

## FOOD CHOICES AND EMOTIONAL PERCEPTION BETWEEN OBESE AND NON- OBESE INDICATION FOR SURGICAL TREATMENT

---

*Taylor Felipe Salamon Araujo*

*Luciano Zanellato Marques*

*Lizandra Silva Kliemann*

*Maiele Kremer*

*Diego De carvalho*

*Carina Rossoni*

All content in this magazine is licensed under a Creative Commons Attribution License. Attribution-Non-Commercial-Non-Derivatives 4.0 International (CC BY-NC-ND 4.0).



**Abstract:** Obesity is related to different factors such as emotional, socioeconomic, and dietary, thus, knowledge of food choices and emotional perception enables means of prevention and treatment. Thus, by analyzing food choices and emotional perception among obese and non-obese individuals. Cross-sectional study conducted with 50 obese and 49 non-obese individuals, seen at the Public Health Network in Santa Catarina, from February 2017 to March 2018. Sociodemographic and clinical data were obtained through a semi-structured questionnaire. Food choices were assessed using the Food Choice Questionnaire (FCQ) and emotional perception by the International Affective Picture System (IAPS). The obese presented lower income and education, higher prevalence of chronic diseases. About 98% of these are dissatisfied with their silhouette, while the non-obese 73.5%. Regarding food choices, the morbidly obese give preference to cheaper foods, without caring about calories and health, valuing the act of eating to feel happy. From the data obtained in the IAPS the valence was consistent in both groups, but the impacted was much greater. The way obese people face situations is exacerbated when compared to non-obese people, affecting their food choices, choosing foods that provide well-being rather than nutrients and minerals, even when most of them claim to be dissatisfied with their bodies. Besides choosing cheap foods, with a pleasant texture and that help them to manage situations imposed by life.

**Keywords:** Obesity; bariatric surgery and metabolic; Food choices, Emotional perception

## INTRODUCTION

Obesity is defined as a metabolic and neuroendocrine disease, resulting from the interface between the obesogenic and genetic predisposition as an intrinsic factor

(HALPERN et. al, 2010). In 2014, the World Health Organization (WHO) reported that 39% of the world's population were overweight, with 13% obese (WHO, 2014). In Brazil, according to data from the Ministry of Health, through the VIGITEL survey (BRASIL 2017), they demonstrated that the prevalence of obesity in our population is 18.9% and morbidly obese 4% (SBCBM, 2015).

The indicated treatment for people with morbid obesity is bariatric surgery. According to the Brazilian Society of Bariatric and Metabolic Surgery (SBCBM, 2016) surgical indication must be based on the analysis of four criteria: BMI; age; associated diseases and duration of disease. Among the associated diseases of an emotional nature is included social stigmatization and depression.

It is known that ways of coping with emotional problems are related to inappropriate eating behaviors (TOMAZ; ZANINI, 2009). The perception of obese and depressed individuals was evaluated by Moraes & Cols (2013), who found that an inadequate eating habit was associated with a lack of control, and the cause of this habit would be emotional suffering, that is, they eat in the form of compensation. Thus, we cannot only consider that the individual feeds only for biological or physiological reasons, but also for social and emotional reasons (ALVARENGA; SCAGLIUSI; PHILIPPI, 2011).

Given the above, it is necessary to know the food choices and emotional perception of the obese population with indication for surgical treatment, enabling thus carrying out more assertive guidelines and a preventive approach to this chronic disease.

## THEORETICAL REFERENCE

### MORBID OBESITY

Obesity is a disease that emerges as one of the main global public health problems of this

century (HARPER; ZISMAN, 2016). This is mainly due to the association with the increase in comorbidities: type 2 diabetes mellitus, cardiovascular diseases, hypertension, obstructive sleep apnea, neoplasms and musculoskeletal diseases (FLEGAL; et al., 2007), among others. Furthermore, its causes are complex and involve biological, neuroendocrine and environmental mechanisms (BERTHOUD, 2007; ABESO, 2009).

Morbid obesity or grade III (BMI  $\geq 40$  kg/m<sup>2</sup>) is directly related to high levels of mortality resulting from associated complications (SANTOS LMP; et al., 2008). The severity of this degree is mainly related to three aspects: high prevalence of disorders in eating behavior, resistance to clinical treatments (insufficient or unsustainable weight loss) and frequent association with interrelated diseases, which are caused or aggravated by obesity and which improve with weight reduction and control (SANTO MA; CECCONELLO I; 2008).

As for the epidemiology of severe obesity, Santos et al. who carried out analysis of a database derived from information made available by the Brazilian Institute of Geography and Statistics (IBGE), reported that between 1974 and 2003 there was a 255% increase in the prevalence of morbid obesity throughout Brazil. In addition, according to the 1998 Latin American Obesity Consensus, the prevalence of morbid obesity is around 0.5-1% of the adult population, but these data are still not well defined. In the US, the estimated rate is 4.7% of the population (FLEGAL; et al., 2002).

Faced with the impossibility of losing and maintaining weight with treatments in conventional clinical trials, bariatric and metabolic surgery is considered the most effective treatment for severe obesity. The most common technique is the Roux-en-Y gastric bypass, characterized by the creation

of a small chamber next to the lesser curvature and by the exclusion of the remainder of the stomach, duodenum and initial portion of the jejunum, with an average loss of excess weight of approximately 70% (SBCBM, 2016)

According to the Brazilian Society of Bariatric and Metabolic Surgery (SBCBM, 2016) there are four criteria that establish the surgical indication of severe obesity:

✓ **BMI:**  $\geq 40$ kg/m<sup>2</sup>, regardless of the presence of comorbidities. Between 35 and 40 kg/m<sup>2</sup> in the presence of comorbidities. Between 30 and 35 kg/m<sup>2</sup> in the presence of comorbidities, listed by the CFM, which must be classified as “severe” by a specialist physician.

✓ **Age:**  $\leq 16$  years, except in the case of genetic syndrome, when the indication is unanimous, the Bariatric Consensus recommends that, in this age group, the risks be assessed by 2 bariatric surgeons who are members of the SBCBM and by the multidisciplinary team. The operation must be consented by the family or legal guardian and they must accompany the patient during the recovery period. Between 16 and 18 years old: whenever there is an indication and consensus between the family or the person responsible for the patient and the multidisciplinary team. Between 18 and 65 years old: no age restrictions. Age 65 years or older: individual assessment by the multidisciplinary team, considering surgical risk, presence of comorbidities, life expectancy and benefits of weight loss.

✓ **Associated diseases:** diabetes, sleep apnoea, high blood pressure, dyslipidemia, cardiovascular diseases including coronary artery disease, myocardial infarction, angina, congestive heart failure, stroke, hypertension and atrial fibrillation, dilated cardiomyopathy, pulmonary corpuscles and obesity hyperventilation syndrome, asthma uncontrolled severe disease, herniated

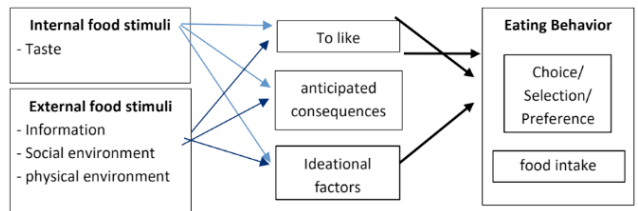
discs, osteoarthritis, gastroesophageal reflux with surgical indication, calculous cholecystopathy, acute recurrent pancreatitis, stress urinary incontinence in women, male and female infertility, erectile dysfunction, polycystic ovary syndrome, varicose veins and hemorrhoidal disease, hypertension idiopathic intracranial intracranial (pseudotumor cerebri), social stigmatization and depression.

✓ **sick time:** having a stable BMI for at least 2 years and comorbidities in the risk range, previous conventional treatments, failure or weight relapse. These were verified through data obtained from the patient's clinical history.

It must be noted that in addition to performing the surgical treatment, the adoption of healthy eating and behavioral habits are essential to prevent the recurrence of the disease (Wannmacher, 2016).

