Educational intervention and obesity indicators of gastroplasty candidates: a quasi-experimental study

Intervenção educativa e indicadores de obesidade de candidatos à gastroplastia: estudo quase-experimental

Intervención educativa e indicadores de obesidad de candidatos a gastroplastía: estudio cuasi experimental

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Abstract

Objective: To assess the effect of educational intervention on obesity indicators in preoperative bariatric surgery patients.

Methods: A quasi-experimental study conducted from June to August 2017 at a referral hospital for bariatric surgery in Ceará, with 55 participants (28 in the Control Group and 27 in the Intervention Group). The Control Group was submitted to verbal instructions on the surgical procedure, routine of the institution. The Intervention Group, in addition to this routine, underwent an educational intervention performed by a nurse, weekly, from reading an educational booklet with information and clarifications about the perioperative period for three weeks. The Wilcoxon test was used for analysis to compare obesity indicators between collection times and the Mann-Whitney test to compare variables among groups.

Results: The variables weight reduction, body mass index, waist circumference, waist-to-height ratio and percentage of overweight increased in the Control Group and statistically significantly reduced in the Intervention Group.

Conclusion: Access to information in the printed material was effective for learning and significantly contributes to the reduction of obesity indicators, which are clinically important for bariatric surgery. The use of educational technologies should be encouraged in the preoperative preparation of gastroplasty candidates.

Resumo

Objetivo: Avaliar o efeito de intervenção educativa nos indicadores de obesidade de pacientes em pré-operatório da cirurgia bariátrica.

Métodos: Estudo quase-experimental realizado de junho a agosto de 2017, em hospital de referência na realização de cirurgias bariátricas no Ceará, com 55 participantes (28 no Grupo Controle e 27 no Grupo Intervenção). O Grupo Controle foi submetido às orientações verbais sobre o procedimento cirúrgico, de rotina da instituição. O Grupo Intervenção, além de tal rotina, foi submetido à intervenção educativa realizada por enfermeira, semanalmente, a partir de leitura de cartilha educativa com informações e esclarecimentos acerca do perioperatório, durante três semanas. Para análise foram utilizados o teste de Wilcoxon para comparar os indicadores de obesidade entre os momentos de coleta e o teste de Mann-Whithey para comparar as variáveis entre os grupos.

Resultados: As variáveis redução de peso, índice de massa corporal, circunferência abdominal, relação cintura estatura e percentual do excesso de peso tiveram aumento no Grupo Controle e redução, com significância estatística, no Grupo Intervenção.

Conclusão: O acesso às informações no material impresso foi eficaz para aprendizagem e contribui significativamente para redução de indicadores de obesidade, os quais são clinicamente importantes para realização da cirurgia bariátrica. O uso de tecnologias educacionais deve ser estimulado no preparo pré-operatório de candidatos à gastroplastia.

Resumen

Objetivo: Evaluar los efectos de la intervención educativa en los indicadores de obesidad de pacientes en preoperatorio de cirugía bariátrica.

Métodos: Estudio cuasi experimental realizado de junio a agosto de 2017, en hospital de referencia en realización de cirugías bariátricas en el estado de Ceará, con 55 participantes (28 en el Grupo de Control y 27 en el Grupo Experimental). Al Grupo de Control se le dieron instrucciones verbales sobre el procedimiento quirúrgico, de rutina de la institución. El Grupo Experimental, además de recibir dicha rutina, recibió una intervención educativa realizada por enfermera, semanalmente, a partir de la lectura de manual educativo con información y explicaciones sobre el perioperatorio, durante tres semanas. Para el análisis se utilizó la Prueba de Wilcoxon para comparar los indicadores de obesidad entre los momentos de recolección y la prueba de Mann-Whitney para comparar las variables entre los grupos.

Resultados: Las variables reducción de peso, índice de masa corporal, circunferencia abdominal, relación cintura/estatura y porcentaje de exceso de peso aumentaron en el Grupo de Control y se redujeron, con significación estadística, en el Grupo Experimental.

Conclusión: El acceso a la información del material impreso fue eficaz para el aprendizaje y contribuyó significativamente para la reducción de indicadores de obesidad, los cuales son clínicamente importantes para la realización de la cirugía bariátrica. El uso de tecnologías educativas debe ser estimulado en la preparación preoperatoria de candidatos a gastroplastía.

Introduction

Obesity is a chronic disease characterized by Body Mass Index (BMI) values equal to or greater than 30 kg/m². Bariatric surgery is the most effective treatment option for morbid obesity for weight management and comorbidities associated with remission of diseases such as high blood pressure, type 2 diabetes mellitus, dyslipidemia, and improved quality of life and well-being.[1]

The indication for the procedure occurs after a thorough clinical assessment that includes the assessment of health and nutritional status from the obesity and psychological indicators. Surgical treatment is proposed when BMI values are between 35 to 39.9 kg/m² in individuals with comorbidities (degree II obesity) or from 40 kg/m² (degree III obesity or also known as morbid obesity due to high risk of death).[1]

However, waiting for this surgical procedure to be performed by the Brazilian Unified Health System (SUS – *Sistema Único de Saúde*) has an indefinite duration, which may contribute to damage to the individual's health status.[2] In a qualitative study, patients described that the longer the waiting time, the more unmotivated the patient becomes,[3] which favors uncontrolled weight and associated comorbidities. Thus, it is possible that these patients who are queued have a profile with higher morbidities and higher BMI due to the delay in surgery.[4]

This reflects surgical risk and greater predisposition to complications.

