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Trabajo Original

Obesidad y síndrome metabólico

Differences in the cluster of depressive symptomatology among bariatric surgery candidates, long-term bariatric surgery patients, and subjects with a major depressive disorder without obesity

Diferencias en el perfil de síntomas depresivos entre pacientes candidatos a cirugía bariátrica, pacientes intervenidos de cirugía bariátrica a largo plazo y personas con trastorno depresivo sin obesidad

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Abstract

Introduction: depression is more frequent among people with obesity (PwO) compared to the general population. Depression seems to improve after bariatric surgery (BS) at short term, but data are inconclusive at long term. Besides, it is not known whether depressive symptoms among PwO are similar to those people with a major depression without obesity.

Objectives: we aimed to study whether there are differences regarding depressive symptomatology among subjects seeking BS or patients after BS in the long-term compared with subjects with MDD.

Methods: the Beck Depression Inventory (BDI) was administered to three groups: 52 patients seeking BS (OB), 135 patients with a BS with a minimum follow-up of 18 months (BS) and 45 subjects with a MDD (MDD).

Results: the MDD obtained the higher score with the BDI whether compared to the OB (18.9 ± 12.7 vs 14.2 ± 6.9; $p = 0.01$) or the BS (18.9 ± 12.7 vs 8.1 ± 8; $p < 0.0001$). Also, BS presented a lower BDI than the OB (8.1 ± 8 vs 14.2 ± 6.9; $p < 0.0001$). The MDD scored higher in the psychological domain than patients in the OB (9.9 ± 7.5 vs 5.7 ± 5.1; $p < 0.0001$) as well as in the BS (9.9 ± 7.5 vs 3.1 ± 3; $p < 0.0001$). There was a negative correlation between a greater score in the somatic domain and %EPP ($p = 0.04$).

Conclusions: at long term, depressive symptomatology among subjects with a BS remained lower compared to PwO seeking BS.PwO presented a different cluster of depression compared to individuals with a MDD. BS reduces the somatic depressive cluster at long term, although its presence is associated to a lesser weight loss.

Keywords:

Obesity. Bariatric surgery. Depression. Long-term.

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Resumen

Introducción: la depresión es más frecuente entre las personas con obesidad (PwO) en comparación con la población general. La depresión parece mejorar después de la cirugía bariátrica (CB) a corto plazo, aunque los datos no son concluyentes a largo plazo. Además, no se sabe si los síntomas depresivos entre las PwO son similares a los de las personas con depresión mayor (TDM) sin obesidad.

Objetivos: nuestro objetivo fue estudiar si existen diferencias con respecto a la sintomatología depresiva entre sujetos en protocol de CB o pacientes sometidos a CB a largo plazo en comparación con pacientes con TDM.

Métodos: se administró el Inventario de Depresión de Beck (BDI) a tres grupos: 52 pacientes en lista de CB (OB), 135 pacientes intervenidos de CB con un seguimiento mínimo de 18 meses (CB) y 45 sujetos con TDM.

Resultados: el TDM obtuvo mayor puntuación en el BDI ya sea comparado con OB (18,9 ± 12,7 *vs.* 14,2 ± 6,9; $p = 0,01$) o CB (18,9 ± 12,7 *vs.* 8,1 ± 8; $p < 0,0001$). Además, CB presentó un BDI menor que OB (8,1 ± 8 *vs.* 14,2 ± 6,9; $p < 0,0001$). TDM obtuvo puntuaciones más altas en el dominio psicológico que los pacientes del OB (9,9 ± 7,5 *vs.* 5,7 ± 5,1; $p < 0,0001$) y del CB (9,9 ± 7,5 *vs.* 3,1 ± 3; $p < 0,0001$). Hubo una correlación negativa entre un mayor puntaje en el dominio somático y %EPP ($p = 0,04$).

Conclusiones: a largo plazo, la sintomatología depresiva entre los pacientes sometidos a CB permaneció más baja en comparación con PwO que buscaban CB. Las personas con CB presentaron sintomatología depresiva diferente en comparación con las personas con TDM. La CB reduce el cuadro depresivo somático a largo plazo, aunque su presencia se asocia a una menor pérdida de peso.

Palabras clave:

Obesidad. Cirugía bariátrica. Depresión. Largo plazo.