### EATING AND LIVING BEHAVIOR OF THE OBESE PEOPLE

Eating behavior can be defined as attitudes related to eating habits and sociocultural attributes, which are characterized both individually and collectively, relating to food itself and the act of eating (TORAL; SLATER; SILVA, 2007). In the Hypothetical Model of Eating Behavior proposed by Eertmans, Baeyens and Van Den Bergh (2001), factors that are associated throughout the individual's personal history result in eating behavior. The moment food intake takes place, it leads to a process that involves different natures, such as biological, psychological, social, economic, cultural, physiological, etc. The focus of this model is the learning mechanisms, flavor concepts, food preferences, the sensory aspects of food, which influence each other and which, perhaps, because they become automatic and routine, do not easily demonstrate complexity (ALMEIDA; et al., 2013).



Flowchart 1: Hypothetical Model of Eating Behavior.

Source: Eertmans, Baeyens and Van Den Bergh (2001)

Besides these, there are other variables that influence eating behavior, such as education and socioeconomic factors such as family size, which impact eating behavior, especially in relation to healthy choices. As for income, generally those with lower income tend to be less flexible in their decision to buy food (OLIVEIRA et al., 2010). The high cost of healthy foods and the low cost of junk foods and fast foods are, in general, considered determinants of food choice, which may partly explain the increased prevalence of obesity in low-income families (BOUMTJE et al., 2005). When considering families that have low resources to purchase more expensive food and need current forms of food distribution, such as food aid, price becomes paramount when choosing food. On the other hand, it does not mean that economic rationality is always dominant in food consumption choices (DEFANTE et al., 2015).

With regard to education, the Vigitel survey (2017) showed that people with less education, 0 to 8 years of study, register an index of 59.7% of overweight and 23.3% of obesity, progressively decreasing as the years of study. However, about half of the Brazilian population who studied for 12 years or more is overweight (BMI > 25Kg/m<sup>2</sup>) (BRASIL, 2015).

As Hill (2006) described in a review article "Today weight gain is seen as an inevitable consequence of aspiring to the good life".

For centuries the changing environment has led us to a sedentary lifestyle, which encourages overeating. Thus, the impact on energy balance appears to be unidirectional, promoting a much more significant positive energy balance.

In general, the environment has become obese due to the increase in the food supply, the amount of high energy density foods and the decrease in the stimulus to physical activity (HILL, 2006). Faced with these various environmental changes, most people are no longer able to fight their influences physiologically, thus experiencing weight gain. It is a fact that not performing physical exercises and consuming a diet rich in sugars and fats contribute to the development of obesity, however it must be noted that it is related not only to the amount of intake, but the quality and composition of food (TRICHESA ; GIUGLIANI, 2005 (AGUIAR; MANINI, 2013) Even, associated with existing technological advances, new professions and the way communities are built contribute to sedentary life. There is a discouragement of walking, running, and other forms of exercise (HILL, 2006).

## EMOTIONAL ASPECTS OF THE OBESE

It is known that ways of coping with emotional problems are linked to inappropriate eating behaviors (TOMAZ; ZANINI, 2009). Insecure individuals, with emotional, nervous, irritable problems, or with difficulty in dealing with stressful situations, sometimes emotionally unload their feelings in food, with the aim of reducing their anxiety, promoting eating disorders and/or obesity (LUZ; OLIVEIRA, 2013). Emotional aspects described by Moraes & cols (2013) when evaluating the perception of obese depressed people found that inadequate eating habit was associated with a lack of control, and the cause

of this would be emotional suffering, that is, they ate as a form of compensation. Thus, we cannot only consider that the individual feeds only for biological or physiological reasons, but also for social and emotional reasons. Under a holistic view of healthy and sustainable eating, aspects related to ways of living together, the reasons that lead to eating, preferences and aversions, thoughts and feelings related to food must be evaluated (ALVARENGA; SCAGLIUSI; PHILIPPI, 2011).

It is noted, therefore, that the treatment of obesity largely depends on behavioral changes, even when treatment is bariatric and metabolic surgery. Inadequate preoperative eating behavior may increase the risk of postoperative failure (RÍOS BP; LOBERA IJ; 2010).

## METHOD

This study is cross-sectional, descriptive and comparative, carried out in the Primary Health Care Units in three municipalities (Água Doce, Jaborá and Joaçaba) and at the Multiprofessional University Ambulatory - AMU (Joaçaba), both in the Midwest Region of Santa Catarina, From February 2017 to May 2018, the sample consisted of 99 participants (Figure 1):

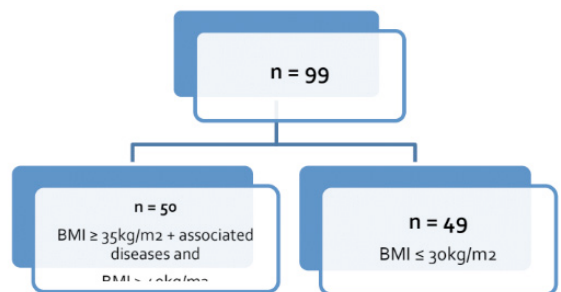


Figure 1 – Study participants.

The study inclusion criteria were: non-obese individuals, with  $BMI \leq 30 \text{ kg/m}^2$  and obese individuals, with indication for surgical treatment, being: age  $\geq 16$  years, with  $BMI \geq 35 \text{ kg/m}^2$  and affected

by life-threatening comorbidities such as: diabetes, sleep apnea, high blood pressure, dyslipidemia, cardiovascular diseases including coronary artery disease, myocardial infarction (MI), angina, congestive heart failure (CHF), stroke, hypertension and atrial fibrillation, dilated cardiomyopathy, lung color and hypoventilation syndrome, severe uncontrolled asthma, osteoarthritis, herniated discs, reflux gastroesophageal disease with surgical indication, calculous cholecystopathy, recurrent acute pancreatitis, hepatic steatosis, stress urinary incontinence in women, male and female infertility, erectile dysfunction, polycystic ovary syndrome, varicose veins and hemorrhoidal disease, idiopathic intracranial hypertension, social stigmatization and depression (CFM RESOLUTION No. 2.131/2015), and exclusion: children and adolescents. This study is part of the research project entitled “Eating behavior:

The study data consisted of:

✓ **sociodemographic and clinical:** obtained through a semi-structured form, including housing, health, economic, family, schooling and benefits such as: social and technological (Annex 2)

✓ **anthropometric:** the direct methods of nutritional assessment were used, as follows:

a) abdominal circumference: a two-meter inelastic measuring tape, with the individual standing, circling the midpoint between the last rib and the iliac crest, at the time of expiration, classified according to the very high risk of developing metabolic diseases, being men > 102 cm and women > 88 cm (CUPPARI, 2005).

c) neck circumference: the measurement is performed with a two-meter, inelastic tape measure, measuring the base of the neck, at the height of the cricothyroid cartilage. In men with a prominence,

CP is measured below the prominence. As for the risk classification of neck circumference (NC), men who have NC  $\geq 39.5$  cm and  $\geq 36.5$  cm for women is equivalent to a BMI  $\geq 30$  kg/m<sup>2</sup> (BENNOUN; SOHAR; LAOR, 2001).

✓ **food choices:** evaluated through the Food Choice Questionnaire (FCQ). This questionnaire assesses the importance given by individuals to nine factors related to food choices: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity and ethical concern. Steptoe, Pollard and Wardle (1995) developed it in London, for an adult population and it was translated by Heitor et al (2015).

✓ **body image:** it was performed using the Silhouette Scale (STUNKARD; SØRENSEN; SCHULSINGER, 1983). This estimates the nutritional status of adults, and presents a definite series of nine figures for each gender, ranging from the thinnest figure to the fattest, drawn by a professional artist, where the individual must choose the one that represents their current, ideal or desired body (MORAES; DOS ANJOS; MARINHO, 2012).

✓ **emotional perception:** the IAPS - International Affective Picture System (LANG; BRADLEY; CUTHBERT, 1997) was used. The International Affective Picture System (IAPS) is an affective image tool that addresses different life events and values present in the general culture of many countries. There were 15 images for the individuals, for each image, the participants responded about the intensity of their emotions using a Likert scale with intensities ranging from 1 (no sensation) to 7 (extreme sensation). Associated were used scales of “Self-assessment Manikins” by Bradley and Lang (1994) and Lang et al., (2005). Because it is an efficient

instrument in the inference of different emotional states and allows a great level of control of exposure and measurement parameters in experimental contexts, IAPS has been widely used in research in the areas of cognition, behavior, affect, psychophysiology, social attitudes, among others, both to study patients with neuropsychiatric disorders and healthy populations (LASAITIS et al., 2008). (Annex 3).

