

# The prevalence of binge eating and associated factors in overweight patients treated in an outpatient unit

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## ABSTRACT

**Objectives:** To estimate the prevalence of binge eating among overweight patients treated in an outpatient unit and to assess associated factors. **Subjects and methods:** Cross-sectional study with 272 patients, aged 22–83 years (average  $52 \pm 13$  years), conducted in an outpatient unit of a University Hospital of Grande Dourados-MS. Sociodemographic, behavioral, anthropometric, clinical and food consumption-related factors were collected. **Results:** Of the assessed subjects, 32.7% had periodic binge eating, which is more prevalent in women (84.3%) and younger adults ( $p = 0.007$ ). Regarding body image satisfaction, 76.4% of patients with binge eating were dissatisfied. Of patients with binge eating, 57.3% reported having been following a diet. Regarding food intake, higher intake of sweetened drinks was observed in the group with binge eating disorder ( $p = 0.05$ ). In a multivariate analysis, age, body image dissatisfaction, obesity and sedentary lifestyle were associated with binge eating disorder. **Conclusion:** The profile of patients who are compulsive eaters is mostly composed of women and younger adults. Another factor that deserves attention is that most patients with binge eating were dissatisfied with their body images. In addition, sedentary lifestyle and food intake are factors that may have contributed to the onset of diseases observed in this group. *Arch Endocrinol Metab.* 2018;62(4):399-409

## Keywords

Obesity; metabolic disorders; eating behavior

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## INTRODUCTION

Until recently, obese individuals were seen as a homogeneous group, with weight as their only similar feature, and behavioral factors, which in many cases are determinants of obesity, were neglected (1). However, it is currently known that eating behavior is something complex that transcends the act of eating and is also related to food intake as a result of internal and external stimuli, whether organic, psychological or social (2).

Eating disorders are psychiatric disorders mainly characterized by significantly irregular eating patterns associated to excessive concern about weight, body image and food intake (3). Binge eating is an eating disorder characterized by the intake of large amounts of food over a short period of time (up to two hours), combined with the sensation of loss of control of what or how much is eaten (4). Other features such as subjective distress feeling with shame, disgust and/or guilt can also be present. In addition, binge eating is a factor that exacerbates obesity and impacts the quality of life and eating behavior of individuals (5).

When binge eating is found to have occurred at least twice a week over the past six months, associated with loss of control and not followed by compensatory behaviors such as fasting or purging to lose weight, such events indicate the presence of Binge Eating Disorder (BED) (4). There is a prevalence of 46% of binge eating among obese individuals enrolled in weight control programs (6). Of individuals with binge eating, around 20% are diagnosed with BED (1,5).

Binge eaters who are obese are classified as a subcategory of the obese population and are more likely to suffer from psychopathologies, especially depression and personality disorder, in addition to spending most of their lives on diets and facing difficulties in social and occupational interaction (1).

Changes in eating style are many times driven by obesity, and the entire context in which the obese individual is inserted should be sometimes considered, since choosing a healthy diet does not depend only on access to adequate nutrition information but also on the preferences developed in the relationships between individuals and food (7).

Given the significance of the information above and the lack of studies on the topic in a subclinical population, that is, patients who were not searching for diagnosis and treatment for binge eating and obesity, the present study was designed to estimate the prevalence of binge eating among overweight patients treated in an outpatient unit and assess associated factors.

## SUBJECTS AND METHODS

A descriptive cross-sectional study was conducted at the cardiology, vascular, endocrinology and metabolism, otorhinolaryngology and pulmonary outpatient units of the University Hospital of Grande Dourados-MS, Brazil. Data collection occurred during three months, from March to May 2015. All participants signed the Free Informed Consent Form. The inclusion criteria were patients of both genders who attended the outpatient units in the referred period, aged 18 years or older (younger adults: 18–59 years and older adults:  $\geq 60$  years) and overweight. (Adult patients with BMI of 25–29.9 kg/m<sup>2</sup> were considered overweight, and older adults –  $\geq 60$  years–with BMI  $\geq 28$  to  $< 30$  kg/m<sup>2</sup> were considered at risk of obesity (8,9). Indians, pregnant women, lactating women, patients in wheelchairs and psychiatric and neurological patients unable to verbally communicate were excluded.