During preparation for surgery, weight loss of 5% or more is possible, even among extremely obese individuals and has been associated with cardiometabolic health benefits.[5] Decreasing 5 to 10% of body weight, along with decreasing waist circumference, have positive effects on metabolic syndrome and the improvement of some obesity-related diseases.[6]

Thus, in addressing individuals with severe obesity, the challenge is not to promote weight reduction alone, but to help them achieve health gains even in the preoperative period, which ultimately is reflected in long term weight control.[7] From this perspective, self-management strategies should be developed and implemented to reduce suffering, improve health and quality of life, and help patients cope with extended waiting times.[8]

In the United States, a randomized controlled trial of 144 preoperative patients was conducted to verify the effect of educational intervention with a nutritional focus and behavioral change from verbal instructions and a six-week follow-up handout. The results showed that these individuals had greater excess weight loss and improved postoperative BMI.[9]

The implementation of educational interventions by health professionals contributes to increase the knowledge about the surgical procedure, reflecting significant improvements in obesity indica-

tors such as weight, BMI and waist circumference. Given the above, the question arises: is there a difference in the obesity indicators of candidates for bariatric surgery after educational intervention with verbal and printed orientation?

Knowing the anthropometric profile and body fat distribution of patients treated by SUS is important to measure the risks related to the morbidity and mortality of surgery and provide resources, special care and postoperative support.[4] From educational interventions, it is possible to improve anthropometric parameters such as weight and BMI even in the preoperative period, favoring the prevention of postoperative complications as well as the promotion of self-care and a better quality of life.

Thus, this study aimed to assess the effect of educational intervention on the obesity indicators of preoperative patients of bariatric surgery.

Methods

This is a quasi-experimental study conducted from June to August 2017 at a reference institution for bariatric surgery performed by SUS in the state of Ceará, Brazil.

Participants in the study were candidates for bariatric surgery, aged over 18 years, literate and who were enrolled in the state of Ceará Obesity Program at the institution under study. Patients who were using the intragastric balloon or who did not have effective oral communication conditions were excluded so that it would be impossible to understand the data collection instrument and reading the educational material to be used in the intervention.

An initial survey was performed at the institution under study to estimate the number of patients able to undergo bariatric surgery (those who had already gone through all consultations with the multidisciplinary team and performed all examinations). They were registered in the waiting book for the surgery call, which totaled 90 patients. Of these, only 66 met the inclusion/exclusion criteria established as there were patients using an intragastric balloon or were called to perform surgery during the time of data collection. The sample was estab-

lished for convenience and participants were invited to take part in the research through previously agreed meetings at the hospital via telephone. On this occasion, in addition to the explanation about the study, the informed consent form and non-random allocation of the patient to their respective group were applied.

Of the 66 patients who agreed to participate, only 59 candidates were sampled. There was sample loss due to dropout (1), placement of intragastric balloon (2) and call for surgery (4). The allocation of participants in the Control Group (CG) and Intervention Group (GI) was performed with the support of an assistant researcher who listed the names of eligible participants and named a number for each participant. From this, the Research Randomizer software generated the division of numbers between the two groups. After this moment, the assistant researcher elaborated the list of CG and IG according to the number of the participant designated in the randomization process.

Thus, the CG had 30 individuals initially and the IG with 29 participants. After the seven-week interval, both the CG and IG had a sample loss of two participants because they were called to perform the surgery, resulting in a sample of 55 individuals, 28 in the CG and 27 in the IG.

Data collection procedure and intervention times

The study involved two data collection moments (M0 and M3) for CG individuals and four moments (M0, M1, M2 and M3) for IG individuals. At baseline (M0), sociodemographic and clinical information (anthropometric measurements and bioimpedance) were collected as can be seen in Figure 1.

On the same day of M0, for GI, the educational intervention was initiated with the objective of providing guidance on perioperative care of bariatric surgery. This phase was performed in three sequential and weekly meetings (M0, M1 and M2) using the educational booklet called "*Cirurgia bariátrica: cuidados para uma vida saudável*" (freely translated as Bariatric surgery: care for a healthy life) in which each meeting addressed a perioperative pe-
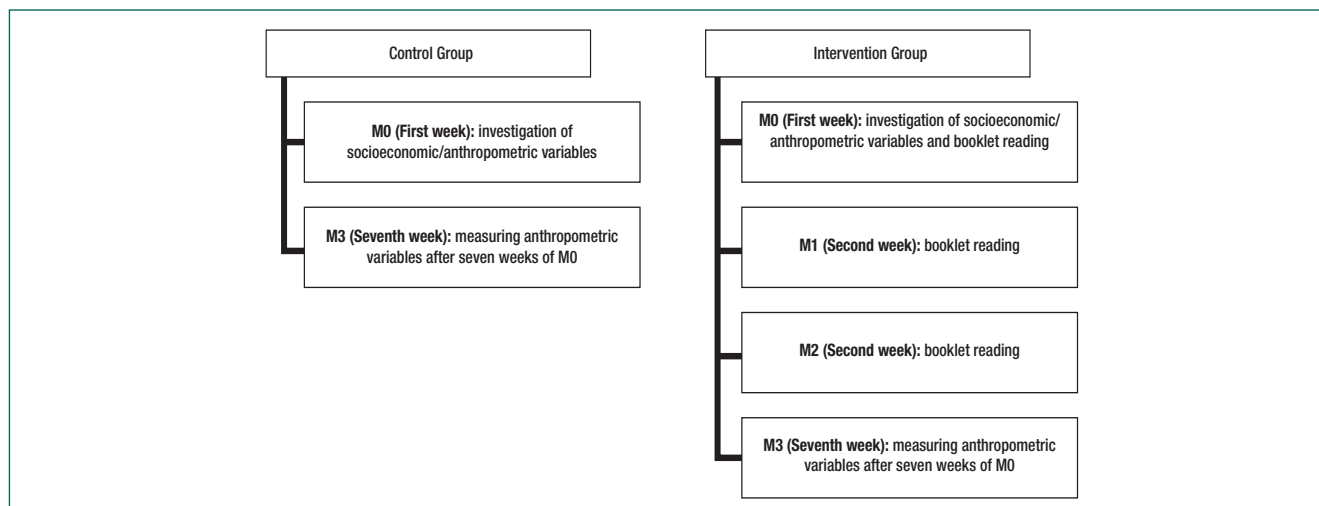
Figure 1. Data collection procedure flowchart (n=55)