Data analysis was the t-student test was performed to compare means and in the comparison of proportions, Pearson's chi-square tests together with the analysis of adjusted residues or Fisher's exact test. The significance level adopted was 5% ( $p < 0.05$ ) and the analyzes were performed using SPSS version 21.0.

## RESULTS

Fifty obese patients with indication for bariatric and metabolic surgery were evaluated. ( $BMI > 35 \text{ Kg/m}^2$  and/or  $BMI \geq 40 \text{ Kg/m}^2$ ) and 49 non-obese individuals ( $BMI < 30 \text{ Kg/m}^2$ ). The obese had low education, income and 45.8% received social benefits, according to the data presented in Table 1. As for associated diseases, the obese had a higher prevalence of arterial hypertension, 68% compared to 4.1% of individuals not obese; 28% type 2 diabetes mellitus, 24% dyslipidemia, 32% osteoarthropathies, 12% osteoporosis, and 8% digestive diseases, among others.

The mean BMI ( $\text{kg/t}^{\text{wo}}$ ) was  $32.7 \pm 8.8$ , the obese with  $40.4 \pm 5.1$  and the non-obese with  $24.9 \pm 3.2$  ( $p < 0.001$ ). Waist circumference, in centimeters, averaged  $100.7 \pm 21.5$ , obese with  $118.4 \pm 13.5$  and non-obese with  $82.8 \pm 10.4$  ( $p < 0.001$ ). Neck circumference had an average of  $38.0 \pm 5.5$ , obese with  $41.7 \pm 5.1$  and non-obese with  $34.2 \pm 2.6$  ( $p < 0.001$ ).

Regarding the use of medication, 66% of the obese use antihypertensive drugs compared to

4.1% of the non-obese ( $p < 0.001$ ). In addition to 28% using oral hypoglycemic agents, 18% using anti-dyslipidemics, only about 4% using insulin, 12% using thyroid hormone and 22% using omeprazole.

The reasons that led obese people to choose foods related to the Health Factor (Figure 2), 48% considered vitamins not important ( $p > 0.006$ ); 1/3 considered health unimportant compared to non-obese individuals ( $p > 0.017$ ) and 64% reported aesthetics as unimportant ( $p > 0.04$ ).

The mood factor (Figure 3) was considered more important by the obese than by the non-obese. The issue of stress relief, as a help to deal with life, relax, stay awake, happy/excited and feel good; 54% considered it very important to eat to feel good ( $p > 0.009$ ), more than double in relation to non-obese individuals, likewise, the ratio of eating to feeling excited ( $p > 0.03$ ) in compared to non-obese.

Regarding the convenience factor, there was no significant difference between obese and non-obese individuals. (Figure 4). From the sensorial appeal factor, the obese considered the pleasant texture significantly more important - 66% considered it very important ( $p > 0.01$ ) (Figure 5).

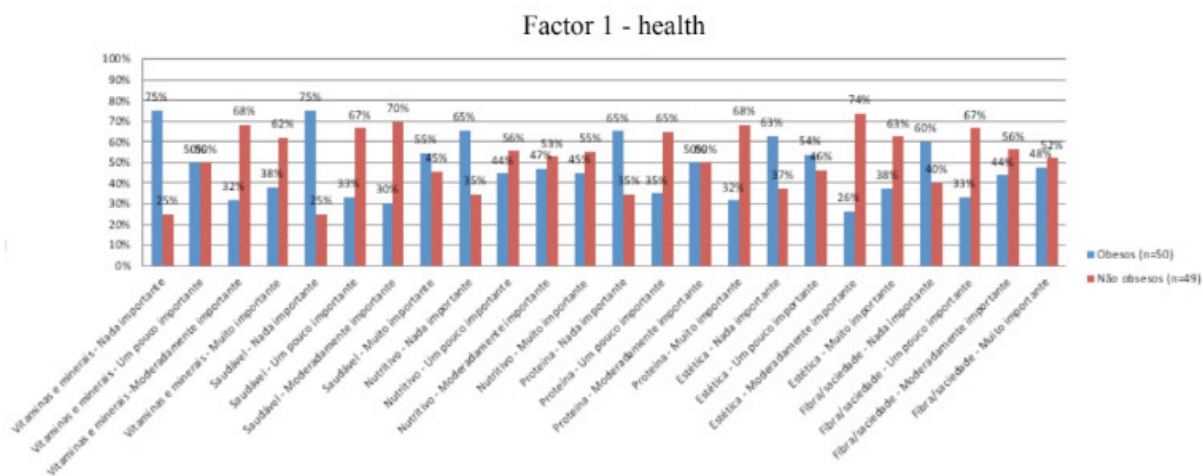
Regarding the natural content factor (Figure 6), the obese considered all factors significantly less important; 32% consider that it is not important that there are artificial ingredients compared to 10% of the obese ( $p > 0.013$ ).

Regarding the price factor (Figure 7), the obese considered it significantly more important that food is not expensive and that it is cheap - 70% consider it very important that it be cheap ( $p > 0.19$ ). Regarding the weight control factor (Figure 8), the obese consider the issue of few calories to be of little importance, with 38.8% compared to 18.4% of the non-obese ( $p > 0.006$ ). Regarding the familiarity factor (Figure 9), the obese

Characteristics	Obese (n= 50) BMI≥ 35kg/m2	Non-obese (n=49) BMI < 30kg/m2	P
<b>Age years)</b>	47.4 ± 12.1	40.3 ± 12.0	<b>0.005</b>
<b>Sex**</b>			0.318
Feminine	43 (86.0)	46 (93.9)	
Masculine	7 (14.0)	3 (6.1)	
<b>marital status</b>			0.101
Single	6 (12.8)	17 (35.4)	
Married	31 (66.0)	23 (47.9)	
Divorced	5 (10.6)	4 (8.3)	
Widower	3 (6.4)	1 (2.1)	
Others	2 (4.3)	3 (6.3)	
<b>Education</b>			<0.001
incomplete fundamental	13 (26.5)*	3 (6.1)	
Complete Elementary	12 (24.5)*	4 (8.2)	
Complete high school	11 (22.4)	11 (22.4)	
Incomplete high school	4 (8.2)	2 (4.1)	
complete higher education	1 (2.0)	15 (30.6)*	
incomplete higher education	3 (6.1)	5 (10.2)	
I didn't attend school	4 (8.2)*	0 (0.0)	
Postgraduate	1 (2.0)	9 (18.4)*	
<b>Family income</b>			<0.001
no income	1 (2.0)	1 (2.0)	
Up to 1 minimum wage	5 (10.0)	1 (2.0)	
From 1 to 3 minimum wages	29 (58.0)*	12 (24.5)	
From 3 to 6 minimum wages	13 (26.0)	15 (30.6)	
From 6 to 9 minimum wages	1 (2.0)	6 (12.2)*	
From 9 to 12 minimum wages	1 (2.0)	1 (2.0)	
From 12 to 15 minimum wages	0 (0.0)	3 (6.1)	
More than 15 minimum wages	0 (0.0)	10 (20.4)*	
<b>social benefit</b>	22 (45.8)	0 (0.0)	<0.001

Source: the authors

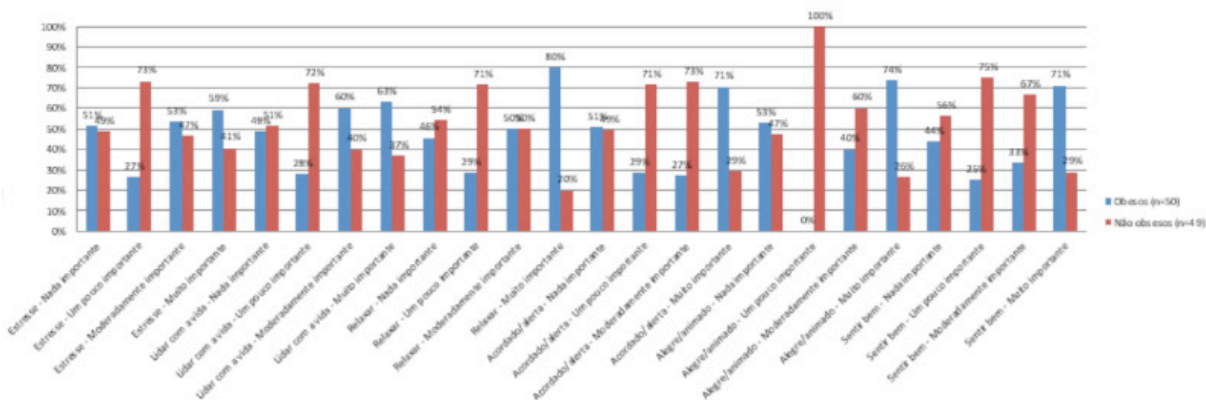
\* statistically significant association by the test of residuals adjusted to 5% of significance **Table 1**. Sociodemographic and economic characteristics of obese individuals with indication for surgical treatment and non-obese individuals. 2018.



