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Research Article

Nutritional and Metabolic Profile and Prevalence of Eating Disorders in Obese Patients Referred For Bariatric Surgery

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Introduction

Increasing prevalence of obesity are systematically reported by the academia and given headlines in the media. In 2010, the Brazilian Ministry of Health (MS), in association with the Brazilian Institute of Statistics and Geography (IBGE), released data that showed an increase in the prevalence of obesity and overweight in all age groups in Brazil. In this report, 50% of men and 48% of women were overweight, and 12.5% of men and 16.9% of women were obese[1]. The World Health Organization (WHO) projected that, in 2015, 2.3 billion people will be overweight and 700 million, obese. This implies a 75% increase in the number of cases of obesity in 10 years[2].

Obesity is not difficult to recognize, but the correct diagnosis requires the identification of the levels of risk, which demands some form of quantification. The Body Mass Index (BMI) is the epidemiological indicator for diagnosis of overweight and obesity, and the higher it is the more numerous and severe tend to be the associated comorbidities[3]. Besides resulting in physical problems, obesity can negatively affect psychiatric and behavioral functions. It can be associated with eating disorders (ED), which difficult the treatment of obesity. However, it is not unusual that ED are missed in the diagnostic evaluation, making the management difficult.

ED is characterized by a perturbation of the eating behavior, causing inadequate eating patterns. ED can be categorized in three: anorexia nervosa, bulimia nervosa and Eating disorder not otherwise specified (EDNOS); among the latter is included the binge eating disorder (BED)[4]. Obese people with BED are a subcategory of the obese population, presenting a higher frequency of psychological and psychiatric disturbances, especially depression and personality disorders. Besides that, they present a more severe degree of obesity, starting earlier, with a higher percentage of time spent in dieting, and with an impairment of the social and occupational life. Therefore, the adequate diagnosis and management of BED patients are fundamental for the correct treatment of the obesity[5].

Currently, the treatment of obesity represents a major challenge. The most effective treatment of severe obesity is bariatric surgery, which induces an expressive and long term weight loss [6,7]. Although the results are encouraging, this is expensive, difficult to apply to all the patients, has some risk and side-effects. Thus, it requires a thorough selection of patients. The non-surgical treatments, which include diet, exercise, pharmacotherapy and behavior therapy, have been poorly evaluated in the setting of severe obesity[8].

Bariatric surgery modifies the nutritional condition by causing physiological and anatomic transformations that modify food ingestion and absorption. However, the eating habits are not always completely modified, and the patients fail to adopt a healthier diet. Little is known about the potentially differential results of bariatric surgery in obese patients with BED. The aim of this study was to describe the nutritional and metabolic characteristics, and the presence of ED in severely obese patients, in the preoperative period of bariatric surgery, in search of a better knowledge of these phenomena for which better therapeutic strategies can eventually be designed.

Methods

Between March 2010 and November 2013, every patient referred to the Endocrine Division outpatient unit of the hospital, with severe obesity and indication for bariatric surgery[9], was invited to participate in the study. The nutritional evaluation consisted of anthropometric measures[10] and food consumption analysis. The anthropometric measures were: weight, height, arm, waist and hip circumferences. The weight (kg) was measured in light, indoor clothes, on a certified scale to the nearest 0.1 kg (Filizolla, Brazil). Height was measured on a wall stadiometer (Sanny, Brazil), with the patient standing, in the Frankfurt position. Body Mass Index (BMI) was calculated dividing the weight in kg by the square of height in m. The arm

circumference (AC) was measured halfway between the olecranon and acromion in the relaxed non-dominant arm. The waist circumference (WC) was measured halfway between the last rib and the iliac crest. The hip circumference (HC) was measured at the most prominent part of the gluteal region. Waist-to-rip ratio (WRR) was then calculated. The circumferences were measured by an inelastic, fiberglass tape-measure (Wiso, Brazil). All measurements followed the recommendations of the Food and Nutritional Surveillance System of the Brazilian Health Ministry[11].