riod divided into preoperative, intraoperative and postoperative.

It is noteworthy that the participants of the CG did not have the face-to-face meetings in M1 and M2, receiving guidance on the surgical procedure according to the routine of the institution by the physician and psychologist.

After seven weeks of follow-up, counting from M0, participants from IG and CG were invited to participate, on alternate days, in the last one-to-one meeting (M3) to again measure clinical variables (weight, hip and waist circumference and bioimpedance). Importantly, moments M0 and M3 for investigation of socioeconomic factors and measurement of anthropometric data were performed by different researchers previously trained to reduce the risk of bias in data inference.

Verbal Guidance for the Control Group

The CG received verbally the institution's routine guidelines that are passed on during clinical consultations with each member of the multidisciplinary team (physician, physiotherapist, psychologist, speech therapist and nutritionist). These consultations follow the clinical protocol provided by the Ministry of Health, which recommends monthly consultations with the candidates for surgery for clinical assessment and exams. Monthly, an educational lecture is also held in the auditorium of the institution under study with all patients who are preoperatively preparing

about perioperative care of bariatric surgery by health professionals.

Educational Intervention for the Intervention Group

The educational intervention was mediated by a booklet and was conducted by the principal researcher, lasting three weeks with a weekly meeting. It was implemented through the following teaching strategies: group, in the auditorium of the institution, through participation in the daily reception and assessment of the meeting, and individual reading the educational booklet. At each weekly meeting a theme was worked out about the perioperative period of bariatric surgery. In each meeting, the participants read the booklet individually, followed by the researcher's assessment that questioned the presence of doubts about the content among participants. The aforementioned booklet was developed during a Master's degree in Nursing at *Universidade Federal do Ceará* and its stages were its construction:[9,10] integrative review on perioperative care of bariatric surgery, searching patient blogs about the main questions related to surgery. and focus group with pre and postoperative patients. In content validation, 42 health professionals participated through the Delphi technique, as well as appearance validation with patients and graphic designers. It has objective language and easy to understand from the illustration of important information and text highlighting. The booklet content involves top-

ics such as healthy diet in the preoperative period, physical exercise, stress control strategies, exams needed to perform the surgery, surgical techniques, complications, risks and care in each perioperative phase.[10,11] The printed booklet has been distributed for free by the institution under study and also via email through email to health professionals and institutions.

Data collection tools

Data collection was performed using an instrument that contained information on the sociodemographic profile and anthropometric data. The sociodemographic variables analyzed were: gender, age, education, marital status, religion, professional status, family income, economic class and origin. Regarding the anthropometric indicators of obesity, data regarding weight, height, waist circumference and hip were collected. The weight was obtained in kilograms using a previously calibrated Welmy mechanical anthropometric scale with a maximum capacity of 300 kg. Waist and hip circumference were assessed with the aid of a simple, inelastic and flexible tape measure and recorded in centimeters. For Bioelectrical Impedance Analysis (BIA), the Omron® HBF-514C (Omron Healthcare, Japan) Full Body Sensor, which is a non-invasive, portable, easy-to-use, reproducible, practical-to-practice feature. The measurement was performed in accordance with a study by Petroski:[12] The subject assessed remained standing, barefoot, with his head raised, looking at the horizon and straight knees and back with heels positioned on the heel electrodes. The weight was evenly distributed on the scale. One should also hold the device with arms extended forward, forming a 90° angle to the body.

In order to minimize body composition estimation errors, all participants were instructed to follow the recommendations of the device manual and the city of Pitanga study,[13] such as: a) two hour fasting; b) have an empty bladder; c) do not drink alcohol in the last 48 hours; d) not being during the menstrual cycle; e) remove adornments of metallic metals such as earrings, necklace, ring, bracelet, piercing, among others; f) not performing vigorous physical activity in the last 24 hours. Before using the balance, it was necessary to configure it with personal data (age, sex and height) to determine body indicators such as weight, BMI, body fat percentage, skeletal muscle percentage, visceral fat percentage, basal metabolism and age. BMI was obtained by dividing body mass in kilograms by height in meters squared (kg/m^2). For the classification of the results, the parameters of the International Federation for the Surgery of Obesity and Metabolic Disorders were considered.[14] Waist Circumference (WC) was classified according to the criteria established by the World Health Organization (WHO) in which WC values above 102 cm in men characterizes abdominal obesity and, in women, the adopted value was above 88 cm.[15] Waist-hip ratio (WHR) was obtained by dividing waist circumference values by hip and, for its classification, the WHO recommended cutoff points were used to stratify risk among men aged 20 to 69 years.[15] Waist-to-Height Ratio (WHtR) is an anthropometric indicator of obesity to discriminate excess body fat associated with coronary risk. The proposed cut-off point is 0.5 for adults, as the waist circumference should be less than half its height.[16] Overweight Percentage (%OWP) was calculated using the Deitel and Greenstein formula:[17] %OWP = initial weight - current weight/initial weight - ideal weight X 100. BMI of 25 kg/m² was used to calculate ideal weight according to a study by Silva et al.[18]