**Figure 2.** Health Factor - Reason for dietary choices of obese individuals with indication for surgical treatment and non-obese individuals, evaluated through the *Food Choice Questionnaire*(FCQ)

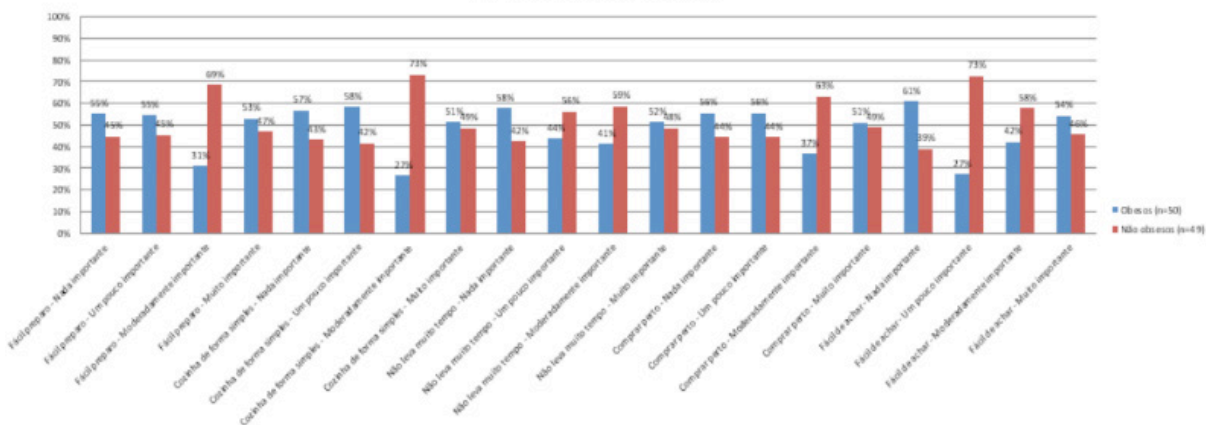


### Factor 2 - Mood



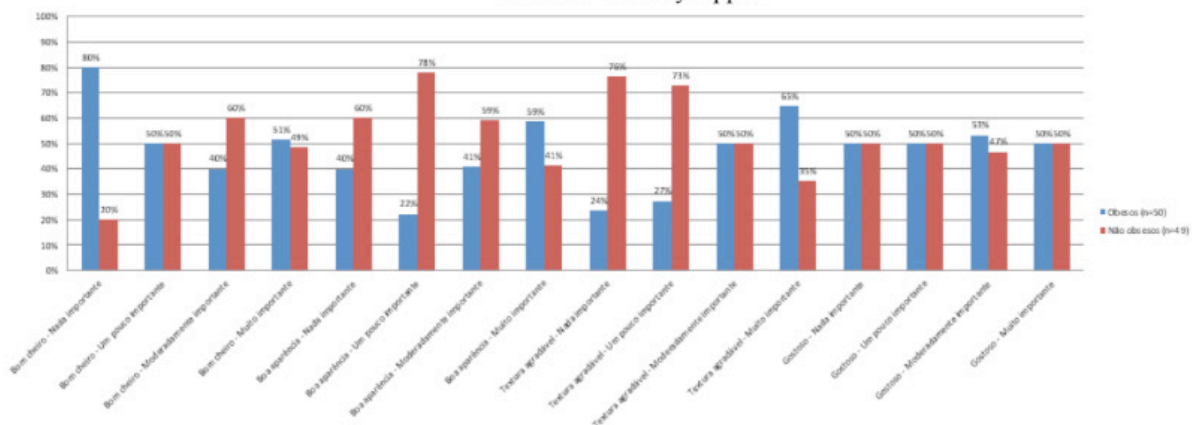
**Figure 3.** Mood Factor - Reason for food choices of obese individuals with indication for surgical treatment and non-obese individuals, evaluated through the *Food Choice Questionnaire*(FCQ)

### Factor 3 - Convenience



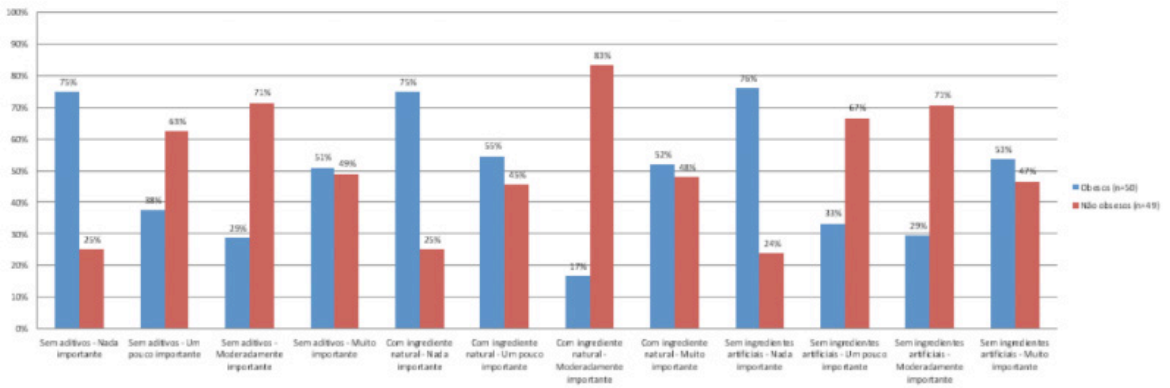
**Figure 4.** Convenience Factor - Reason for food choices of obese individuals with indication for surgical treatment and non-obese individuals, evaluated using the Food Choice Questionnaire (FCQ).

### Factor 4 - Sensory Appeal



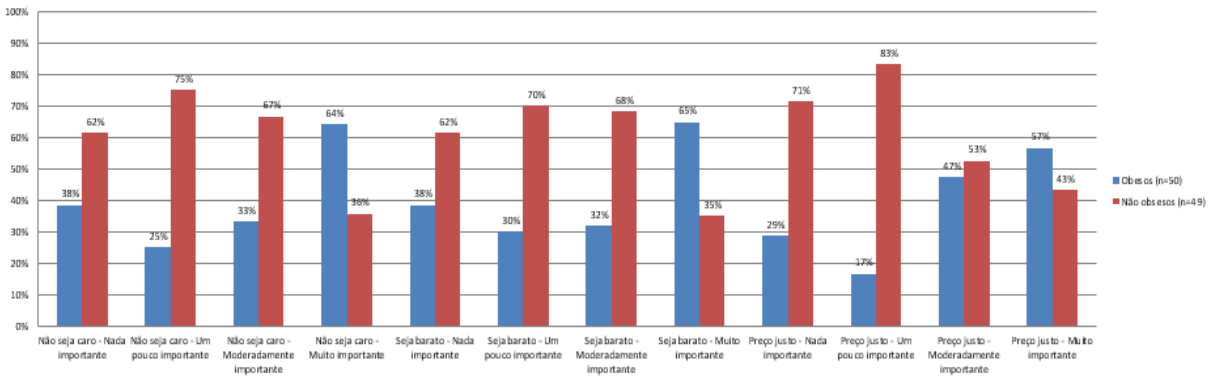
**Figure 5.** Sensory Appeal Factor - Reason for food choices of obese individuals with indication for surgical treatment and non-obese individuals, evaluated through the Food Choice Questionnaire (FCQ).