INTRODUCTION

Obesity has become one of the leading health problems over the last century (1). This disease is not only associated with metabolic comorbidities but also psychological conditions. In fact, it is well known that obesity and depressive disorder share common pathopsychological pathways, and that there is a bidirectional association between these two diseases. It has been shown that obesity increases the risk of presenting a major depressive disorder (MDD) (RR = 1.55) as well as a MDD is a predisposing factor for obesity (RR = 1.58). Moreover, the lifetime prevalence of a MDD among the general population is about 10 % and increases up to 20 % among subjects with obesity seeking bariatric surgery (2).

Bariatric surgery (BS) is nowadays the most effective procedure for weight loss among subjects with severe obesity and it accounts for significant amelioration and/or resolution of medical comorbidities related to obesity. However, the effects of this surgical procedure on psychological conditions and, specifically on depression or depressive symptomatology, are controversial. At short-term, most studies published so far have found that there is a significant amelioration or even a remission regarding depressive symptomatology. It is possible that depression may not influence weight loss in the short-term because initial weight loss is more driven by metabolic factors due to anatomical changes in the gastrointestinal tract than psychological or behavioral factors. However, the effects of BS at long-term, when weight loss has reached a plateau, are more controversial and, some of the studies performed at this time suggest that there could be a relapse in depressive symptoms among these patients. This could be of particular interest because up to 20-30 % of patients regain weight after BS in the long-term, and psychological factors have been proposed as one of the precipitating factors of this relapse in weight (3,4).

On the other hand, MDD comprises a wide and heterogenic spectrum of depressive symptomatology. Particularly among subjects with type 2 diabetes, it has been shown that, despite the prevalence of this psychiatric disorder is greater compared to general population, the type of depressive symptoms is different than the typical melancholic depression, showing more physical symptomatology (5). What is more, when considering people with obesity, few studies have suggested that these subjects could present more frequently with an atypical depression rather than a melancholic one (6-8). Therefore, failure to examine depressive subtypes may explain some of the inconsistencies in the literature and suggest these subtypes may be important to determine their impact on weight outcomes.

We aimed to study whether there are significant differences regarding depressive symptomatology among subjects seeking bariatric surgery or patients after BS in the long-term compared with subjects with a MDD without obesity.

MATERIAL AND METHODS

SUBJECTS

For this cross-sectional study, participants were recruited consecutively from the outpatient's clinic of an Endocrine and a Psychiatry Department from a Tertiary Center The sample comprised three groups: patients attending an obesity unit seeking bariatric surgery (OB), patients who had undergone a bariatric surgery procedure with a minimum follow-up of 18 months (BS) and subjects with a diagnosis of a MDD who attended the outpatient's Psychiatry Department (MDD). For all groups, the inclusion criterion was being 18 years of age or older. Other additional inclusion criteria for the OB group were having a BMI equal or greater than 35 kg/m^2 and not having undergone a bariatric surgery procedure before. Exclusion criteria for the MDD group were having another psychiatric condition other than depression, such as schizophrenia, bipolar disorder or suicide attempt. Written informed consent was obtained for both groups prior to study participation. The study was approved by the Ethics Committee of the hospital.

ASSESSMENT OF DEPRESSIVE DISORDER

To rule out the presence and the severity of depressive disorder, the Spanish version of the Beck Depression Inventory (BDI) was administered to all participants. The BDI is a 21-item questionnaire that assesses mood over the previous month. Total scores range from 0 to 63 with greater scores indicating more symptoms of depression. The BDI has been widely used as a screening tool for depression in the general population. In this setting, a cutoff equal or higher than 13 is suggestive of significant depressive symptoms. The BDI has a high coefficient alpha (0.80), its construct validity has been well stablished, and it is a valuable tool which differentiates between depressed from non-depressed people. Also, among subjects with a known MDD, BDI has been proved to be useful to assess the severity of depressive symptoms as well as the response to the antidepressant therapy prescribed. In people with a MDD, a total score of 0-13 is considered a minimal range, 14-19 is mild, 20-28 is moderate and 29-63 is severe. However, among people living with obesity, a cutoff equal or greater than 16 for the entire 21-item measure exhibited the best balance between sensitivity and positive predictive value. This greater cutoff would be able to detect more than 70 % of the patients with a MDD yet provide more than 70 % of certainty that a person screening positive has this condition. Furthermore, as scores in every question of the BDI range between 0 and 3, we considered as a significant result equal to or greater than 2. Also, apart from the total scored obtained after administering the BDI, we divided all items of the BDI into three categories: psychological/cognitive sub score (score ranging from 0 to 33), negative emotions sub score (score ranging from 0 to 6) and somatic sub score (score ranging from 0 to 24) (9,10).