The food consumption evaluation included a 24-hour weighted food record (with a digital scale and graduated glass bowl)[12,13], and a semi-structured nutritional interview. For the evaluation of nutrients, we used the Nutribase 7.18 software (Cybersoft, Phoenix Arizona, USA). The Basal Metabolic Rate (BMR) was calculated based on formulas for overweight adults, both men and women[14].

Physical activity was assessed by the International Physical Activity Questionnaire (IPAQ), short version[15]. Quality of life was evaluated by the 12 Item Short Form Health Survey (SF-12)[16], and the psychological evaluation was made through the Structured Clinical Interview for DSM-IV Dissociative Disorders (SCID) and the Binge Eating Scale (BES)[17-20]. All instruments had been previously validated for the Brazilian population, and those who required previous specific training were applied and interpreted by a qualified psychologist. The patients were considered ex-smokers if they had quit the habit for over a year.

The metabolic evaluation consisted on dosages of: triglycerides (TG), total cholesterol (TC), both by colorimetric method enzymatic (Hitachi 917, Roche, Brazil), HDL cholesterol (HDL-c) by an enzymatic homogeneous method (Hitachi 917, Roche, Brazil), LDL cholesterol (LDL-c) by the Friedewald formula[21]. Glucose was measured by an enzymatic colorimetric (oxidase) method (Hitachi 917, Roche, Brazil), glycated hemoglobin (AIC%) by immune turbidimetry (Hitachi 917, Roche, Brazil) and c-reactive protein (CRP) by Nephelometry (BNII, DSP, Brazil). The confirmation of the associated comorbidities was made by clinical history, records and use of medications.

The statistical analysis was carried out in SPSS v.20 (IBM, USA). Results are expressed as mean ± standard deviation (SD) or median (interquartile range); frequencies are given as percentage of the total. This project was approved by the Hospital's Institutional Review Board, and all subjects gave written informed consent.

Results

Two hundred and twenty consecutive patients were evaluated. In our sample, 78.8% were female and 21.2% were male. The mean age was 43.92 ± 11.5 years. The mean weight was 128.01 ± 23.0 kg; BMI was 48.21 ± 7.2 kg/m². The AC was 42.77 ± 5.8 cm, WC and HC were 135.38 ± 15.1 cm and 138.66 ± 14.4 cm, respectively. The BMR was 2164.74 ± 286.2 kcal/day. The caloric intake was 2688.06 ± 1058.9 kcal/day, distributed in 18.69 ± 5.3% protein; 51.48 ± 8.8% carbohydrates and 13.48 ± 3.0% lipids (being 9.10% ± 4.8% as saturated fat). Of the evaluated patients, 96.4% had tried to follow a diet with or without pharmacological therapy; those who reported use of anorexigenic medication 37.4% reported prior use of sibutramine and 21,5% of amphetamines. The other dietary findings are depicted in Table 1.

Table 1: Nutrition Profile

Nutrition Profile	All sample	Women	Men	P[a]
Weight (kg)	128.01 ± 23.9	121.8 ± 19.3	150.4 ± 25.6	<0.001[1]*
BMI (kg/m²)	48.2 ± 7.2	47.4 ± 6.8	50.8 ± 8.2	0.006 [1]*
AC (cm)	42.7 ± 5.8	42.6 ± 5.8	43.2 ± 5.7	0.554 [1]
WC (cm)	135.3 ± 15.1	131. 6 ± 12.9	149.4 ± 14.6	<0.001[1]*
HC (cm)	138.6 ± 14.4	138.2 ± 14.1	140.4 ± 15.4	0.364 [1]
WRR	0.97 ± 0.08	0.95 ± 0.07	1.06 ± 0.08	<0.001[1]*
BMR (Kcal/day)	2164.74 ± 286.2	2087.01 ± 231.4	2443.57 ± 292.8	<0.001[1]*
Energy Intake (Kcal/day)	2688.06 ± 1058.9	2531.08 ± 911.8	3226.27 ± 1339.8	0.014[1]*
Protein (%Kcal/day)	18.69 ± 5.3	18.1 ± 4.7	20.45 ± 6.7	0.045[1]*
Carbohydrate (%Kcal/day)	51.48 ± 8.8	52.47 ± 8.8	48.10 ± 8.2	0.021[1]*
Fat (%Kcal/day)	13.48 ± 3.0	13.28 ± 3.2	14.15 ± 1.9	0.180 [1]
Saturated Fat (%Kcal/day)	28.5 ± 5.0	8.8 ± 5.3	9.85 ± 2.0	0.388 [1]

BMI: Body Mass Index; AC: arm circumference; WC: waist circumference; HC: hip circumference; WRR: waist-to-rip ratio; BMR: Basal Metabolic Rate. Data are mean ± SD. [1] t-Test for independent samples. a comparison between in women and men.