### Factor 5 - natural content



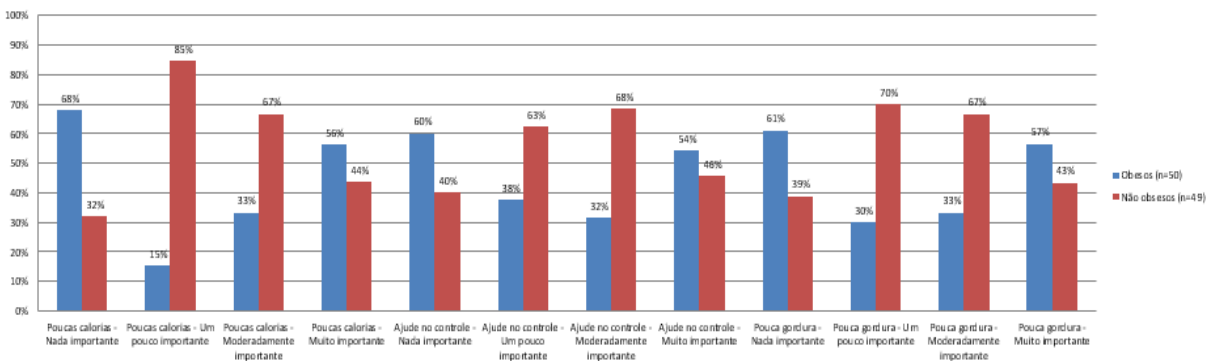
**Figure 6.** Natural Content Factor - Reason for food choices of obese individuals with indication for surgical treatment and non-obese individuals, evaluated through the *Food Choice Questionnaire* (FCQ).

### FATOR 6 - PREÇO



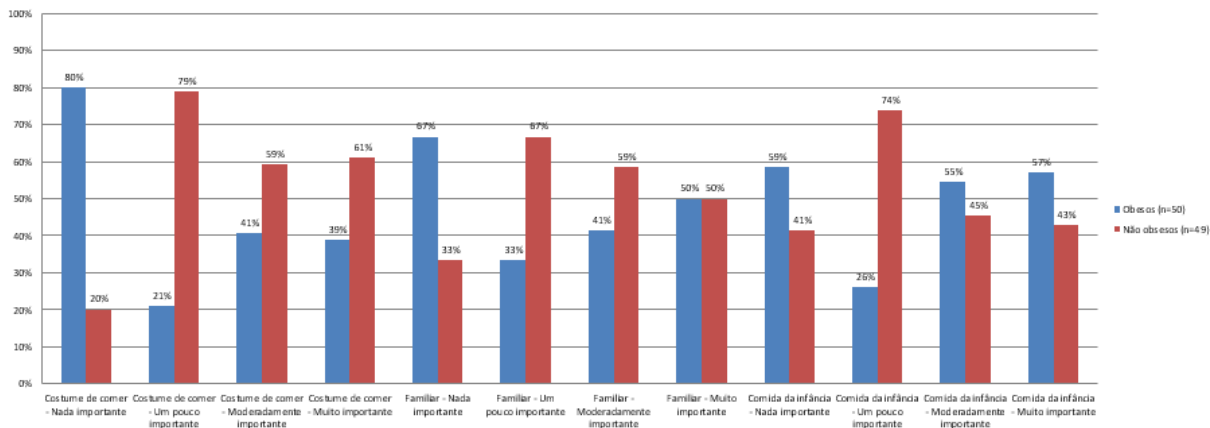
**Graph 7.** Price Factor - Reason for food choices of obese individuals with indication for surgical treatment and non-obese individuals, evaluated through the *Food Choice Questionnaire* (FCQ)

### FATOR 7 - CONTROLE DE PESO



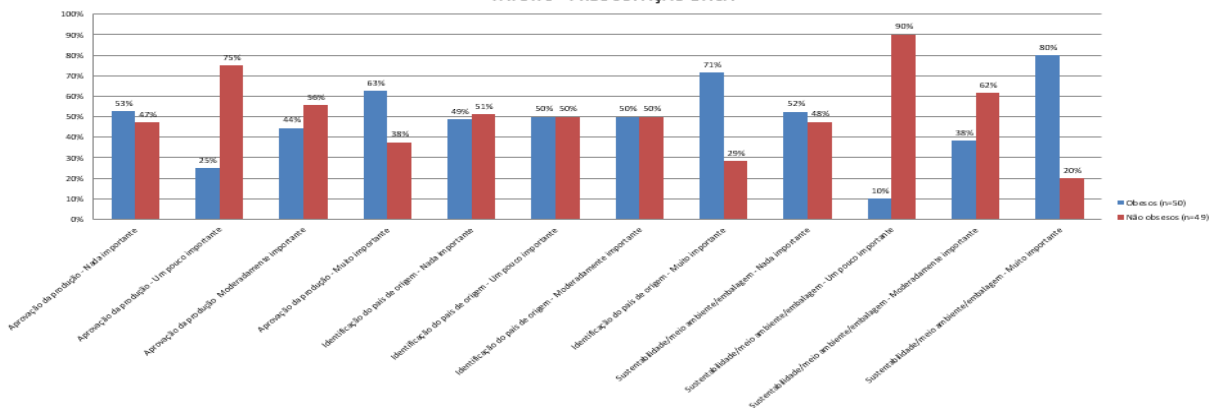
**Graph 8.** Weight Control Factor - Reason for dietary choices of obese individuals with indication for surgical treatment and non-obese individuals, evaluated through the *Food Choice Questionnaire* (FCQ).

### FATOR 8 - FAMILIARIDADE



**Graph 9.** Familiarity Factor - Reason for food choices of obese individuals with indication for surgical treatment and non-obese individuals, evaluated through the *Food Choice Questionnaire* (FCQ)

### FATOR 9 - PREOCUPAÇÃO ÉTICA



**Figure 10.** Familiarity Factor - Reason for food choices of obese individuals with indication for surgical treatment and non-obese individuals, evaluated through the *Food Choice Questionnaire* (FCQ).

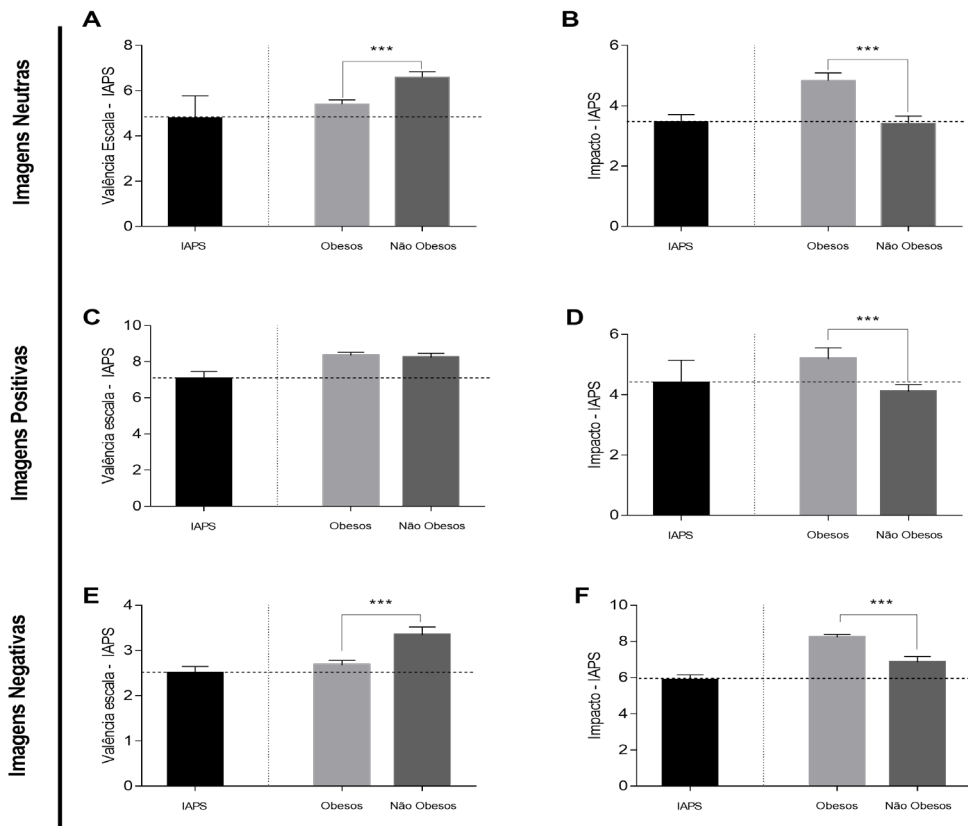
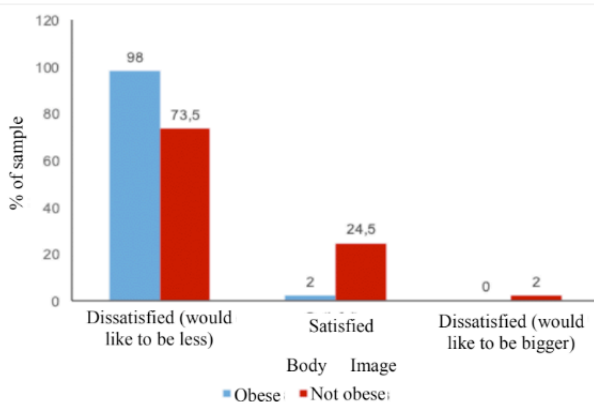


Figure 12. Comparison of IAPS between obese patients with indication for surgical treatment and non-obese patients

considered the habit of eating less important - 56% not at all important ( $p < 0.01$ ).