In the study period, 525 patients were examined, and 272 patients aged 22–83 years were considered eligible for the study. There were different reasons for not participating in the study, mostly related to failure to meeting the inclusion criteria (particularly age and body mass index [BMI]). There were 16 refusals to participate. However, all patients had unrestricted access to medical treatment, regardless of whether or not they participated in the study. It should be stressed that these patients were seeking treatment for diseases/disorders other than obesity in these outpatient units.

Study participants filled out a standardized questionnaire through face-to-face interviews. The instrument included questions related to the following aspects: sociodemographic, economic and behavioral (gender, ethnicity, age, income, schooling, marital status, practice of physical activity, use of tobacco and alcohol, presence of binge eating and body image satisfaction), anthropometric (weight, height and waist circumference – WC), clinical (diagnosis of diabetes mellitus – DM, systemic arterial hypertension – SAH, dyslipidemia and other disorders) and food intake. Based on these data, the variables of interest for this study were extracted.

Weight was assessed on a calibrated portable scale (Balmak Actilife®) up to 200 kg. Height was measured with a portable stadiometer (Altuxata®) with 213 cm in length and a precision of 0.5 cm, according to the technical standards of the Food and Nutrition Surveillance System (10).

Based on weight and height, BMI in kg/m<sup>2</sup> (weight divided by squared height) was calculated; the adult patients with a BMI of 25–29.9 kg/m<sup>2</sup> were considered overweight, those with BMI  $\geq 30$  kg/m<sup>2</sup> were considered obese (8); older adults ( $\geq 60$  years) with BMI  $\geq 28$  to  $< 30$  kg/m<sup>2</sup> were considered at risk of obesity, and those with  $\geq 30$  kg/m<sup>2</sup> were considered obese (9).

Waist circumference (WC) was measured with graduated inelastic tape according to the technical standards of the Food and Nutrition Surveillance System (10). The cutoff points considered were: high  $\geq 94$  cm for men and  $\geq 80$  cm for women, and very high  $\geq 102$  cm for men and  $\geq 88$  cm for women (8).

Practice of physical activity was assessed according to individuals' reports as follows: "no physical activity" (No) when individuals were inactive (sedentary behavior), and "physical activity" (Yes) when individuals performed physical exercises, according to the recommendations of the Institute of Medicine/Food and Nutrition Board (11). The use of tobacco and alcohol, regardless of quantity, was asked about.

Body image satisfaction was assessed according to individuals' reports: Are you satisfied with your body image? When satisfied (Yes), when dissatisfied (No). Regarding the presence of binge eating, aspects related to overeating and loss of control were considered according to Appendix B of the Diagnostic and Statistical Manual of Mental Disorders, 4<sup>th</sup> edition (4). Subjects who answered "yes" to both questions were considered binge eaters. Other questions related to behavior associated with binge eating were also assessed: eating fast, eating until feeling uncomfortably full, eating large amounts of food when not feeling physically hungry, eating alone for being embarrassed about the amount of food and feeling ashamed, depressed guilty after binge eating. When at least three of these five questions had positive answers, patients were characterized as suffering from binge eating disorder (BED; 4).

Clinical data were collected from medical records, were reported by patients themselves or were collected during assessment. For the diagnosis of metabolic syndrome (MS), the proposal of the International Diabetes Federation (12) was considered.

Food intake was assessed through the Food Frequency Questionnaire (FFQ), which was validated and described by Ribeiro and cols. (13). For assessment of the eating frequency of patients, food items were sorted into the following groups: milk and dairy products, meat and eggs, sausages, fat as a food additive, snacks and canned food, whole grains, refined and processed grains, legumes, tubers, vegetables, fruits, desserts/sweets, sweetened drinks and diet and light products.

The frequency of the consumption of sausages, snacks, desserts/sweets and sweetened drinks was assessed differently from the other groups, with eating frequency being considered the consumption of less than or equal to once a week. For the other food groups, eating frequency was grouped as follows: less than five times a week or more than five times a week.