Sttistical analysis

Data were analyzed using SPSS (Statistical Package for Social Sciences) software, version 24.0. Data relating to patients' clinical and epidemiological variables were treated using descriptive statistics using univariate and bivariate frequency distributions and descriptive measures (means, medians, standard deviation and 25-75 percentages). Differences between proportions were verified by applying the Pearson Chi-Square statistical test and differences between continuous variables with the Mann-Whitney test. The Wilcoxon test for paired samples was used to compare the obesity indicators at the

initial and final moments. Mann-Whitney test was used to compare% OWP and between groups.

Ethical aspects

The study was approved by the *Uniersidade Federal do Ceará*'s Research Ethics Committee (nº 1,658,436, CAAE (*Certificado de Apresentação para Apreciação Ética* - Certificate of Presentation for Ethical Consideration) 56499116.2.3001.5041) and by the institution's Ethics Committee.

Results

Based on the findings in Table 1, we can observe that the groups were homogeneous about the variables such as age, gender, marital status and education before the educational intervention.

Essentially, the sample consisted of women, 35-44 years old, married, with 9-11 years of study and active. Most participants were from Fortaleza and/or metropolitan region. When assessing the occupational situation, it was observed that 63.3% (19) of the participants CG and 51.7% (15) of the IG were active and performed functions as baker, cook, cleaning lady, seamstress, farmer, merchant, marketer, teacher and secretary. The most frequent family income was 2 to 3 minimum wages - 60% (18) in the CG and 48.3% (14) in the IG (Table 1). Prior to conducting the intervention groups did not differ about the clinical parameters of obesity in the study. Table 2 shows the comparisons between the medians (with percentages 25 and 75) of the clinical indicators of obesity and the body composition of the groups control and intervention at the M0 and M3 collection moments.

Among the M0-M3, there was a statistically significant variation between the medians of the obesity indicators of the IG patients: BMI (49.5 to 49 kg/m^2, p=0.000), WC (130 to 131 cm, p=0.001) and WHtR (0.826 to 0.818 cm, p=0.001). WHR ranged from 0.952 to 0.937, but had no statistically significant difference (p=0.187). All indicators increased in CG (Table 2). Table 3 presents the WHR classification for cardiovascular risk and BMI of CG and intervention patients.

Table 1. Characteristics of groups control and intervention regarding sociodemographic profile (n=59)

Variables/Categories	Group Control n(%)	Group Intervention n(%)	p value†
Gender			
Female	25(83.3)	28(96.6)	0.093
Male	5(16.7)	1(3.4)	
Age			
18 to 24	1(3.3)	1(3.4)	0.831
25 to 34	10(33.3)	6(20.7)	
35 to 44	13(43.3)	15(51.7)	
45 to 54	4(13.3)	4(13.8)	
55 to 64	2(6.7)	2(6.9)	
Over 65 years	1(3.3)	1(3.4)	
Mean Age (Standard Deviation)	38.77(±9.818)	41.38(±9.87)	0.233*
Marital status			
Single	11(36.7)	5(17.2)	0.167
Married	18(60)	21(72.4)	
Divorced	-	2(6.9)	
Widow(er)	1(3.3)	1(3.4)	
Religion			
Catholic	20(66.7)	18(60)	0.159
Evangelical	5(16.7)	7(24.1)	
Christian	3(10)	3(10.3)	
Others	2(6.6)	1(3.4)	
Schooling			
0 to 8 years of study	5(16.7)	9(31)	0.410
9 to 11 years of study	19(63.3)	16(55.2)	
12 years and over of study	6(20)	4(13.8)	
Occupation			
Active	19(63.3)	15(51.7)	0.367
Inactive	11(36.7)	14(48.3)	
Family income			
< 1 MW	2(6.7)	4(13.8)	0.305
1 MW	8(26.6)	11(37.9)	
From 2 to 3 MW	18(60)	14(48.3)	
From 4 to 6 MW	2(6.7)	-	
Mean family income	1903(±1146)	1346(±779)	0.052*
Economic rating			
B2	3(10)	6(20.7)	0.385
C1	10(33.3)	7(24.1)	
C2	10(33.3)	6(20.7)	
DE	7(23.4)	10(34.5)	
Origin			
Fortaleza	17(56.7)	12(41.4)	0.005
Metropolitan Region	9(30)	9(31)	
Countryside	4(13.3)	8(27.6)	

† Pearson's chi-square; * Mann-Whitney Test

In both groups (control and experimental), the cardiovascular risk rating from WHR was considered "very high" in most participants, with no statistically significant difference. However, in the BMI classification, it was possible to observe statistical significance in the comparison between M0 and M3 of the experimental group (p=0.046), with a reduction in the number of individuals classified with superobesity I (Table 3).