Regarding ethical concerns (Figure 10), the obese considered the issue of sustainability/environment/packaging more important than the non-obese, with 24% of the obese believing it to be very important and only 6.1% of the non-obese ( $p > 0.06$ ).

Family income was associated with the choice for health reasons in the non-obese group, that is, the higher the family income, the more important the subject considers the choice for these health reasons. But in the morbidly obese group, the association with family income was not statistically significant. Furthermore, there was no statistically significant association between body image distortion and food choice for weight control, both in morbidly obese and non-obese individuals ( $p > 0.10$ ). The perception of body image shows that, although obese people are significantly more dissatisfied with their body image ( $p = 0.002$ ), wanting to have a smaller silhouette, 73.5% of non-obese people would also like to have a smaller silhouette, as shown in the figure. **Figure 11**



**Figure 11.** Body image perception of obese and non-obese people according to Stunkard silhouettes according to obesity. The results obtained from emotional perception through the IAPS demonstrate that the obese valued the neutral images in the same way as the

control group, however, the impact ratio was significantly higher in the obese group than in the non-obese group. Likewise, in relation to valence, the position of the obese was in line with the IAPS data and the non-obese group, however, the manifested impact was much greater in relation to the same groups. In addition, with regard to the IAPS, in the graph in figure 12A, it can be seen that the obese evaluated the neutral images correctly and the impact it brought to them, shown in figure 12B, was considerably greater in relation to the impact generated by the non-obese. In the same way, the negative and positive images, visible in figure 12E and 12C respectively, are in accordance with the IAPS, whereas the impact, visible in figure 12F and 12D, was much greater in the group of individuals with morbid obesity. As shown in Figure 12.

## DISCUSSION

The present study showed important differences between obese and non-obese individuals. It was noticed that, obese people have lower income and education, which will directly impact food choices. Low financial acquisition makes them prefer cheaper foods. They claim that they don't care about the number of calories, eating food according to their emotions, and despite that, they are not happy with their body image. The IAPS analysis showed that the obese group had a greater emotional impact when compared to the non-obese group. Oliveira & Cols (2010), in research carried out with obese and non-obese individuals, had shown that socioeconomic variables such as income and education impact eating behavior, especially in relation to healthy choices, data that corroborate our study.

Numerous factors impact the food choice of the population. In this research comparing obese and non-obese individuals, it was found that individuals in the first group consider the

emotional factor more important than non-obese individuals, giving more importance to issues such as relaxing, feeling good, happy or excited. Among the obese population evaluated, 54% consider it very important to eat to feel good, corroborating data from the literature, which describe emotional problems, difficulty dealing with stressful situations, irritability, depression that impact eating behavior, leading to inadequate food choices (TOMAZ; ZANINI, 2009; LUZ; OLIVEIRA, 2013). The obese participants in our study considered the price factor significantly more important than food is not expensive and that it is cheap - 70% consider it very important that it be cheap, in line with the study by Boumtje & Cols (2005). Other researchers such as Defante & Cols (2015) state that in families that have low resources to purchase more expensive foods, price becomes paramount in the choice of foods. In the Hypothetical Model of Eating Behavior, proposed by Eertmans, Baeyens and Van Den Bergh (2001), it is verified that factors that are associated throughout the individual's history, result in eating behavior. The focus of this model is learning mechanisms, flavor concepts, food preferences, among others. On the contrary, in this study, regarding the familiarity factor, the obese consider the habit of eating less important - 56% consider it not important at all.

In view of the results of the self-assessment of body image, it was found that although obese individuals were significantly more dissatisfied with their body image ( $p=0.002$ ), wanting to have a smaller silhouette, 73.5% of non-obese individuals would also like to have a smaller silhouette. In a survey carried out by Kakeshita, published in the magazine: ``Saúde Pública`` (2006; 40:497-504), the authors reached similar results demonstrating that both obese and non-obese individuals were dissatisfied with their self-image, desiring

slimmer bodies.

In the article entitled Decreased Emotional Perception in Obesity, Giel & Cols. (2016), who used the IAPS, in which they describe two similar studies with obese people, it was found that the valence in relation to the images was reduced, contrary to the present study, in which the obese valued neutral, positive and negative images. negative in the same way as the data described in the IAPS and the data obtained from non-obese patients. Thus, demonstrating that the way in which they discern good and bad situations is the same as non-obese people, but the relationship to impact was discrepant. The limitations of our study are inherent to the characteristics of a cross-sectional, comparative study, in addition to describing a local reality.

## CONCLUSIONS

In view of the results, it is concluded that the obese, with indication for surgical treatment, value food not thinking about nourishing themselves, or keeping themselves aesthetically beautiful and healthy, but rather, they value food that makes them feel good, cheerful and relaxed, unlike the non-obese, who mostly believe that healthy eating is very important, that vitamins and minerals must be part of meals, without worrying about eating to reduce stress, relax or get a state of joy. In addition to prioritizing foods that are not expensive.

The perception of body image of obese and non-obese people was similar, both expressed dissatisfaction, they would like to have a smaller silhouette. The obese showed to be more emotionally impacted, although they do not value, positively or negatively, the images as the non-obese group. Therefore, their emotional perception in relation to different situations in life, whether good or bad, are interpreted in an exacerbated way in relation to non-obese people, the ability to discern

positive and negative situations are consistent with both groups, but the consequences that these interpretations bring to daily activities and have major repercussions for their health, as they become more impulsive and shortsighted.

This way, it is important that individuals

with indication for bariatric and metabolic surgery undergo multidisciplinary follow-up, which values their emotional changes, demonstrated in this study. Persistently acting on the impact that experiences cause on each obese individual.

## REFERENCES:

ABESO. **Associação Brasileira para o Estudo da Obesidade e da Síndrome Metabólica** [online], 2016. Disponível em: <<http://www.abeso.org.br/atitude-saudavel/mapa-obesidade>>. Acesso em: 09 mar. 2018. AGUIAR, R. S.; MANINI, R. A fisiologia da obesidade: bases genéticas, ambientais e sua relação com o diabetes. **ComCiência**, n.145, 2013.

ALMEIDA, S. S; et al. **Psicobiologia do Comportamento Alimentar**. Rio de Janeiro: Rubio. 2013.

ALVARENGA, M. S.; SCAGLIUSI, F. B. PHILIPPI, S. T. **Nutrição e transtornos alimentares: avaliação e tratamento**. Editora: Manole, 2011.

APA, Associação psiquiátrica Americana. **Manual diagnóstico e estatístico de transtornos mentais**. Porto Alegre: Artes Médicas, 1994.

ARAÚJO, B. C. **Aspectos psicológicos da alimentação**. Manole, 2004.

BEN-NOUN, L.; SOHAR, E.; LAOR, A. **Neck circumference as a simple screening measure for identifying overweight and obese patients**. *Obesity research*, v. 9, n. 8, p. 470–7, ago. 2001.

BERTHOUD, H.-R. Interactions between the “cognitive” and “metabolic” brain in the control of food intake. **Physiology & Behavior**, v. 91, n. 5, p. 486–498, 2007.

BISHWAJIT, G.; BISHWAJIT, G. **Nutrition transition in South Asia: the emergence of non-communicable chronic diseases**. *F1000Research*, v. 4, 24 nov. 2015.

BLASS, E. M., et al. **On the road to obesity: television viewing increases intake of high-density foods**. *Physol. Behav.*, v.88, n.4, p. 597-604, 2006.

BAGGIO, L. L. **Oxyntomodulin and glucagon-like peptide-1 differentially regulate murine food intake and energy expenditure**. *Gastroenterology*, v.127, n.2, p.546– 558, 2004.

BARSH, G. S.; FAROOQI, I. S.; O’RAHILLY, S. **Genetics of body-weight regulation**. *Nature*, v.404, p.644-651, 2000.