The present study was approved by the Research Ethics Committee of Anhanguera-Uniderp, under No. 838.813, according to Resolution No. 466, of December 12, 2012 of the Health Council–Ministry of Health.

BM SPSS (Statistical Package for the Social Science) Statistics®, version 22, was used for statistical analysis. Categorical data analysis was performed using the chi-square test or Fisher's exact test. Continuous variables (expressed as means and standard deviation) were analyzed by the Student-t-test or Mann-Whitney test.  $P$  values  $\leq 0.05$  were considered statistically significant. Odds ratio (OR) and 95% confidence interval (CI95%) were calculated. Multivariable logistic regression analysis was performed. Only variables with  $p \leq 0.05$  were included in the study.

## RESULTS

In this study, 272 patients were assessed: the group was composed of 211 (77.6%) women and 61 (22.4%) men aged 22–83 years (average  $52 \pm 13$  years), and of these, 194 (71.3%) were younger adults (Table 1).

Regarding the presence of binge eating, 32.7% of the assessed individuals were binge eaters. Table 1 shows the sociodemographic and economic data collected from patients, distributed according to the presence of binge eating, which was more prevalent among women (84.3%;  $p = 0.08$ ) and younger adults (82%;  $p = 0.007$ ). Among outpatient units, the specialty with the highest number of patients with binge eating was otorhinolaryngology with 29.2%. A high percentage of patients with primary education (58.5%), monthly income from 2 to 3 minimum wages (54%) and married

or living with a partner (61%) was observed. Regarding the age of subjects in the different groups, patients with binge eating were mainly composed of younger adults ( $49 \pm 12.5$  years;  $p = 0.007$ ).

Regarding nutritional status, both adults and older adults with binge eating had, in general, BMI significantly higher than those without binge eating ( $33.2 \pm 5.5$  kg/m<sup>2</sup> vs.  $30.4 \pm 4$  kg/m<sup>2</sup>;  $p < 0.001$  and  $36.5 \pm 4.2$  kg/m<sup>2</sup> vs.  $32.7 \pm 3$  kg/m<sup>2</sup>;  $p < 0.001$ , respectively). In addition, most patients with binge eating showed increased WC (94.4%;  $p = 0.009$ ). Regarding lifestyle, most subjects in the binge eating group declared themselves to be nonsmokers (62.9%), reported not drinking alcohol (76.4%) and reported being physically inactive (sedentary behavior) (88.8%;  $p = 0.03$ ). Also, 76.4% ( $p = 0.003$ ) of patients with binge eating reported body image dissatisfaction, and 57.3% followed a diet or had already been dieting (Table 2).

Among patients suffering from binge eating, 60 (67.4%) individuals were characterized as suffering from BED. Regarding comorbidities, 26.1% of patients were diabetic, 53.7% were hypertensive, 38.6% had dyslipidemia and 75% reported other disorders, e.g., related to the gastrointestinal and respiratory tract (Table 3).

Eating frequency assessment showed that the intake of meat and eggs in the group of patients with binge eating occurred with frequency of  $\geq 5$  times/week in 84.3% of subjects assessed. As for refined and processed grains, 98.8% of patients with binge eating consumed these items with a frequency of  $\geq 5$  times/week. The intake of sweetened drinks was higher in the group with binge eating ( $p = 0.05$ ; Table 4).

Multivariable regression analysis showed that variables exposure age, nutritional status, body image (shape) satisfaction and physical inactivity were strongly associated to binge eating (Table 5).

Table 6 shows additional information on the characteristics of overweight patients. The assessment of differences between overweight and obese patients showed that most obese individuals are adults ( $p < 0.001$ ) with a higher mean age ( $p = 0.001$ ). Moreover, obese individuals had more comorbidities such as hypertension (60%;  $p = 0.005$ ), diabetes (32%;  $p = 0.004$ ), MS (41.7%;  $p = 0.03$ ) and sleep apnea (14.3%;  $p = 0.001$ ). The assessment of the intake of diet and light products by overweight and obese patients showed that obese individuals consumed these products more frequently ( $p = 0.01$ ).