Table 2. Clinical indicators of obesity of control and intervention group patients before and after intervention (n=55)

Variables	M0			M3			M3-M0 (p valueº)	
	CG	GI	p value†	CG	GI	p value†	CG	IG
	Median	Median		Median	Median			
WHQ	0.961 (0.896-1.00)	0.952 (0.878-0.992)	0.820	0.96 (0.898-0.996)	0.937 (0.859-0.993)	0.497	0.330	0.187
WHtR	0.825 (0.744-0.881)	0.826 (0.777-0.909)	0.422	0.833 (0.76-0.876)	0.818 (0.750-0.906)	0.755	0.812	0.001
WC	132 (121-144)	130 (122-144)	0.850	136 (123-145)	131 (118-143)	0.333	0.630	0.001
BMI	48.7 (43.8-53.0)	49.5 (47.6-53.8)	0.225	48.9 (44.3-53.1)	49.0 (44.3-53.6)	0.973	0.227	0.000

† Mann Whitney test for comparison between groups; Wilcoxon test for paired samples

Table 3. Distribution of clinical indicator classification of obesity among groups according to WHR and BMI (n = 55)

Variables	M0			M3			M3-M0 (p value*)	
	CG	GI	p value†	CG	GI	p value†	CG	GI
	n(%)	n(%)		n(%)	n(%)			
WHR classification								
Low	1 (3.3)	-	0.461	4 (13.3)	-	0,639	0.317	0.317
High	3 (10)	5 (14.3)		1 (3.3)	6 (22.2)			
Very high	26 (86.7)	24 (85.7)		23 (76.7)	21 (77.8)			
BMI classification								
II Obesity	1 (3.3)	1 (3.4)	0.539	1 (3.6)	2 (7.4)	0.453	1	0.046
III Obesity	16 (53.3)	14 (48.3)		14 (50)	16 (59.3)			
I Superobesity	12 (40)	10 (34.5)		12 (42.8)	6 (22.2)			
II Superobesity	1 (3.3)	4 (13.8)		1 (3.6)	3 (11.1)			

† Pearson's chi-square; * Wilcoxon test for paired samples.

Table 4. Comparison of patient body composition between control and intervention groups(n=56)

Variables	M0			M3			M3-M0 (p valueº)	
	CG	IG	p value†	CG	IG	p value†	CG	IG
	Median	Median		Median	Median			
Weight	125.7 (111.9-139.4)	121.8 (112.6-138.7)	0.773	130 (113-140)	120 (112-136)	0.204	0.211	0.000
% of fat	56.7 (53.0-58.5)	57.5 (55.6-59.6)	0.219	58 (53-59)	57 (53-58)	0.417	0.054	0.001
Visceral Fat%	13 (11-15)	13 (10-14)	0.868	12 (10-14)	12 (10-14)	0.856	0.157	0.034
% Muscle mass	19.8 (18.9-21.8)	19.1 (18.3-20.4)	0.112	19.5 (18.4-21.8)	19.5 (19.0-21.7)	0.581	0.011	0.001
Basal metabolism	1946 (1797-2137)	1843 (1791-2038)	0.205	1990 (1808-2098)	1805 (1724-1985)	0.015	0.294	0.022
Body age	77 (74-80)	78 (73-80)	0.848	78 (74-80)	78 (69-80)	0.862	0.054	0.057

† Mann Whitney test for comparison between groups; Wilcoxon test for paired samples

In M0 and M3, the profile of patients in body composition is similar. By assessing the evolution between the two moments (M3-M0), it was possible to identify differences in the medians between initial and final weight (Δ=1.8 kg, p=0.000), % body fat (Δ=1.5%, p=0.001), % visceral fat (Δ=1%, p=0.034), % muscle mass (Δ=0.4%, p=0.001) and basal metabolism (Δ=0.36, p=0.022) (Table 4). The following is Figure 2 of the% OWP mean comparison.

The mean% OWP in the CG was -0.5% (± 2.20), i.e., patients tended to gain weight while in the IG, the mean was 2.97% (± 3.25). There was statistical significance in comparing% OWP between groups (p=0.000) (Figure 1).
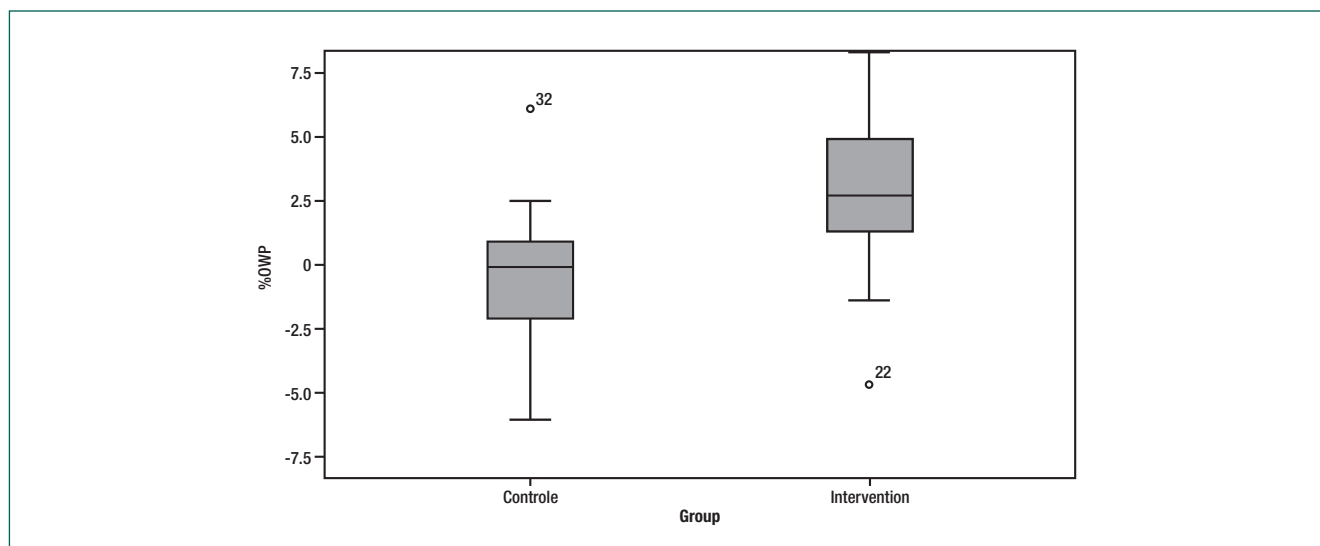
Figure 2. Comparison of overweight loss among patients according to control and intervention groups (n=55)