BOUCHARD, C. et al. **The genetics of human obesity**. New York: Marcel Dekker; p.157-85, 1998.

BOUMTJE, P. I. et al. **Dietary habits, demographics, and the development of overweight and obesity among children in the United States**. *Food policy*, v.30, p. 115-128.

BRASIL. **Ministério da Saúde**. Guia alimentar. Como ter uma alimentação saudável. Disponível em:< <http://www.saude.gov.br/nutricao>>. Acesso em: 02 mar. 2018.

BRASIL. **Ministério da Saúde** [online], 2016. Disponível em: <<http://portalsaude.saude.gov.br/index.php/cidadao/principal/agencia-saude/24993-brasil-alerta-sobre-consequencias-da-ma-nutricao-e-obesidade-infantil>>. Acesso em: 04 abr. 2018.

BRASIL. Ministério da Saúde. Coordenação-Geral da Política de Alimentação e Nutrição, Secretaria de Atenção à Saúde. **Guia alimentar para a população brasileira**. 2a ed. Brasília; 2014.

BRUBAKER, P. L. **The glucagon-like peptides: pleiotropic regulators of nutrient homeostasis.** Annals of the New York Academy of Sciences, v.1070, p.10–26, 2006.

CANI, P. D. et al. **Metabolic endotoxemia initiates obesity and insulin resistance.** Diabetes, v.56, p.1761-72, 2007.

CEDERNAES, J.; BASS, J. **Decoding obesity in the brainstem.** eLife, v. 5, 2016.

CFM - **Conselho Federal de Medicina.** Disponível em: <[http://www.portalmedico.org.br/resolucoes/CFM/2015/2131\\_2015.pdf](http://www.portalmedico.org.br/resolucoes/CFM/2015/2131_2015.pdf)>. Acesso em: 1 maio 2018.

CHAGNON, Y.; PÉRUSSE, L.; BOUCHARD, C. **Familial aggregation of obesity, candidate genes and quantitative trait loci.** Curr Opin Lipid, v.8, p.205-211, 1997.

CUPPARI, L. **Nutrição clínica no adulto.** Editora Manole, 2005.

DAVIS, C. et al. **Evidence that ‘food addiction’ is a valid phenotype of obesity.** Appetite, v.57, p.711–717, 2011. Disponível em: <<http://portalsaude.saude.gov.br/index.php/cidadao/principal/agencia-saude/17445->>>. Acesso em: 24 abr. 2018.

DAKIN, C. L. **Peripheral oxyntomodulin reduces food intake and body weight gain in rats.** Endocrinology, v.145, n.6, p.2687–2695, 2004.

DAMIANI, D.; CARVALHO, D. P.; OLIVEIRA, R. G. **Obesidade na infância – um grande desafio.** Pediatria Moderna, v.36, n.8, p.489–523, 2000.

DEFANTE, L. R. et al. **Comportamento de consumo de alimentos de famílias de baixa renda de pequenas cidades brasileiras: o caso de Mato Grosso do Sul.** Interações (Campo Grande), v. 16, n. 2, p. 265–276, dez. 2015.

EERTMANS, A.; BAEYENS F.; VAN DEN BERGH, O. **Food likes and their relative importance in human eating behaviour: review and preliminary suggestions for health promotion.** Health Educ. Res. v.64, p.443-456, 2001.

ELOBEID, M. A.; ALLISON, D. B. **Putative environmental- endocrine disruptors and obesity: a review.** Curr Opin Endocrinol Diabetes Obes, v.15, p.403–408, 2008.

FANDIÑO, Julia et al. Bariatric surgery: clinical, surgical and psychiatric aspects. **Revista de psiquiatria do Rio Grande do Sul,** v. 26, n.1, p. 47-51. jan./abr. 2004.

FERRAZ EM. ARRUDA PCL. BACELAR TS. FERRAZ AAB. ALBUQUERQUE AC. LEÃO CS. Tratamento cirúrgico da obesidade mórbida. **Rev. Col. Bras. Cir.** 2003; 30:98-105

FIELD, B. C. T.; CHAUDHRI, O. B.; BLOOM, S. R. Obesity treatment: novel peripheral targets. **British Journal of Clinical Pharmacology,** v.68, n.6, p.830–843, 2009.

Flegal KM, Carroll MD, Ogden CL, Johnson CL. **Prevalence and trends in obesity among USA adults, 1999-2000.** JAMA 2002; 288:1723-7

FLEGAL, K.M.; et al. Cause specific excess deaths associated with underweight, overweight and obesity. **J. Am. Med. Assoc.,** p. 2028–2037, 2007.

FRANCISCHI, R.P.P. et al. Obesidade: atualização sobre sua etiologia, morbidade e tratamento. **Revista de Nutrição,** v.13, n.1, p.17-28, 2000.

GARCIA, R. W. D. Reflexos da globalização na cultura alimentar: considerações sobre as mudanças na alimentação urbana. **Revista de Nutrição:** Campinas, v.16, n.4, p. 483- 492, 2003.

GARRIDO JUNIOR, Arthur B. **Cirurgia da obesidade.** São Paulo: Atheneu, 2003.

GEARY N. **Endocrine controls of eating: CCK, leptin, and ghrelin.** Physiol Behav, v.81, n.5, p.719-733, 2004.



- GIORDANO, A. et al. MECHANISMS IN ENDOCRINOLOGY: White, brown and pink adipocytes: the extraordinary plasticity of the adipose organ. **European Journal of Endocrinology**, v. 170, n. 5, p. R159–R171, 10 abr. 2014.
- GREGOR, M. F.; HOTAMISLIGIL, G. S. Inflammatory Mechanisms in Obesity. **Ann. Rev. Immunol.**, v. 29, p. 415-445, 2010.
- HALPERN, B. **Combinations of Drugs in the Treatment of Obesity**. Pharmaceuticals, p. 2398-2415, 2010.
- HALPERN, Z. S. C.; RODRIGUES, M. D. B.; COSTA, R. F. Determinantes fisiológicos do controle de peso e apetite. **Revista de Psiquiatria Clínica**, v.31, n.4, p.150-153, 2004.
- HANLEY, J. G. et al. Overweight among children and adolescents in a Native Canadian community: prevalence e associated factors. **Am J Clin Nutr.**, v.71, p.693- 700, 2000.
- HARPER, J. W.; ZISMAN, T. L. Interaction of obesity and inflammatory bowel disease. **World journal of gastroenterology**, v. 22, n. 35, p. 7868–81, 21 set. 2016.
- HEBE BRAND, J. et al. “Eating addiction”, rather than “food addiction”, better captures addictive-like eating behavior. **Neuroscience & Biobehavioral Reviews**, v. 47, p. 295–306, 2014.
- HEISLER, L. K. et al. Serotonin activates the hypothalamic-pituitary-adrenal axis via serotonin 2C receptor stimulation. **The Journal of neuroscience: the official journal of the Society for Neuroscience**, v. 27, n. 26, p. 6956–64, 27 jun. 2007.
- HEITOR, S. F. D. et al. **Tradução e adaptação cultural do questionário sobre motivo das escolhas alimentares (Food Choice Questionnaire – FCQ) para a língua portuguesa**. *Ciência & Saúde Coletiva*, v.20, n.8, p.2339-2346, 2015.
- HILL JO. Understanding and addressing the epidemic of obesity: an energy balance perspective. **Endocr Rev** 2006; 27:750-61.
- JOMORI, M. M.; PROENCA, R. P. C.; CALVO, M. C. M. Determinantes de escolha alimentar. **Revista de Nutrição**, v.21, n.1, p.63-73, 2008.
- KAKESHITA IS, ALMEIDA SS. Relação entre índice de massa corporal e a percepção da autoimagem em universitários. **Rev Saúde Pública** 2006; 40:497-504.
- KLOK, M. D.; JAKOBSDOTTIR, S.; DRENT, M. L. The role of leptin and ghrelin in the regulation of food intake and body weight in humans: a review. **Obesity reviews: an official journal of the International Association for the Study of Obesity**, v. 8, n. 1, p. 21–34, jan. 2007.
- LANDEIRO, F.; QUARANTINI, L. Obesidade: Controle Neural e Hormonal do Comportamento Alimentar. **Revista de Ciências Médicas** p. 236–245, 2012.
- LANG, P. J.; BRADLEY, M. M.; CUTHBERT, B. N. **International Affective Picture System (IAPS): Technical Manual and Affective Ratings**. International Affective Picture System (IAPS), 1997.
- LASAITIS, C. et al. Atualização das normas brasileiras para o International Affective Picture System (IAPS). **Revista de Psiquiatria do Rio Grande do Sul**, v. 30, n. 3, p. 230–235, dez. 2008.
- LEIDY, H. J. et al. The role of protein in weight loss and maintenance. **The American journal of clinical nutrition**, v. 101, n. 6, p. 1320S–1329S, 29 abr. 2015.
- LEVY-COSTA, R. B., et al. Household food availability in Brazil: distribution and trends. **Revista Saúde Pública**, v.39, n.4, p.530-540, 2005.
- LUZ, F. Q. DA; OLIVEIRA, M. DA S. **Terapia cognitivo-comportamental da obesidade: uma revisão da literatura**. *Aletheia*, n. 40, p. 159–173, 2013.
- MADEIRA, I. et al. **Leptin as a predictor of metabolic syndrome in prepubertal children**. *Archives of Endocrinology and Metabolism*, n. ahead, p. 0–0, 2016.