**Table 1.** Sociodemographic and economic data from patients treated in an outpatient unit of a University Hospital – UFGD, 2015

Variables	Total N = 272	Binge eating n = 89	No binge eating n = 183	p
	Average ± SD	Average ± SD	Average ± SD	
Age (years)	52 ± 13	49 ± 12.5	53.5 ± 13	0.007
<b>Classification by age classification</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	
Younger adults	194 (71.3)	73 (82)	121 (66.1)	0.007
Older adults	78 (28.7)	16 (18)	62 (33.9)	
<b>Gender</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	
Female	211 (77.6)	75 (84.3)	136 (74.3)	0.08
Male	61 (22.4)	14 (15.3)	47 (25.7)	
<b>Specialty</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	
Cardiology	83 (30.5)	23 (25.8)	60 (32.8)	0.17
Vascular	48 (17.6)	15 (16.9)	33 (18)	
Otorhinolaryngology	73 (26.8)	26 (29.2)	47 (25.7)	
Endocrinology and metabolism	27 (9.9)	14 (15.7)	13 (7.1)	
Pneumology	41 (15.1)	11 (12.4)	30 (16.4)	
<b>Ethnicity</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	
White	163 (59.9)	53 (59.6)	110 (60.1)	0.84
Brownish	81 (29.8)	28 (31.5)	53 (29)	
Black	28 (10.3)	8 (9)	20 (10.9)	
<b>Education</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	
Illiterate	31 (11.4)	11 (12.4)	20 (10.9)	0.68
Primary education	159 (58.5)	48 (53.9)	111 (60.7)	
Secondary education	63 (23.2)	22 (24.7)	41 (22.4)	
Higher education/ Graduate studies	19 (7)	8 (9)	11 (6)	
<b>Income (minimum wage)</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	
Up to 1	104 (38.2)	32 (36)	72 (39.3)	0.73
2 to 3	147 (54)	51 (57.3)	96 (52.5)	
More than 4	21 (7.7)	6 (6.7)	15 (8.2)	
<b>Marital status</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	
Single	46 (16.9)	19 (21.3)	27 (14.8)	0.58
Married/living with a partner	166 (61)	52 (58.4)	114 (62.3)	
Divorced	28 (10.3)	8 (9)	20 (10.9)	
Widowed	32 (11.8)	10 (11.2)	22 (12)	

Significant difference:  $p \leq 0.05$ ; Student's t-test; Chi-square test or Fisher exact test. SD: standard deviation; s.m.: minimum wage.

## DISCUSSION

This is the first study to include a large subclinical sample of binge eaters in the region of Dourados-MS. The results obtained indicate that binge eaters are mostly younger adults and women dissatisfied with their body image who drink sweetened beverages. In addition, obesity and physical inactivity were strongly associated with binge eating.

These findings were similar to those obtained in a study conducted by França, Gigante and Olinto (14),

who investigated the occurrence of binge eating episodes in adult men and women and observed that women had a significantly higher prevalence of binge eating behavior compared to men (9.6% vs. 5.6%;  $p = 0.001$ ). In the same study, binge eating was more frequent among subjects aged 20–29 years (11.0%) and tended to decrease with aging ( $p = 0.001$ ) (14). In a review by Klump, Culbert and Sisk (15), who analyzed studies on binge eating in humans and animals, they found that the proportion of women to adult men who had compulsive eating was 5:1 (15).

