



GLOBAL JOURNAL OF MEDICAL RESEARCH: I  
SURGERIES AND CARDIOVASCULAR SYSTEM  
Volume 22 Issue 2 Version 1.0 Year 2022  
Type: Double Blind Peer Reviewed International Research Journal  
Publisher: Global Journals  
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

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*Keywords:* bariatric surgery, weight loss, morbid obesity, physical activity.

*GJMR-I Classification:* NLMC Code: WJ768



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# Determinant Factors and Possible Causes Associated with the Success or Failure of Loss of Excess Weight (%PEP) in Patients Submitted to Bariatric Surgery

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**Result:** 45 patients were divided into two groups (G1 > PEP n.31) and (G2 < PEP n.14). There was no statistical difference regarding age and surgical time. As for the surgical time and PEP > 50 aged 2 -3 years (66%), 4 years (81%) and 5 - 6 years (50%). In the food groups, G2 was found to be significant in the butter, white bread, soft drink and coffee with sugar. There was no difference in activity, however, in G1 who did not practice activity, 46% had 4 years of surgery and in G2 who practiced activity, 37.5% were 5 years old, which represents a relationship between surgical time and quality in the practice of the activity.

**Conclusion:** In order to guarantee long-term postoperative success, the monitoring of a multidisciplinary team is essential.

**Keywords:** bariatric surgery, weight loss, morbid obesity, physical activity.

## I. INTRODUCTION

The World Health Organization (WHO) considers obesity a global epidemic conditioned by the dietary profile and the practice of physical activity<sup>1</sup>. The etiology of obesity is complex and multifactorial, resulting from the interaction of genes, the modern environment is a powerful stimulus for the development of obesity, lifestyles and emotional factors<sup>1,2</sup>. Risk factors for the development of obesity can be divided into non-

modifiable and modifiable, among the latter are decreased physical activity and increased caloric intake that promote increased weight and fat concentration in the body.<sup>2</sup> Few clinical treatments for obesity are effective in losing and maintaining ideal weight.<sup>2</sup> According to studies carried out by the Brazilian Society of Bariatric and Metabolic Surgery (SBCBM), the indication of bariatric surgery is currently growing, being considered an effective method in the treatment of severe and its comorbidities and also in long-term weight control. In 1999, bariatric surgery was included among the procedures covered by the Unified Health System (SUS).<sup>3</sup> Gastric Bypass is the most practiced bariatric technique in Brazil, corresponding to 75% of surgeries performed, due to its safety and, mainly, its effectiveness.<sup>4</sup> The patient undergoing surgery loses 70% to 80% of the initial excess weight.<sup>4</sup> In this mixed procedure, part of the stomach is stapled, which reduces the space for food, and a deviation of the initial bowel, which promotes the increase of hormones that give satiety and reduce hunger.<sup>4</sup> The final proposal would be that the patient develops control in food consumption in quality and quantity in the long term, but the presence of inappropriate lifestyle behaviors such as little or no practice of physical activity and inadequate eating habits can reduce the effectiveness of the surgical procedure and represent the recovery of excess weight lost.<sup>5,6</sup> Literature shows that 15% of patients may have regained weight, returning to the obesity range or even severe obesity between five and ten years after bariatric surgery, and in some cases, increased consumption of food and liquid calories was observed. The mechanisms possibly involved in this process need to be better analyzed.<sup>4,7,8,9,10</sup> The multidisciplinary follow-up is essential for the maintenance of success in bariatric surgery by monitoring the behavior of physical activity and adequate food consumption.

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## II. OBJECTIVES

To know the reasons for the success or failure of overweight loss (%PEP) in patients undergoing bariatric surgery, and its relationship (or association) with the elapsed time of surgery, quality of food consumption and physical activity.

## III. METHOD

This research was authorized by the Research Ethics Committee (CEP) of the Santa Casa de Misericórdia Brotherhood of São Paulo under n. of CAAE 23694219.4.0000.5479. Patients were considered to be able to participate in the research after reading and signing the free and informed consent form. This is an observational cross-sectional study. Bariatric patients with surgical time between 2 and 7 years, older than 18 years, without comorbidities treated at the Bariatric Nutrition Specialty Outpatient Clinic of the Hospital da Irmandade da Santa Casa de Misericórdia of São Paulo (ISCMSP) were evaluated. As exclusion criteria: Pregnant women, nursing mothers, drug addicts, alcoholics, smokers, cancer patients and those using drugs for weight loss. To define the percentage difference in weight lost in relation to excess weight (%PEP), the weight recorded on the day of surgery was used as a basis, the ideal weight for the Body Mass Index (BMI) value as proposed by the FAO and for patients aged 60 years or more, the BMI was used according to the age and minimum weight achieved in the post-surgery period, as described by Novais<sup>11</sup>. The loss of excess weight is considered one of the main

parameters to define the success of the surgical procedure, and researchers agree that the criterion for this assessment is the %WBS of at least 50%. Patients were divided into two groups (group I: successful PEP>50% and group II: unsuccessful PEP<50%). To verify the possible causes of overweight recovery in this group, the food frequency questionnaire (FFQ) adapted from SICHIERI<sup>12</sup> and EVERHART<sup>13</sup> was applied with the classification of higher calorie food groups that could contribute to the recovery of excess weight if consumed with higher frequency and for behavior analysis for the practice of physical activity, a questionnaire was applied according to VIGITEL<sup>14</sup> 2018 (Surveillance of Risk Factors and Protection for Chronic Diseases by Telephone Survey). An analysis of the frequency of consumption of selected food groups was performed according to the Fisher test for a significance level of  $p < 0.05$ . (Table 1), to analyze the practice of physical activity, the Chi-square test was used. (Table 2)

## IV. RESULTS

Were evaluated forty-five female patients with surgical times ranging from 2 to 7 years were evaluated. Patients were divided into two groups: those considered successful PEP>50%, called G1 (n=31), and those considered unsuccessful with PEP<50%, called G2 (n=14). There was no statistical difference ( $p=0.815$ ) between the mean ages of G1 (48.3 years $\pm$ 1.19) and G2 (48.5 years $\pm$ 1.2). In this study group, patients with 2 and 3 years of surgery had 66% success, with 4 years 81% success, with 5 and 6 years 50% success and with 7 years 100% successful.