Discussion

The present study brings important contributions to the care line for severely obese patients by showing that the booklet-mediated educational intervention was effective in improving obesity indicators in patients waiting for bariatric surgery for seven weeks of follow-up.

The profile found in this study was women, with a predominant age range of 35-44 years, married with a mean BMI of 48.7 kg/m². These data are similar to the cross-sectional study conducted in the city of Santa Maria (RS) with 100 candidates awaiting bariatric surgery identified a mean BMI of 43.51 ± 6.25 kg/m² with a variance between 35 kg/m² and 85.78 kg/m² among participants.[19]

In Fortaleza, a cross-sectional study with 92 postoperative patients identified a mean preoperative BMI of 47.2 ± 6.8 kg/m² with a minimum BMI of 35.1 kg/m² and a maximum of 74.2 kg/m².[20] Another cross-sectional study conducted in the city of Sergipe with 78 patients, to assess the evolution of nutritional status during preoperative follow-up with the nutritionist, revealed a predominance of gender female patients with BMI classified as superobesity (53.2 ± 13.8 kg/m²) or obesity degree III (40.2 ± 4.5 kg/m²).[21]

A retrospective cohort study conducted with 50 obese patients in the state of Rio Grande do Sul showed a profile of gender female patients (88%) with a mean age of 38.1 ± 11.9 years with variance between 18 and 66 years. Regarding clinical characteristics, an mean weight of 118.51 ± 21.88 kg (minimum 90 kg and maximum of 184 kg) was observed, mean BMI of 43.55 ± 5.52 kg/m² (minimum BMI of 34.5 kg/m² and maximum of 56.4 kg/m²) and mean WC of 123.06 ± 16.21 cm.[6]

Systematic review with meta-analysis of 39 articles published from 1999 to 2014 on anthropometric profile and comorbidities of patients undergoing bariatric surgery at SUS showed a predominance of women (79%) with a mean age of 41.4 years and a mean BMI of 48.6kg/m². Of the 3845 participants, 21.8% were smokers, 60.8% hypertensive and 22.3% diabetic.[4]

These data alert to the need for nurses to plan and implement effective strategies directed to the female public in order to provide guidance on good health practices, self-care and risk factors associated with obesity, which may favor the health promotion of this target audience. In addition, it is pertinent to highlight that the low demand of obese men in the health service should also be the target of nursing actions, since, in general, male patients have a higher degree of obesity and worse anthropometric indicators, contributing to the occurrence of complications.

Among the participants of this study, we observed high values in WC, WHR and WHtR indicators, which are related to cardiovascular risk. A cross-sectional study conducted in the city of São José do Ribamar, state of Maranhão, to verify the correlation between BMI and anthropometric indicators of cardiovascular risk among 120 women from 20 to 49, showed that 60% of participants were overweight according to the classification. BMI 70.8% were at risk for cardiovascular disease by WC and 60.8% by WHtR. Significant correlation was observed between BMI and obesity indicators such as WC (p <0.001, r=0.47), WHR (p <0.001, r=0.62) and WHtR (p <0.001, r=0.85).[22]

The presence of excessive abdominal fat contributes to the development of other comorbidities such as cardiovascular disease, which further impairs the health status of the obese. Thus, it is pertinent that in all points of attention of the SUS network, nurses perform the verification of anthropometric measures such as WC and WHR, especially, and provide guidance on healthy eating and physical activity practice so that control and obesity reduction.

After the follow-up period of the study participants, the variation between the initial and final weight medians was 125.7 kg to 130 kg in the CG (p=0.211) and 121.8 kg to 120 kg in the IG (p=0.000). There was also an improvement in BMI (48.7 vs. 48.9 kg/m^2 in CG (p = 0.227) and 49.5 vs. 49 kg/m^2 in IG, p=0.000), WC (132 vs 136 cm in the CG (p=0.630) and 130 vs. 131 cm in the IG, p=0.001) and WHtR (0.825 vs. 0.833 cm in the CG (p=0.812) and 0.826 vs. 0.818 cm in the IG, p=0.001). The WHR indicator did not present significant statistics in the comparison between groups.