**Table 2.** Anthropometric and behavioral data from patients treated in an outpatient unit of a University Hospital – UFGD, 2015

Variables	Total n = 272	Binge eating n = 89	No binge eating n = 183	p
<b>Anthropometry</b>	<b>Average ± SD</b>	<b>Average ± SD</b>	<b>Average ± SD</b>	
Weight (kg)	81.2 ± 13.9	85.3 ± 14.7	79.2 ± 13.1	0.001
Height (m)	1.5 ± 0.08	1.5 ± 0.07	1.5 ± 0.09	0.86
BMI (kg/m <sup>2</sup> ) Younger adults	31.5 ± 4.8	33.2 ± 5.5	30.4 ± 4	<0.001
BMI (kg/m <sup>2</sup> ) Older adults	33.5 ± 3.6	36.5 ± 4.2	32.7 ± 3	<0.001
WC (cm)	101.7 ± 11.4	103 ± 11.1	101 ± 11.5	0.18
<b>Nutritional status</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	
Overweight	97 (35.7)	20 (22.5)	77 (42.1)	0.002
Obesity	175 (64.3)	69 (77.5)	106 (57.9)	
<b>WC classification</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	
No risk	5 (1.8)	1 (1.1)	4 (2.2)	0.009
High risk	36 (13.2)	4 (4.5)	32 (17.5)	
Very high risk	231 (84.9)	84 (94.4)	147 (80.3)	
<b>Body image satisfaction</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	
Yes	99 (36.4)	21 (23.6)	78 (42.6)	0.003
No	173 (63.6)	68 (76.4)	105 (57.4)	
<b>Lifestyle</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	
Use of tobacco				
Nonsmoker	176 (64.7)	56 (62.9)	120 (65.6)	0.82
Former smoker	70 (25.7)	25 (28.1)	45 (24.6)	
Smoker	26 (9.6)	8 (9)	18 (9.8)	
Alcohol intake				
Yes	54 (19.9)	21 (23.6)	33 (18)	0.33
No	218 (80.1)	68 (76.4)	150 (82)	
Physical activity				
Yes	55 (20.2)	10 (11.2)	45 (24.6)	0.03
No	217 (79.8)	79 (88.8)	138 (75.4)	
Is on a diet or has been on a diet				
Yes	140 (51.5)	51 (57.3)	89 (48.6)	0.19
No	132 (48.5)	38 (42.7)	94 (51.4)	

Significant difference:  $p \leq 0.05$ ; Student's-t test or Mann-Whitney test; Chi-square test or Fisher exact test. SD: standard deviation; BMI: body mass index; WC: waist circumference.

Only overweight patients receiving medical treatment in several specialties were assessed in the present study, and in none of the cases did patients receive treatment to lose weight. Literature findings suggest that 16% and 54% of obese individuals who seek treatment to lose weight are binge eaters (16,17). In the present study, there was a prevalence of 32.7% of binge eaters, although patients were not seeking help to reduce weight. In a population-based study carried out in the city of Pelotas-RS, the prevalence of binge eating was 7.9% in the general population (14).

Although patients assessed in this study did not intend to obtain treatment for losing weight, 57.3% of individuals in the binge eating group reported following diets, indicating concern with body weight control. These individuals spend most of their lives following diets and facing difficulties in social and occupational interactions (1) and should be encouraged to adopt healthy eating habits, that is, a varied and balanced diet. Above all, they should be encouraged to eat with pleasure and without guilt, because many times, food intake is performed as a compensatory mechanism in situations of anxiety, depression, sadness and anger (18,19).

**Table 3.** Clinical data from patients treated in an outpatient unit of a University Hospital, 2015

Variables	Total n = 272	Binge eating n = 89	No binge eating n = 183	P
Presence of disease	n (%)	n (%)	n (%)	
Systemic arterial hypertension				
Yes	146 (53.7)	42 (47.2)	104 (56.8)	0.15
No	126 (46.3)	47 (52.8)	79 (43.2)	
Diabetes mellitus				
Yes	71 (26.1)	20 (22.5)	51 (27.9)	0.38
No	201 (73.9)	69 (77.5)	132 (72.1)	
Dyslipidemia				
Yes	105 (38.6)	36 (40.4)	69 (37.7)	0.69
No	167 (61.4)	53 (59.6)	114 (62.3)	
Metabolic syndrome				
Yes	101 (37.1)	29 (32.6)	72 (39.3)	0.28
No	171 (62.9)	60 (67.4)	111 (60.7)	
Renal disease				
Yes	38 (14)	15 (16.9)	23 (12.6)	0.35
No	234 (86)	74 (83.1)	160 (87.4)	
Coronary disease				
Yes	72 (26.5)	20 (22.5)	52 (28.4)	0.31
No	200 (73.5)	69 (77.5)	131 (71.6)	
Thyroid disorders				
Yes	47 (17.3)	19 (21.3)	28 (15.3)	0.23
No	225 (82.7)	70 (78.7)	155 (84.7)	
Apnea				
Yes	27 (9.9)	11 (12.4)	16 (8.7)	0.38
No	245 (90.1)	78 (87.6)	167 (91.3)	
Psychological aspects				
Yes	51 (18.8)	20 (22.5)	31 (16.9)	0.32
No	221 (81.3)	69 (77.5)	152 (83.1)	
Other disorders				
Yes	204 (75)	70 (78.7)	134 (73.2)	0.37
No	68 (25)	19 (21.3)	49 (26.8)	