MCCRORY M. A. et al. Dietary determinants of energy intake and weight regulation in healthy adults. **Jornal de Nutrição**, v.130, p. 276-279, 2000.

MORAES, A. L.; ALMEIDA, E. C.; SOUZA, L. B. Perceptions of depressed obese people about the factors associated with the maintenance of their obesity: an investigation in a Family Health Program in Rio de Janeiro city. **Physis: Revista de Saúde Coletiva**, v. 23, n. 2, p. 553-572, 2013.

MORAES, C.; DOS ANJOS, L. A.; MARINHO, S. M. S. DE A. Construção, adaptação e validação de escalas de silhuetas para autoavaliação do estado nutricional: Uma revisão sistemática da literatura. **Cadernos de Saude Publica**, v. 28, n. 1, p. 7-19, 2012.

MOREIRA, S. A. Alimentação e comensalidade: aspectos históricos e antropológicos. **Cienc Cult**, v.62, n.4, p.23-26, 2010.

MRAZ, M.; HALUZIK, M. The role of adipose tissue immune cells in obesity and low-grade inflammation. **Journal of Endocrinology**, v.222, n.3, p.113-127, 2014.

NINI, E et al. Evaluation of laparoscopic bariatric surgery using the BAROS score. **Ann. Chir**, France, p. 107-114, fev. 2002.

OLIVEIRA, L. D. DE S. DE et al. Public Policies for Food Security in Countries with Different Development Levels. **International Public Management Review**, v. 11, n. 3, p. 122-141, 2010.

OLIVEIRA, A. M. A. Sobrepeso e obesidade infantil: influência de fatores biológicos e ambientais em Feira de Santana, BA. **Arq Bras Endocrinol Metab**, v.47, n.2, p.144-150, 2003.

ORTIGOZA, S. A. Guarnieri. **Alimentação e saúde**: as novas relações espaço-tempo e suas implicações nos hábitos de consumo de alimentos. Raega - O Espaço Geográfico em Análise, v.15, jun. 2008.

ORTIZ R. **Mundialização e cultura**. 2.ed. São Paulo: Brasiliense, 1994.

PINKNEY, J. et al. Hypothalamic obesity in humans: what do we know and what can be done? **Obesity reviews**: an official journal of the International Association for the Study of Obesity, v. 3, n. 1, p. 27-34, fev. 2002.

**Primeiro Consenso Latino-Americano em Obesidade**. Rio de Janeiro, out. 1998.

POULAIN, J. P.; PROENÇA, R. P. C. Reflexões metodológicas para o estudo das práticas alimentares. **Revista de Nutrição**, v.16, n.4, p.365-386, 2003.

RIBEIRO, E. B. Studying the central control of food intake and obesity in rats. **Revista de Nutrição**, v. 22, n. 1, p. 163-171, fev. 2009.

RÍOS BP. LOBERA IJ. Sobrepeso y obesidad em los trastornos de La conducta alimentaria. **Rev. Española de Nutrición Comunitaria**. 2010; 16:83-9

RONSONI, R. M. et al. **Prevalência de obesidade e seus fatores associados na população de Tubarão-SC**. Arquivos Catarinenses de Medicina, v.34, n.52, 2005.

SANTOS LMP. OLIVEIRA IV. PETERS LR. CONDE WL. Trends in Morbid Obesity and in Bariatric Surgeries Covered by the Brazilian Public Health System. **Obesity Surgery**. 2010; 20:943-8. Publicação eletrônica - Jun/2008.

SANTO MA. CECCONELLO I. Obesidade mórbida: controle dos riscos. **Arq. Gastroenterol**. 2008;45.

SBCBN - **Sociedade Brasileira de Cirurgia Bariátrica e Metabólica**. 2015. Disponível em: <<https://www.sbcbm.org.br/pesquisa-revela-que-obesidade-atinge-mais-brasileiros-entre-56-e-65-anos/>>. Acesso em: 5 mar. 2018.

SEGAL, A. **Obesidade e co-morbidade psiquiátrica**: caracterização e eficácia terapêutica de atendimento multidisciplinar na evolução de 34 pacientes [Tese Doutorado]. São Paulo: Faculdade de Medicina da Universidade de São Paulo: 1999.

SEGAL, Adriano, FANDIÑO, Julia. Indicações e contra-indicações para realização das operações bariátricas. **Revista Brasileira de Psiquiatria**, p. 68-72, 2002.

SILVA, C. et al. Circunferência do pescoço como um novo indicador antropométrico para predição de resistência à insulina e componentes da síndrome metabólica em adolescentes: Brazilian Metabolic Syndrome Study. **Revista Paulista de Pediatria**; 32(2):221-9; 2014. Disponível em: <[http://www.scielo.br/pdf/rpp/v32n2/pt\\_0103-0582-rpp-32-02-00221.pdf](http://www.scielo.br/pdf/rpp/v32n2/pt_0103-0582-rpp-32-02-00221.pdf)>. Acesso em: 2 abr. 2018.

STEPAN, C. M. The hormone resistin links obesity to diabetes. **Nature**, v.409, n.6818), p.307–12, 2001.

STEPTOE, A.; POLLARD, T. M.; WARDLE, J. **Development of a measure of the motives underlying the selection of food: the Food Choice Questionnaire**. *Appetite*; v.25, n.3, p.267-284, 1995.

STUNKARD, A. J.; SØRENSEN, T.; SCHULSINGER, F. **Use of the Danish Adoption Register for the study of obesity and thinness**. *Research publications - Association for Research in Nervous and Mental Disease*, v. 60, p. 115–20, 1983.

TAYKIR VH; STONEHOCKER B, STEELE M, SHARMA AM. An overview of treatments for obesity in a population with mental illness. **Can J Psychiatry**. 2012; 57(1):13-20

TELCHMANN L. et al. Fatores de risco associados ao sobrepeso e à obesidade em mulheres de São Leopoldo, RS. **Revista Brasileira Epidemiologia** v.42, n.2, p. 60-69, 2006.

TORAL, N. SALATER, B. SILVA, M. V. Consumo alimentar e excesso de peso de adolescentes de Piracicaba. **Revista de Nutrição: São Paulo**, v.20, n.5, p.449-459, 2007.

TRICHESA, R. M.; GIUGLIANI, E. R. J. Obesidade, práticas alimentares e conhecimentos de nutrição em escolares. **Revista de Saúde Pública**, v.39, n.4, p.541-547, 2005.

TOMAZ, R.; ZANINI, D. S. Personalidade e coping em pacientes com transtornos alimentares e obesidade. **Psicologia: Reflexão e Crítica**, v. 22, n. 3, p. 447–454, 2009.

VASILIU, O. et al. PBB PCB, **body weight and the incidence of adult-onset diabetes mellitus**. *Epidemiology*. v,17, p.352–359, 2006.

VIJAY-KUMAR, M. et al. Metabolic syndrome and altered gut microbiota in mice lacking Toll-like receptor 5. **Science**, v.328, n.5975, p.228-231, 2010.

WAKI, H.; TONTONNOZ, P. **Endocrine functions of adipose tissue**. *Annual Review of Pathology*, v.2, p.31–56, 2007.

WILLETT, W. C. Dietary fat and obesity: an unconvincing relation. **Am. J. Clin. Nutr.**, v.68, n.6, p.1149-1150.