**Table 1:** Frequency of use and consumption of food groups, of patients of patients seen according to success and failure of bariatric surgery, (PEP >50% and PEP <50%) ISCMSP, 2020.

Food Groups	Success				Failure				Total		Value offor
	Rarely		Frequent		Rarely		Frequent		N	% Rarely	
	N	%	N	%	N	%	N	%			
Butter	15	48.4	16	51.6	1	7.1	13	92.9	16	35.5	0.0007*
Embedded	18	58.1	13	41.9	10	71.4	4	28.6	28	63.0	0.2886
White breads	9	29.0	22	71.0	2	14.3	12	85.7	11	24.4	0.0027*
Candy	25	80.6	6	19.4	11	78.6	3	21.4	36	80.0	0.3131
Chocolates	26	83.9	5	16.1	13	92.8	1	7.2	39	88.4	0.6930
Farinaceous sweets	11	35.5	20	64.5	13	92.8	1	7.2	24	53.3	0.0042*
Soft drinks	14	45.2	17	54.8	4	28.6	10	71.4	18	40.0	0.0297*
Coffee with sugar	13	41.9	18	58.1	2	14.3	12	85.7	15	33.3	0.0027*
Artificial juice	15	48.4	16	51.6	5	35.7	9	64.3	20	44.4	0.0540
Natural juice	11	35.5	20	64.5	6	42.8	8	57.2	17	37.8	0.0988

Reference: Bariatric Nutrition Specialty Clinic, Hospital da Irmandade da Santa Casa de Misericórdia of São Paulo (ISCMSP)

**Table 2:** Physical Activity Practice presented by patients seen according to success and failure of bariatric surgery (PEP >50% and PEP <50%). ISCMSP, 2020.

Physical activity practice	Success		Failure		Total	
	N	%	N	%	N	%
Sim	18	58.1	8	57.1	26	57.8
Não	13	41.9	6	42.9	19	42.2
Total	31	68.9	14	31.1	45	100.0

$\chi^2 = 0.003$

$p = 0.7887$  (N.S.)

Reference: *Bariatric Nutrition Specialty Clinic, Hospital da Irmandade da Santa Casa de Misericórdia of São Paulo (ISCMSP)*

## V. DISCUSSION

When assessing the age of the patients in this study, a mean age was found to be 48.3 years for the successful group (PEP >50%) and 48.5 years for the failure group (PEP <50%). It was observed that there was no statistically significant difference in age for the success or failure of overweight loss (PEP >50% and PEP <50%) in this study group.

It was also observed that there was no statistically significant difference regarding the surgical time for the success or failure of excess weight loss (PEP >50% and PEP <50%). According to ABESO (2009/2010)<sup>15</sup>, it is necessary to maintain weight loss for 5 years, a period in which failure to control weight maintenance can occur. As for the analysis of qualitative food consumption of patients with failure for PEP <50%, there was statistical significance for the frequent consumption of foods from the group of butter, white bread, soda and coffee with sugar. Patients with success for PEP >50%, there was a statistical significance for the frequent consumption of foods from the farinaceous sweet group (Table 1). According to a study by Soares (2017), there is a tendency in this group of patients to return to inadequate eating habits after 2 years of the procedure, with increased consumption of foods rich in carbohydrates and lipids.<sup>16,17,18</sup> For the other food groups, consumption there was no statistically significant difference, that is, consumption is the same in both groups. There was no significant difference between the two groups according to PEP >50% and PEP <50% in relation to the analysis of physical activity practice (Table 2). It is important to mention that of the patients with a success rate for surgery (PEP >50%) and who did not practice physical activity, 46% had 4 years of surgery. Scientific studies report that after 5 to 10 years the risks of weight regain are greater.<sup>19</sup> Another analysis to be pointed out is that for the 57.1% of patients with an unsuccessful rate for surgery (PEP <50%) and who practiced physical activity, 37.5% had 5 years of surgery, which may represent a relationship between surgical time and the practice of physical activity and the quality of this activity. According to Alexandrino (2019) of the patients who underwent surgical procedures for weight loss with an average follow-up of 7 years, 74% who were successful in the treatment had regular physical exercise practice<sup>20</sup>.

## VI. CONCLUSION

Factors such as age and surgical time were not determinant for success or failure parameters. The consumption of high-calorie food groups more frequently can lead to failure to lose excess weight and promote short-term recovery. The practice of physical activity and surgical time may be related to the successful loss of excess weight. To guarantee an effective treatment, capable of ensuring postoperative success, monitoring by a professional nutritionist, associated with a multidisciplinary team, is essential to promote changes in eating habits due to the new physiological condition. Behavioral changes with healthy eating and the practice of daily physical activity are essential for maintaining the loss of excess weight in post-bariatric patients

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