Other studies with obese or overweight populations have also shown improvement in obesity indicators after the implementation of educational/behavioral interventions. Such studies strengthen the nurse's role as an educator to provide guidance to encourage changes in health practices and improve knowledge about the perioperative period of bariatric surgery.

From the bond with the patient in the educational moments, the nurse can identify difficulties experienced in the individual's daily life that impair their lifestyle and self-care and establish nursing interventions that solve the obstacles encountered. Recognition of the clinical-anthropometric profile and social determinants of health are fundamental factors for health promotion practice based on the individual's needs.

In Paraná, a quasi-experimental before and after study was conducted to verify the effectiveness of an intervention program on anthropometric measurements and the stage of readiness for behavior change in overweight adult women (BMI≥25 kg/m²) during follow-up of 16 weeks. The sample consisted of 13 women in IG and 20 in CG. Results showed significant change in obesity indicators such as weight (p=0.004), BMI (p=0.003), WC (p <0.001), WHtR (p=0.002) and readiness for change among women in the IG. In CG, there was an increase in the mean of three of the four measures analyzed (weight, BMI and waist circumference).[23]

When comparing these findings with the results of the present study, it is possible to observe that there is similarity in the improvement of the weight, BMI and WC indicators, but the WHR did not show significant changes after the follow-up period.

Weight reduction has a direct impact on BMI and its classification. In IG, in M0, 10 individuals presented superobesity I and, at the end of seven weeks, only six participants had this classification. This demonstrates the commitment to achieve the weight loss needed to reduce surgical risks.

In the United States, a randomized clinical trial was conducted with 5,145 overweight and obese individuals aged 45 to 76 years (BMI ≥ 25 kg/m²). This trial aimed to assess the effect of intervention to promote healthy habits during four-year follow-up on clinical variables such as weight and cardiovascular risk factors among severely obese (degree III obesity) compared with overweight individuals (degree I and II obesity). The IG participated in a weight loss behavioral program that included group and individual meetings with a goal of weight loss ≥ 10%, caloric restriction and physical activity practice. In all BMI categories, changes in weight after four years were significantly greater between IG (p <0.05). [24]

In this group, in the last year of assessment, participants with severe obesity lost 4.9% ± 8.5% of overweight, similar to the loss of obese class I (4.8% ± 7.2%) and class II. (4.4% ± 7.6%) and significantly higher than obese ones (3.4% ± 7.0%; p <0.05). Changes in LDL-cholesterol, triglycerides, diastolic blood pressure, glycated hemoglobin and blood glucose were similar among individuals with degree I, II and III obesity, but morbidly obese subjects had less favorable LDL results (3.1 ± 0.4 mg/dL) and systolic blood pressure (-1.4±0.7 mmHg) compared to other obese (p <0.05). These findings reinforce the importance of implementing interventions to promote healthy habits, which may favor long-term weight loss and improvements in cardiovascular disease risk factors among severely obese individuals.[24]

In educational moments, nurses can use various tools to implement health education. In this study, the educational booklet "*Cirurgia bariátrica: cuidados para uma vida saudável*" was used, which provides guidance on the entire perioperative period of bariatric surgery divided into stages (pre, trans and postoperative). Other successful experiences have been identified in the scientific literature as educational workshops, verbal guidance and educational programs based on behavioral changes (physical activity and healthy eating).

A retrospective and observational cohort intervention study was conducted in Ireland with 189 bariatric surgery candidates to assess variations in anthropometric and metabolic data following an educational lifestyle program. Intervention was applied by nurses through educational workshops lasting two hours per week over a period of eight weeks. Themes were based on promoting healthy lifestyle health with a focus on healthy eating (emphasizing diet modification techniques such as carbohydrate counting, food label interpretation and portion size calculation), exercise practice physical and stress management.[25]

Educational intervention enabled significant improvements in anthropometric, metabolic and cardiovascular risk variables. Of the 183 baseline patients, 150 (81.9%) completed the eight-week follow-up program. Improvement in obesity indicators was identified as weight (129.6 ± 25.9 vs. 126.9 ± 26.1 kg, p <0.001), BMI (46.3 ± 8.3 vs. 44.9 ± 9.0 kg/m^2, p <0.001), WC (133.0 ± 17.1 vs. 129.3 ± 17.5 cm in women and 143.8 ± 19.0 vs. 135.1 ± 17.9 cm in women). men, both p <0.001).[25]

In Chile, a quasi-experimental study was conducted to verify the effects of a preoperative educational program based on physical activity orientation, psychological support and nutritional education with 19 women candidates for bariatric surgery for 16 weeks. Results showed significant improvements in weight (Δ = -6.49, 100.94 ± 14.95 vs. 93.45 ± 14.51kg, p <0.000), BMI (Δ = -6.48, 40.45 ± 5.62 vs. 37.57 ± 5.74 kg/m^2, p <0.000), WC (Δ = -6.23; 119.31 ± 13.01 vs. 111.74 ± 12.87 cm, p <0.000) and% body fat (Δ = -9.09; 42.03 ± 6.57 vs. 37.96 ± 5.56 kg/m^2, p <0.001).[26]

Another eight-week intervention aimed at high intensity physical training was also implemented in Chile from a quasi-experimental study. The objective was to assess the contribution of physical activity to the anthropometric profile of overweight or obese women in two groups: the adherent group (AG), which should complete at least ≥75% (minimum of 18 sessions, n=16, age: 38.4 ± 13) of the program and the non-adherent group (NAG), with frequency <75% (less than 18 sessions, n=8, age: 32.2 ± 6) during follow-up. The results showed that the group with low adherence (participation <18 sessions) did not show significant changes after intervention. AG (participation ≥18 sessions) showed significant changes in the obesity indicators: weight (p <0.001), BMI (p <0.001), % body fat (p <0.001) and% visceral fat (p=0.020).[27]