SOCIODEMOGRAPHIC AND CLINICAL PARAMETERS

In all groups, gender, age, height, weight, BMI, educational level, partnership status and employment situation were recorded from electronic medical records. Height and weight were measured while each participant was wearing indoor clothing, without shoes. BMI was calculated as weight divided by height squared.

STATISTICAL ANALYSIS

Statistical analyses were performed using the IBM® SPSS® Statistics Version 21.0. Initial analyses were descriptive and included calculation of mean, median and standard deviation for continuous variables and frequencies for categorical variables. The distribution of the sample was analyzed by the Kolmogorov-Smirnoff test. The three groups were compared regarding sociodemographic variables, BMI and BDI by using χ^2 tests for categorical variables and *t* tests and univariate analysis of variance (ANOVA) for continuous variables. The statistical significance level for all tests was set at an α of $p < 0.05$.

RESULTS

DESCRIPTIVE CHARACTERISTICS

A total of 135 patients were included in the BS group (72.6 % ♀, 50.1 ± 12.8 years, initial BMI = 46.9 ± 6.7 kg/m^2, time since surgery 86.9 ± 45.8 months, current BMI = 35.3 ± 6.9 kg/m^2), 52 subjects in the OB group (65.4 % ♀, 49.2 ± 12.2 years, BMI = 46.9 ± 6.9 kg/m^2), and a total of 45 subjects were included in the MDD group (53.3 % ♀, 38 ± 13.9 years, BMI = 25.9 ± 3.2 kg/m^2).

Group comparisons on BMI and sociodemographic characteristics are represented in table I. As expected, BMI was significantly greater in the two groups that included people with obesity compared to the MDD group (46.9 ± 6.7 kg/m^2 vs 35.3 ± 6.9 kg/m^2 vs 25.9 ± 3.2 kg/m^2; $p < 0.0001$). Also, current BMI was higher among OB group subjects compared to the BS sample (46.9 ± 6.9 kg/m^2 vs 35.3 ± 6.9 kg/m^2; $p < 0.0001$).

Table I. Demographic and clinical parameters of patients with obesity (OB), subjects who underwent bariatric surgery (BS) and individuals with a major depressive disorder (MDD)

	OB group (*n* = 52)	BS group (*n* = 135)	MDD group (*n* = 45)	*p*
Sex (female) (%)	65.4	72.6*	53.3*	0.02
Age (years)	49.2 ± 12.2	50.1 ± 12.8	38 ± 13.9	< 0.001
Educational level (superior) (%)	31	30	32	NS
Employment situation (active)	33	32	34	NS
Marital status (single) (%)	37	41	35	NS
Time since BS (months)	NA	86.9 ± 45.8	NA	-
Current BMI (kg/m^2)	46.9 ± 6.9	35.3 ± 6.9	25.9 ± 3.2	< 0.0001
Presurgical BMI (kg/m^2)	NA	46.9 ± 6.7	NA	-

Data are mean ± SD or %. BS: bariatric surgery; BMI: body mass index.

Furthermore, patients with a MDD were younger compared with both OB (38 ± 13.9 vs 49.2 ± 12.2 years; $p < 0.001$) and BS groups (38 ± 13.9 vs 50.1 ± 12.8 years; $p < 0.0001$). Besides, there were more women included in the BS group than in the MDD sample (72.6 % vs 53.3 %; $p = 0.02$). However, no differences were seen among the three groups regarding sociodemographic characteristics.

ASSESSMENT OF DEPRESSIVE SYMPTOMATOLOGY

Table II and figure 1 present the results of the different groups comparisons regarding both the total score obtained with the BDI, and the three sub scores (psychological/cognitive, negative emotions and somatic depressive symptoms). There were significant differences among the three groups regarding the scores obtained in both total and different compounds of the BDI. The MDD group obtained the higher score for significant depressive symptoms by using the BDI, whether compared to the OB group (18.9 ± 12.7 vs 14.2 ± 6.9; $p = 0.01$) or the BS group (18.9 ± 12.7 vs 8.1 ± 8; $p < 0.0001$). Also, patients on the BS presented a significantly lower BDI score than subjects on the OB (8.1 ± 8 vs 14.2 ± 6.9; $p < 0.0001$).