Significant difference:  $p \leq 0.05$ ; Fisher's exact test.

For better results regarding weight control, individuals must be motivated to diet and to perform physical exercises. Some studies have shown the benefits of performing physical activities, since it can effectively reduce binge eating, resulting in the improvement of emotional and behavioral disorders and promoting health (20,21). However, the present study found that 88.8% ( $p = 0.03$ ) of individuals with binge eating are less physically active than individuals with BED (22,23).

When obese individuals are unable to control body weight, they are likely to experience psychological

suffering related to social discrimination due to their condition, body image depreciation, insecurity and feelings of failure related to weight loss (17,18). In this study, body image dissatisfaction was prevalent in 76.4% ( $p = 0.003$ ) of patients with binge eating. In the study conducted by França, Gigante and Olinto (14), body image dissatisfaction, obesity and health self-assessment were strongly associated with binge eating. Another study that assessed non-clinical populations in five Brazilian cities has shown that individuals with binge eating had a greater prevalence of body

**Table 4.** Regular food intake of patients treated in an outpatient unit of a University Hospital – UFGD, 2015

Variables	Total n = 272	Binge eating n = 89	No binge eating n = 183	p
Food intake frequency	n (%)	n (%)	n (%)	
Milk and dairy products				
< 5 times/week	119 (43.8)	36 (40.4)	83 (45.4)	0.51
≥ 5 times/week	153 (56.3)	53 (59.6)	100 (54.6)	
Meat and eggs				
< 5 times/week	57 (21)	14 (15.7)	43 (23.5)	0.15
≥ 5 times/week	215 (79)	75 (84.3)	140 (76.5)	
Sausages				
≤ 1 time/week	181 (66.5)	62 (69.7)	119 (65)	0.49
> 1 time/week	91 (33.5)	27 (30.3)	64 (35)	
Fat as a food additive				
< 5 times/week	113 (41.5)	40 (44.9)	73 (39.9)	0.43
≥ 5 times/week	159 (58.5)	49 (55.1)	110 (60.1)	
Snacks and canned food				
≤ 1 time/week	226 (83.1)	73 (82)	153 (83.6)	0.73
> 1 time/week	46 (16.9)	16 (18)	30 (16.4)	
Whole grains				
< 5 times/week	237 (87.1)	78 (87.6)	159 (86.9)	1.000
≥ 5 times/week	35 (12.9)	11 (12.4)	24 (13.1)	
Refined and processed grains				
< 5 times/week	9 (3.3)	1 (1.1)	8 (4.4)	0.27
≥ 5 times/week	263 (96.7)	88 (98.9)	175 (95.6)	
Legumes				
< 5 times/week	51 (18.3)	20 (22.5)	31 (16.9)	0.32
≥ 5 times/week	221 (81.3)	69 (77.5)	152 (83.1)	
Tubers				
< 5 times/week	255 (93.8)	80 (89.9)	175 (95.6)	0.10
≥ 5 times/week	17 (6.3)	9 (10.1)	8 (4.4)	
Vegetables				
< 5 times/week	100 (63.2)	31 (34.8)	69 (37.7)	0.68
≥ 5 times/week	172 (63.3)	58 (65.2)	114 (62.3)	
Fruits				
< 5 times/week	130 (47.8)	45 (50.6)	85 (46.4)	0.60
≥ 5 times/week	142 (52.2)	44 (49.4)	98 (53.6)	
Desserts/ sweets				
≤ 1 time/week	187 (68.8)	56 (62.9)	131 (71.6)	0.16
> 1 time/week	85 (31.3)	33 (37.1)	52 (28.4)	
Sweetened drinks				
≤ 1 time/week	45 (16.5)	9 (10.1)	36 (19.7)	0.05
> 1 time/week	227 (83.5)	80 (89.9)	147 (80.3)	
Non sweetened drinks				
< 5 times/week	224 (82.4)	73 (82)	151 (82.5)	1.000
≥ 5 times/week	48 (17.6)	16 (18)	32 (17.5)	
Diet and light products				
< 5 times/week	223 (82)	78 (87.6)	145 (79.2)	0.09
≥ 5 times/week	49 (18)	11 (12.4)	38 (20.8)	