Another quasi-experimental study was conducted in Chile to assess the effect of a multidisciplinary educational program from counseling, nutritional education and exercise follow-up sessions with 28 candidates for bariatric surgery. After four months, there was an improvement in weight (99.41 ± 18.01 vs. 92.54 ± 16.6kg, p <0.000), BMI (38.9 ± 7.36 vs. 36.29 ± 6.88kg/m^2, p <0.000), % body fat (41.62 ± 9.32 vs. 36.42 ± 6.97 kg/m^2, p <0.001) and WC (122.64 ± 14.57 vs. 113.07 ± 12.34 cm, p <0.000).[28]

A quasi-experimental study was conducted in Spain to verify the weight loss of 10 bariatric

surgery candidates after participating in an educational program based on physical activity and adherence to healthy eating for eight weeks. The results showed that there was a variation in weight of 5.17 kg (± 4.03 kg, p <0.05) with maximum weight loss of 13.9 kg. The final mean BMI was 42.88 kg/m², with a mean reduction of 1.77 from baseline (p <0.05). In the body composition variables, the mean lean mass percentage was 23.2% with a 1.77% increase over baseline (p <0.05), the fat percentage was 48.72% (Δ=-2.83%, p<0.05) and the percentage of visceral fat was 14.14% (Δ=1.43%, (p <0.05).[29]

In Brazil, a quasi-experimental study conducted to determine the effectiveness of a multidisciplinary program in the preoperative preparation of 176 individuals showed that, between the first consultation in the program and the day of surgery, the mean preoperative weight loss was 22.6 ± 12.2 kg. The mean BMI ranged from 50.6 ± 8.4 to 42.1 ± 5.6 kg/m² with% OWP of 32.5% ± 11%. In this program, patients receive guidance mainly on the importance of preoperative weight loss; food care; psychological disorders; need for postoperative follow-up and family role in the perioperative.[30]

In this study, it was possible to identify an mean weight loss of only 2.97% in the IG, with the results subject to limited follow-up. For CG, weight gain was observed. A study in Portugal found that preoperative weight loss was less than 10% of excess body weight in which about 70% (n=29) of patients managed to lose 5% after nutritional intervention.[7]

Preoperative weight loss is associated with a lower incidence of perioperative complications, reduced surgical time, less blood loss during surgery, and decreased hospital stay,[31] in addition to reflecting self-management skills, resulting in greater self-efficacy for weight reduction and control.[32]

It is inferred, therefore, that better surgical results are obtained from adequate preoperative preparation with the offer of teaching sessions on bariatric surgery, risks and benefits and strategies for achieving better long-term weight loss. Therefore, nurses should seek continuous training on obesity and bariatric surgery in order to have adequate knowledge and skills for the care management of this population throughout the perioperative period.

The study's limitations include short-term follow-up (seven weeks). Other studies are important in order to verify the impact of medium and long term educational interventions and the reflection of these educational moments on postoperative surgical outcomes. In addition, it is pertinent to assess other clinical variables such as cholesterol, triglycerides, glycated hemoglobin and blood pressure to strengthen the protective effect of weight loss among preoperative patients.

Conclusion

It was concluded that after seven weeks of follow-up, the group that used the booklet as an educational strategy had significant and clinically important values in weight reduction, BMI, WC, WHtR and% OWP when compared to the group that received verbal guidance. There was also an improvement in obesity indicators during the M0-M2 moments among IG participants, such as BMI (48.7 vs. 48.9 kg/m² in CG (p=0.227) and 49.5 vs. 49 kg/m² in IG, p=0.000); WC (132 vs. 136 cm in CG (p=0.630) and 130 vs. 131 cm in IG; p=0.001) and WHtR (0.825 vs. 0.833 cm in CG (p=0.812) and 0.826 vs. 0.818 cm no IG, p=0.001). The WHR indicator did not present significant statistics in the comparison between groups. It is pertinent the sensitization of health professionals to value the contribution of educational interventions in the care process of severely obese patients. The use of educational technologies such as the booklet represents a tool to be used in health education that is a simple, inexpensive and effective resource to assist patients' orientation and motivation to adopt healthy lifestyles that will reflect in the reduction of health. indicators of obesity and surgical risk. It can be incorporated into the routine of all multidisciplinary teams working in SUS obesity programs. It is hoped that the results can contribute to future studies aimed at the implementation of educational interventions with other innovative teaching pro-

posals in order to improve the quality of care offered to this target population.

Collaborations

Barros LM participated in the conception and design, collection, analysis, interpretation of data and active participation in the discussion of results; writing of the article; approval of the final version and agreement with all aspects of the manuscript in terms of the truth or completeness of the information. Carneiro FN participated in the interpretation of the data and in the approval of the final version of the manuscript. Galindo Neto NM participated in the writing of the article or relevant critical review of the intellectual content, review and final approval of the version to be published and compliance with all aspects of the manuscript in terms of veracity or completeness of information. Moreira RAN, Araújo MFM, Barbosa LP and Caetano JA participated in the review and final approval of the version to be published and agreement with all aspects of the manuscript in terms of veracity or completeness of information.

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