When we considered the psychological domain of the BDI, subjects included in the MDD group scored higher than patients in the OB group (9.9 ± 7.5 vs 5.7 ± 5.1; $p < 0.0001$) as well as in the BS sample (9.9 ± 7.5 vs 3.1 ± 3; $p < 0.0001$). Moreover, the OB group had also a greater punctuation in this psychological sub score compared to subjects who had undergone BS (5.7 ± 5.1 vs 3.1 ± 3; $p = 0.006$).

Negative emotions and suicidal thoughts are included in the negative emotions sub-score. The MDD group showed the greater score in this sub-scale, whether compared with the OB group (1.5 ± 1 vs 0.4 ± 0.3; $p < 0.0001$) or the BS sample (1.5 ± 1 vs 0.4 ± 0.2; $p < 0.0001$). No differences were seen in terms of negative emotions between the OB and the BS group (0.4 ± 0.3 vs 0.4 ± 0.3; $p = 0.9$).

Somatic sub-score did not differ between the MDD group, and the subjects included in the OB group (7.4 ± 4.5 vs 8 ± 2.9; $p = 0.4$). However, in BS patients, the score obtained in this somatic sub-scale was significantly lower, either comparing with the MDD group (4.6 ± 3.8 vs 7.4 ± 4.5; $p < 0.0001$) or the OB group (4.6 ± 3.8 vs 8 ± 2.9; $p < 0.0001$).

When we only considered subjects included in the OB group, we found that there was a negative correlation between a greater score in the somatic domain of depressive symptomatology and the percentage of excess weight loss (%EPP) ($p = 0.04$).

Table II. Comparison of the global score, and psychological, negative emotions and somatic subscores among patients with obesity (OB), subjects who underwent bariatric surgery (BS) and individuals with a major depressive disorder (MDD)

	OB group (n = 52)	BS group (n = 135)	MDD group (n = 45)	p
BDI global score	14.2 ± 6.9*	8.1 ± 8#	18.9 ± 12.7*#	0.01* < 0.0001#
Psychological subscore	5.7 ± 5.1*	3.1 ± 3#	9.9 ± 7.5*#	< 0.0001*#
Negative emotions subscore	0.4 ± 0.3*	0.4 ± 0.2#	1.5 ± 1*#	< 0.0001*#
Somatic subscore	8 ± 2.9#	4.6 ± 3.8#*	7.4 ± 4.5*	< 0.0001#*

Data are mean ± SD. BDI: Beck Depression Inventory.

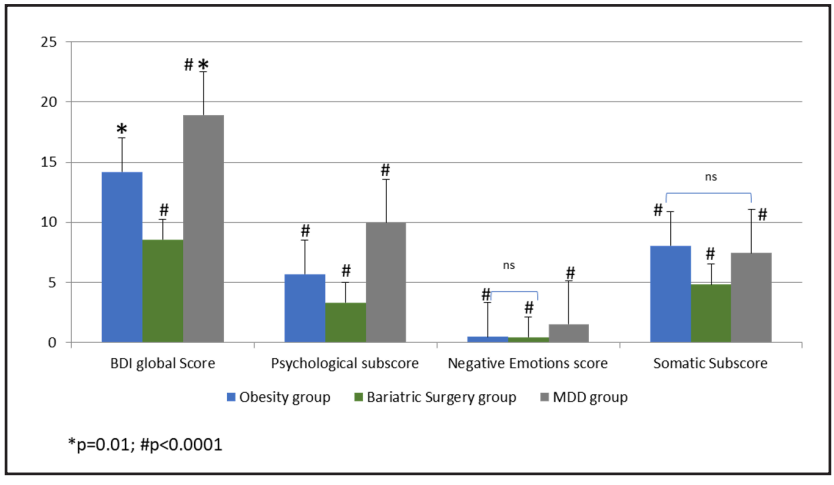

Figure 1.

Comparison of the global score, and psychological, negative emotions and somatic subscores among patients with obesity (OB), subjects who underwent bariatric surgery (BS) and individuals with a major depressive disorder (MDD).