Significant difference:  $p \leq 0.05$ ; Fisher's exact test.

**Table 5.** Association among risk factors in binge eating patients

Variables	Unadjusted odds ratio			Adjusted odds ratio		
	OR	IC95%	p	OR	IC95%	p
Classification by age						
Younger adults	2.33	1.25–4.35	0.007	3.38	1.72–6.67	< 0.001
Older adults	1.0			1.0		
Nutritional status						
Obesity	2.50	1.40–4.46	0.002	2.64	1.34–5.20	0.005
Overweight	1.0			1.0		
Waist circumference						
High	0.50	0.04–5.65	0.57	0.19	0.01–2.52	0.21
Very high	2.28	0.25–20.78	0.46	0.65	0.06–7.11	0.73
No risk	1.0			1.0		
Body image satisfaction						
No	2.40	1.36–4.25	0.003	2.11	1.13–3.94	0.01
Yes	1.0			1.0		
Physical activity						
No	2.57	1.23–5.39	0.01	2.56	1.17–5.60	0.01
Yes	1.0			1.0		
Sweetened drinks						
> 2 times/week	2.17	0.99–4.74	0.05	1.72	0.75–3.96	0.20
≤ 1 time/week	1.0			1.0		

CI95%: 95% confidence interval; OR: odds ratio; adjusted by: age rating, waist circumference, nutritional status, body image satisfaction, physical activity, sweetened drinks. Significant difference:  $p \leq 0.05$ .

weight dissatisfaction and excessive weight (24). Such circumstances indicate that unsuccessful attempts to lose weight are associated with excessive concern about weight, which generates emotional stress and binge eating as a compensatory behavior (18).

Longitudinal studies on binge eating are important, particularly when supported by actions aimed at promoting improvements in symptoms, as in a study in Campinas-SP in which patients with binge eating were monitored during six months by a multidisciplinary team. In the referred study, the authors reported a significant decrease in binge eating symptoms and body image dissatisfaction, with improvement in depression and anxiety symptoms after treatment. Food intake and body weight also decreased (25).

Food intake of binge eaters is an important aspect, and in this study, patients with binge eating showed a more frequent intake of sweetened drinks ( $p = 0.05$ ) compared to those without binge eating. Another clinically relevant aspect is the consumption of desserts/sweets and refined and processed grains, which is higher among patients with binge eating, since these food groups are generally consumed by obese individuals

not only to alleviate hunger but also to fight stress, anxiety, mental fatigue and depression (2,18,26). Such a fact is probably due to psychological factors involved in the eating behavior once eating often reflects the hedonic value given to food, influencing brain response to what and how much is eaten (27). Another relevant issue concerning the consumption of these food groups is that, since they are usually rich in empty and low nutritional calories, they may contribute to obesity development.

Assessment of the nutritional status of patients of this study showed that the group of patients with binge eating had higher weight, BMI and WC. Moreover, obesity can be a determinant for the development of other disorders, particularly cardiovascular, which are aggravating factors for associated risks such as hypertension, insulin resistance and dyslipidemia (28).