Relative to Clinical Profile, 72.1% of the evaluated patients had a previous diagnosis of systemic arterial hypertension; 32%, Type 2 Diabetes Mellitus (DM2); 18.9%, dyslipidemia and, 41.7%, Obstructive Sleep Apnea (OSA). The most prevalent psychiatric disorder was BED (47%); 24.8 % were classified as severe, and 23.8% were moderate. Depression was diagnosed in 31.8% as current and 62.1% as past. SF-12's global score was 31.34 ± 3.0. The physical activity's global score was 11.68 ± 1.9, and the mental health's 19.68 ± 2.6. The lowest the results of the SF-12 are, the poorer is the state of physical and mental health. The majority of the patients (46%) considered their health as regular; 22.1% believed to have poor health; 73.2% felt they had done less than they would have liked to, due to physical health, despite this, nearly half of our (42.4%) was classified as "active", in the IPAQ; 47.2% said they had done less than they would have desired due to emotional problems. The other characteristics are described in Table 2.

Table 2: Biochemical parameters

	All Sample	Women	Men	P[a]
TC (mg/dL)	1.90 ± 36.5	193.37± 34.2	181.56± 43.1	0.108[1]
HDL c (mg/dL)	41.0 ± 9.1	42.65 ± 9.3	35.69 ± 5.7	<0.001[1]*
LDL c (mg/dL)	116.17± 32.0	117.50± 30.3	111,43 ± 37.8	0.354[1]
TG (mg/dL)	169.5(54-742)	166.11(54–404)	182.0(62-742)	0.943[2]
CRP (mg/L)	12.49 (2 - 63)	12.8 (4 - 63)	11.34(2– 9.5)	0.269[2]
Glucose(mg/dL)	119.9± 43.95	124.75± 45.6	131.33± 52.1	0.484[1]
A1C%	7.06 ± 2.0	7.0 ± 2.0	7.1 ± 1.8	0.664[1]

TC: Total cholesterol: HDL c: HDL cholesterol: LDL c: LDL cholesterol: TG: Triglycerides; CRP: C reactive protein; A1C%: glycated hemoglobin. Data are mean ± SD or median (interquartile range). [1]t-Test for independent samples; [2] Mann-Whitney u. a: comparison between in women and men.

Discussion

There is abundant literature on the epidemiologic aspects of obesity, but it is scarce when dealing with severe obesity. The BMI of this sample was higher than in the other studies (41 kg/m²-48.5 kg/m²)[23-26]. Likewise, the prevalence's of BED, Hypertension and DM2 were higher than previously reported. Porto et al found a prevalence of 66% of Hypertension and 13,9% of Type 2 DM[22]; Mattos et al found a prevalence of BED in 36% of the patients[23] and Bocchieri Ricciardi of 33%[24]. The increased prevalence of eating disorders could be driving the extreme weights observed in our sample.

Obese patients with BED present a more severe obesity, associated with many psychological symptoms. Severely obese patients suffer prejudice, may have an impaired work performance and have poorer quality of life[25]. The high prevalence of BED in extremely obese subjects calls for an adequate diagnosis of eating disorders, so that a more adequate and effective treatment can be implemented. The presence of BED could be a trigger factor to the severe obesity, a hypothesis not sufficiently studied to date. Binge eating is associated with a high burden of metabolic risk factors. Much of the associated risk appears to be mediated by BMI[26]. Moreover, mild to severe somatic affective-depressive symptom, strictly linked to BED, are associates with visceral obesity and all your complications, inclusive Non alcoholic fatty liver disease (NAFLD)[27].