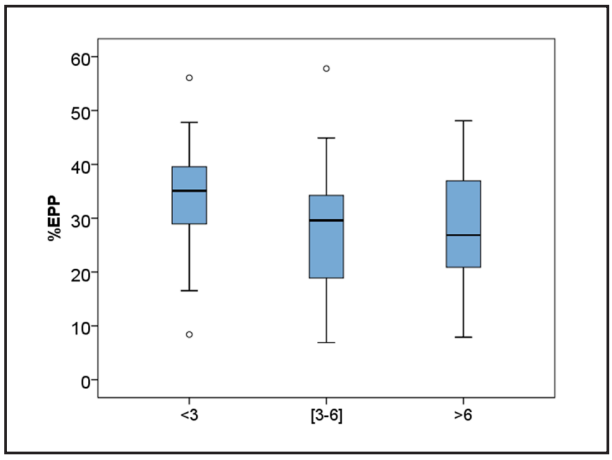

Figure 2.

Negative correlation between a greater score in the somatic domain of depressive symptomatology and the percentage of excess weight loss (%EPP) ($p = 0.04$).

We could not find any association between the %EPP and the presence of psychological or negative depressive symptoms. Data are represented in figure 2.

DISCUSSION

Our study found that, depressive symptomatology among patients long term after BS, was lower than subjects with obesity without having undergone this surgical procedure. However, and despite being on a pharmacological and psychological tailored treatment, patients with a major depression without obesity showed higher levels of depressive symptoms compared with patients living with obesity, either having or not a bariatric procedure. Also, depressive symptomatology was significantly different among those subjects with obesity, with a predominance of somatic symptoms (atypical depression) compared to subjects with a diagnosis of a MDD without this metabolic condition, where the greater scores were obtained by both psychological/cognitive sub-scales and the negative items in the BDI (melancholic or classical depression). Moreover, although depressive symptomatology among BS patients remained lower even on the long term, we found a negative association between atypical depressive symptoms and %EPP.

In a former study, we found similar results when we compared patients with type 2 diabetes and significant depressive symptoms with subjects with a MDD without a glycemic disorder. We concluded that the predominance of this somatic-biological cluster among subjects with type 2 diabetes could reflect symptoms related to a poor metabolic control as well as a difficulty to adapt to a chronic metabolic condition rather than a classical depression *per se*. Therefore, this heterogeneity in the symptomatology of depression might reflect a potential different response to antidepressant therapy among these patients (5).

In this sense, Osterhues et al. investigated depression in 192 bariatric surgery candidates and 96 in-patients with mental disorders from a psychosomatic medicine department. They also included 96 non-clinical volunteers with overweight or class 1 obesity as well as 103 postoperative bariatric surgery patients. They found lower physical health related quality of life (HRLQ) among patients seeking for BS compared to inpatients who were currently receiving psychotherapeutic hospital treatment. However, subjects waiting for BS perceived better subjective mental well-being and poorer physical HRQL, despite similar depression scores, than psychotherapy inpatients (6). Also, and in line with other studies published previously, depressive symptomatology, both somatic and mental, decreased significantly after BS, at short term (8,11-14). However, the psychotherapeutic inpatient group included, not only patients with a MDD, but also many other different psychiatric conditions, such as eating disorders, anxiety disorders, post-traumatic stress disorder, borderline personality disorder or any impulse control disorder. Therefore, comparisons with patients with depression and obesity, regardless of the BS situation, as well as with our results, should be interpreted with caution. In addition, the bariatric surgery sample included patients who underwent this procedure on the short term after this evaluation (6).

Moreover, evidence suggests that weight loss after BS is related to short and medium term decrease in depressive symptomatology (11,14-17). The LABS study included more than 2000 BS patients who completed the BDI at baseline and at different time points over a period of 3 years after surgery. Despite the amelioration of depressive symptoms after BS on the short term, after the first year the scores obtained with the BDI increased, suggesting a small worsening of depressive symptomatology (11,18). However, depressive symptoms were reduced significantly at 2-3 years after BS (12,14,19). There was a positive association between the decrease in BMI and the amelioration of depressive symptoms. The link between the decrease in BMI and the improvement in depressive symptoms post-BS could be explained by different biological pathways, such as a reduction both in the low-grade inflammatory state and the insulin resistance or the normalization of the HPA-axis dysregulation (20). Psychosocial factors could also exert a positive influence, such as more activities in daily life, satisfaction with the body image, among others (21-26). However, the nature and evolution of long-term post-BS changes in depressive symptomatology, as well as the influence of these changes exerts on weight loss remains unclear. The German multi-center Essen Bochum Obesity Treatment Study (EBOTS) showed that despite a significant improvement in depressive symptoms on the short and medium term after BS in 152 patients, there was a deterioration between 4 and 9 year follow-up, showing HADS depression scores comparable to presurgical levels (27). Conversely, we found that depressive symptomatology remained lower than the presurgical period.

