.4)	101.3 (36.6)	<0.001
FCQ state				
Intense desire	7.9 (3.2)	5.7 (2.8)	7.5 (3.2)	<0.001
Positive anticipation	7.8 (3)	6 (2.7)	7.5 (3)	<0.001
Negative anticipation	7.2 (3)	5.7 (2.6)	6.9 (3)	<0.001
Lack of control	6.9 (3.1)	4.7 (2)	6.5 (3.1)	<0.001
Hunger as physiological state	7.9 (3.1)	7.1 (3.6)	7.8 (3.3)	0.07
Total	38.3 (12.4)	29.2 (9.6)	36.7 (12.5)	<0.001
BIS-11				
Attentional	16.2 (3.9)	18.2 (3)	16.5 (3.8)	<0.001
Motor	19.7 (4.6)	14.4 (2.7)	18.7 (4.8)	<0.001
Non-planning	25.3 (4.6)	23.2 (3.8)	24.9 (4.5)	0.002
Total	61.2 (10.5)	55.8 (7.3)	60.1 (10.2)	<0.001

Food cravings assessed by the FCQ trait and state questionnaire were largely more frequent in the PwO group, with the exception of the "hunger as physiological state," which was similar to the lean group. Both traits and states food cravings correlated with night eating and emotional eating. Food cravings have often been associated with food addiction and certain eating disorders, such as binge eating [32], which we did not observe in our study. This could be related to our small number of patients with binge eating patterns. There was no observed gender influence in the multivariate model, despite some studies suggesting a role of female gender on cravings [33]. Food cravings, as other psychological traits, have contradictory trends following obesity treatment, namely bariatric surgery, with some studies suggesting normalization [34] and others reporting no change [35]. This is important because compliance to dietary changes can be compromised and so can be treatment results; some studies show that food-craving interventions previous to bariatric surgery can improve outcomes [36].

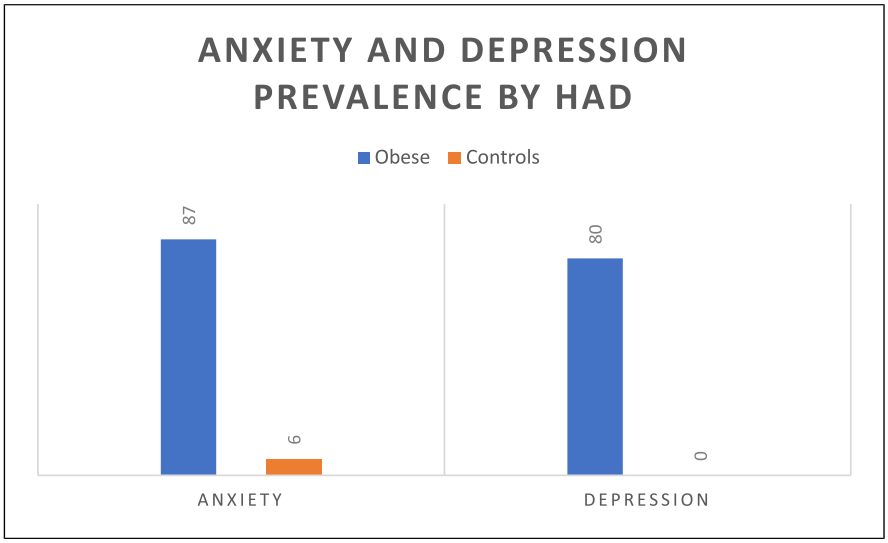

Fig. 4. Anxiety and depression prevalence as assessed by HAD.

Impulsivity, as assessed by the BIS-11 questionnaire, was higher in our PwO cohort than in lean controls. Our results are in line with the literature, in which impulsivity has often been associated with obesity [37, 38]. It was interesting to observe that attentional impulsivity was, unlike expected, more frequent in the control group. In fact, attentional and motor impulsivity, rather than non-planning impulsiveness, is more frequently associated with obesity, binge-eating disorder, and food addiction [39]. Nevertheless, the total impulsiveness score was higher in the PwO group, with no gender influence, but correlating with emotional eating.

Our study presented some limitations. The first one we have already addressed. Our control group was not similar in terms of demographics, which following our multivariate logistic regression showed to have been a confounder for depression. Furthermore, we did not include extensive evaluation of all psychological conditions, nor structured interviews by psychologists or psychiatrists following the questionnaires, which remain tools to screen patients and not diagnose alone. However, we believe the study shows interesting results, that we hope to pursue, by following patients into bariatric surgery and afterward.

To conclude, our sample of PwO exhibited traits of several psychological comorbidities evaluated, such as OC traits, anxiety and depression, cravings, and impulsivity. These results are mostly in line with current literature. Of interest is also its association with emotional eating. This highlights the importance of a psychological evaluation prior to surgery, as well as a follow-up after surgery.

Statement of Ethics

This study protocol was reviewed and approved by Comissão Ética para a Saúde, Unidade Local de Saúde São José, Approval No. CES299_2019, on the 07/02/2020. All participants signed an informed consent upon inclusion.

Conflict of Interest Statement

Prof. José Silva-Nunes was a member of the journal's Editorial Board at the time of submission. The remaining authors have no conflicts of interest to declare.

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Author Contributions

I.R.F.: study design, data collection, data analysis, and draft manuscript writing. M.V.C., N.C., and D.M.: data collection and draft manuscript writing. J.S.-N.: study design, supervision, and manuscript revision.

Data Availability Statement

The data that support the findings of this study are not publicly available due to being a private database that may contain information that could compromise the privacy of research participants but are available from the corresponding author, I.R.F. (contact details: ines.r.figueiredo@ulssjose.min-saude.pt), upon reasonable request.

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