It is noteworthy that obesity itself does not determine an eating disorder, as binge eating can occur both in normal-weight and obese individuals. However, obesity is a biased risk factor because it results from imbalanced food intake, and studies indicate a positive association between binge eating and increased adiposity (6,29-32).

**Table 6.** Complementary data according to overweight classification of a University Hospital – UFGD 2015

Variables	Total n = 272	Overweight n = 97	Obesity n = 175	p
	Average ± SD	Average ± SD	Average ± SD	
Age (years)	52 ± 13	48.5 ± 11.6	54 ± 13.4	0.001
<b>Classification by age</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	
Younger adults	194 (71.3)	85 (87.6)	109 (62.3)	< 0.001
Older adults	78 (28.7)	12 (12.4)	66 (37.7)	
<b>Presence of</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	
Systemic arterial hypertension				
Yes	146 (53.7)	41 (42.3)	105 (60)	0.005
No	126 (46.3)	56 (57.7)	70 (40)	
Diabetes mellitus				
Yes	71 (26.1)	15 (15.5)	56 (32)	0.004
No	201 (73.9)	82 (84.5)	119 (68)	
Dyslipidemia				
Yes	105 (38.6)	36 (37.1)	69 (39.4)	0.79
No	167 (61.4)	61 (62.9)	106 (60.6)	
Metabolic syndrome				
Yes	101 (37.1)	28 (28.9)	73 (41.7)	0.03
No	171 (62.9)	69 (71.1)	102 (58.3)	
Renal disease				
Yes	38 (14)	15 (15.5)	23 (13.1)	0.58
No	234 (86)	82 (84.5)	152 (86.9)	
Coronary disease				
Yes	72 (26.5)	20 (20.6)	52 (29.7)	0.11
No	200 (73.5)	77 (79.4)	123 (70.3)	
Thyroid				
Yes	47 (17.3)	12 (12.4)	35 (20)	0.13
No	225 (82.7)	85 (87.6)	140 (80)	
Apnea				
Yes	27 (9.9)	2 (2.1)	25 (14.3)	0.001
No	245 (90.1)	95 (97.9)	150 (85.7)	
Psychological aspects				
Yes	51 (18.8)	13 (13.4)	38 (21.7)	0.10
No	221 (81.3)	84 (86.6)	137 (78.3)	
Other disorders				
Yes	204 (75)	69 (71.1)	135 (77.1)	0.30
No	68 (25)	28 (28.9)	40 (22.9)	
<b>Food intake frequency</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	
Diet and light group products				
< 5 times/week	223 (82)	87 (89.7)	136 (77.7)	0.01
≥ 5 times/week	49 (18)	10 (10.3)	39 (22.3)	

Significant difference:  $p \leq 0.05$ ; Student's t-test; Chi-square or Fisher's exact test. SD: standard deviation.

The characteristics of the sociodemographic profile of subjects in this study are typical of binge eaters of the public health system, who have primary education, a monthly income of 2–3 minimum wages and a stable marital status (married/living with a partner). Similar results were obtained in the study of Pacanowski and cols. (33), who assessed binge eating in individuals from Minnesota (USA). In the referred study, corroborating our findings, the authors also observed a greater prevalence of white, employed and married individuals.

This model of holistic approach was observed in the study by Carvalho-Ferreira and cols. (25) in which interdisciplinary intervention in binge eaters contributed to improve the physical and psychological symptoms of patients. Therefore, eating behavior has aroused the interest of many researchers, as it is a major element for successful treatment (34).

The assessment of subclinical samples is important because these samples consist of patients who did not seek diagnosis and treatment for binge eating and obesity in outpatient units. Thus, without the identification of this condition, patients cannot be properly treated, which might lead to aggravation of their symptoms.

It was concluded that the profile of binge eaters consists mostly of younger adults and women. Another factor that deserves attention is that most patients with binge eating were dissatisfied with their body image and with a high prevalence of elevated WC.

Moreover, factors such as physical inactivity and high consumption of sweetened drinks as well as high (though not significant) rates of consumption of desserts/sweets and refined and processed grains may have contributed to the onset of disorders detected in this group.

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