Furthermore, it should be considered whether the deterioration in depressive symptoms on the long-term could increase the risk of suicide among this population. A meta-analysis that included 61 studies and more than 142,000 patients showed that pooled

postoperative suicide prevalence of 0.3 % was below the global suicide rate (1.4 %) (28). However, 3 longitudinal studies, including 43,406 patients, showed that the risk for suicide or attempt was increased following BS compared to baseline rates within the same population (29). A very low score in the negative emotions questions in the BDI among these patients might explain this lower suicide rate. A history of suicidal ideation seems to be the strongest predictor of suicidal ideation 1-year post-surgery, followed by a younger age (30). This increased suicidality could be the result of a combination of unfavorable medical, biological, genetic, and psychosocial factors. The main contributor could be a new onset of depression or the worsening of depressive symptomatology, given that the presence of a depression is one of the most consistently reported risk factors for suicide attempts or complete suicide (31,32). However, changes in the absorption of antidepressant medications after BS (33), changes to excessive eating to alcohol dependence after BS (34), disappointment from unrealistic expectations about surgical treatment, body image dissatisfaction due to hanging skin, etc., may also play an important role (26). Therefore, it is extremely important a continuous psychological evaluation after BS, also on the long term, to identify increases in depressive symptomatology, as well as classify the predominant depressive symptomatology.

A point to consider is whether some types of depressive symptomatology could have a negative impact on weight loss after a BS procedure. In this sense, we found a negative correlation between the presence of somatic symptoms and the %EPP among subjects who underwent BS, on the long term. This finding could reflect the negative influence of physical symptoms on the acquisition of healthy lifestyle habits, such as regular physical activity. In a previous study, we found that the presence of chronic pain among subjects who underwent BS, at long term, was related to a greater presence of depressive symptomatology and a lesser degree of regular physical activity (35). Smith et al included 345 patients waiting for BS and with a psychological presurgical evaluation. They found that patients who reported atypical depressive symptoms prior to BS were more likely to meet criteria for BED but did not have poorer weight loss within 18 months post-surgery (8). However, data regarding the effects of the different symptoms of depression on weight are scarce and inconclusive.

However, as most of the studies published so far, we conducted a cross-sectional study and, therefore, causal relationships between depressive symptomatology and obesity cannot be made. In this sense, it is noteworthy to point out that atypical depression could be a risk factor for obesity. In fact, the population-based prospective Zurich Cohort Study found a trend for a positive association between atypical depression and the average rate of weight gain over 20 years (36). Also, Lasserre et al. investigated, in a population-based cohort study including more than 3000 subjects, whether the different subtypes of depression (melancholic, atypical, combined, or unspecified) were predictive of adiposity in terms of incidence of obesity and changes in BMI, waist circumference and fat mass. They found that only participants with an atypical depression at baseline revealed a higher increase in adiposity (BMI, waist circumference and fat mass) during the 5.5 years of follow-up compared with participants without depression (37).

As mentioned before, one of the main limitations of the present study was its cross-sectional design and, therefore, a causal relationship between changes in depressive symptomatology before and after BS cannot be made. We used self-report assessments instead of a structured interview. However, BDI is a validated tool among subjects with obesity and previous research has produced valid results using a similar methodology. Also, we could not generalize our results to non-Caucasian populations. As far as we know, this is the first study that compares the types of depressive symptomatology among subjects with a MDD, patients with obesity seeking BS and subjects who underwent a BS procedure on the long term.

CONCLUSION

In conclusion, over the long term, subjects who underwent bariatric surgery displayed lower levels of depressive symptoms compared to those patients with obesity seeking this surgical procedure. Notably, the cluster of depression differed between individuals with obesity and subjects with a major depressive disorder without obesity, with a predominance of negative emotions in the last ones. Furthermore, despite bariatric surgery reduces somatic symptoms of depression over the long term, its presence is associated to a lesser weight loss.

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