The very high BMI in our sample (48.21 ± 7.2 kg/m²) could explain the high prevalence of comorbidities. Local environmental factors, such as food and physical activity habits, and genetic characteristics of our population (both poorly studied) should be seen as potential variables associated with the high prevalence of comorbidities in these patients. Another factor that must be considered is the very difficult access to qualified centers, and the long waiting time for treatment with specialists in the Brazilian Public Health System. This could play a role on the progression of the disease, culminating in a higher frequency of severe cases. This hypothesis needs to be tested.

The quality of life, evaluated through the SF-12, was much jeopardized. Scores around 56.58 for physical activity and 60.76 for mental health are medium scores in a healthy population[28]. The mean in our patients was 11.68 ± 1.9 and 19.68 ± 2.6, respectively, for physical and mental health. Dowsey et al, in a group of obese patients with hip arthroplasty, found quality of life scores significantly better than in our observation: 22.9 ± 3.6 physical and 47.2 ± 10.3 mental health in the morbidly obese patients[28]. The extent to which quality of life is affected can have, in the origin, social factors and social limitations, neither of which has been sufficiently studied in our community.

The levels of physical activity varied. In our sample (42.4%) was classified as "active", in the IPAQ. Similar results were found[29]. However, to reduce the risks of chronic and disabling disease, or to prevent gain of weight, higher degrees and duration of physical activity are recommended. Only 28% of our patients practiced moderate to elevated physical activity with the minimal recommended frequency or duration to have any impact on health, according to the American College of Sports Medicine[30]. The evaluation of physical activity through IPAQ may be subject to failures, because of the possibility of inappropriate reporting, loss of memory or omission. Besides that, the IPAQ was not validated to Brazilian obese population. Although the IPAQ has not been specifically validated for the sub segment of obese Brazilian individuals it has been extensively validated for the Brazilian general population.

The elevated frequency of females (78,8%) draws attention. In Brazil, the frequencies of overweight adults are usually reported as similar in men (50%) and women (48%). For obesity, the frequencies are 12.4% and 16.9% respectively[1]. Estimates of 2007 suggest that severe obesity affects 2% of men and 4% of women in Brazil[31]. These estimates differ from the proportion found in our sample. Other Brazilian and international studies report similar frequencies to the present study[22-25]. One cannot rule out a selection bias, since our unit is a reference center.

Men had a pattern of obesity with a higher weight, as expected ($p<0.001$). Besides that, they had larger waist circumference ($p<0.001$), greater caloric ($p=0.014$) and protein intakes ($p=0.045$). Visceral adipose tissue remains more strongly associated with an adverse metabolic risk profile[32]. Since protein intake was higher in men, we speculate that this is related to a high intake of red meat, which is quite common in southern Brazil[33]. Women, on the other hand, consume a diet richer in carbohydrates ($p=0.021$¹*) and present binge eating with a higher frequency (p=0,032).These data agree with other studies, which described a higher prevalence of BED in women[34].

Men had lower HDL-c values compared to the women ($p<0.001$), although the frequencies of hypertension, DM2 and dyslipidemia were similar, as well as fat intake. A lower HDL-c could indicate a different inflammatory environment in these men, with implications that have yet to be studied. Although subject to some inaccuracy, the method of nutritional evaluation used in this study is the preferred instrument in clinic practice, and a reliable tool to evaluate food consumption[35,36]. Food intake is mediated, in part, through brain pathways for motivation and reinforcement. Dysregulation of these pathways may underlay some of the behaviors exhibited by patients with eating disorders.

In severe obesity, bariatric surgery is a late choice, not the initial one. In every step of the treatment, all the elements play an important role in the results and have to be evaluated. The presence of eating disorders has to be diagnosed, and managed throughout the treatment period, from the conservative preoperative treatment to the postoperative. The patients who receive an adequate treatment in the preoperative period are more capable of accomplishing the changes in life style that prepare them for the bariatric surgery, and to adequately comply to the postoperative recommendations[37].

The relatively limited number of subjects, recruited from a single center, and the higher prevalence of women in our sample may make generalization to other populations quite difficult. These findings must be confirmed in larger samples and in other centers, so that adequate, more specific strategies and policies of evaluation and management can be developed.

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