




Bariatric Support Groups Predicts Long-term Weight Loss

Alba Andreu¹ · Amanda Jimenez^{1,2,3} · Josep Vidal^{1,2,4} · Ainitze Ibarzabal¹ · Ana De Hollanda^{1,2,3} · Lilliam Flores^{1,4} · Silvia Cañizares¹ · Judit Molero¹ · Violeta Moizé^{1,2,4} 

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Abstract

Background Support groups are an integral part of bariatric surgery (BS) programs yet there is limited evidence for an association between support group attendance and BS weight outcomes.

Settings University Hospital, Spain.

Objectives This study examined the effect of support group attendance on weight loss (WL) at short- and long-term follow-up (FU) following BS.

Methods Participants were 531 (mean body mass index (BMI) = 45.8 (5.4) kg/m²; mean age 45.9 (11.1) years, 76.4% females) who underwent BS (Roux-en-Y gastric bypass (RYGB): 233 (43.8%); sleeve gastrectomy (SG): 298 (56.2%)) in our clinic. The bariatric support group program (BSGP) consisted of two subprograms: Novel-BSGP (N-BSGP; first 12 months after surgery) and Experienced-BSGP (E-BSGP; FU between 12 months 5 years after BS).

Results Three hundred and twenty-three (60.8%) and 129 (24.3%) participants attended at least one session of N-BSGP and E-BSGP, respectively. Linear regression analyses showed that number of sessions attended during year 1 predicted percent total body WL (%TBWL ($\beta = 0.381$, $p < 0.001$)) and percent excess WL (%EWL ($\beta = 0.928$, $p < 0.001$)) at one year and number of sessions attended during years 2–5 were positively related to %TBWL and %EWL achieved at 5 years (%EWL: $\beta = 0.162$ ($p = 0.014$) and %TBWL: $\beta = 0.378$ ($p = 0.013$)) respectively.

Conclusion We observed a significant beneficial effect of a post-surgical support group program on short- and long-term body WL after BS.

Keywords Bariatric surgery · Weight loss · Peer support · Multidisciplinary team

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✉ Violeta Moizé
vmoize@clinic.cat

Alba Andreu
aandreu@clinic.cat

Amanda Jimenez
ajimene1@clinic.cat

Jospe Vidal
jovidal@clinic.cat

Ainitze Ibarzabal
aibarza@clinic.cat

Ana De Hollanda
amdehol@clinic.cat

Lilliam Flores
lflores@clinic.cat

Silvia Cañizares
scanizar@clinic.cat

Judit Molero
jmolero@clinic.cat

¹ Obesity Unit, Hospital Clinic Barcelona, Villarroel 170, 08036 Barcelona, Spain

² Institut d'Investigacions Biomèdiques August Pi Sunyer (IDIBAPS), Barcelona, Spain

³ Centro de Investigación Biomédica en Red de obesidad y nutrición (CIBEROBN), Madrid, Spain

⁴ Centro de Investigación Biomédica en Red de Diabetes y Enfermedades Metabólicas Asociadas (CIBERDEM), Madrid, Spain

Introduction

Bariatric surgery (BS) is considered the treatment of choice for patients suffering from severe obesity, both in terms of weight loss (WL) and improvement of comorbidities [1]. However, heterogeneity exists in WL trajectories [2] and as many as 25% of patients experience unsuccessful WL outcomes (e.g., $\leq 50\%$ of the excess of weight loss (EWL)) at 4.5 years after BS [3]. Although surgical, psychological, and biological mechanisms have been implicated in the ability to achieve and maintain weight loss after BS, post-surgical behavior and lifestyle aspects, such as lack of adherence to a healthy eating plan [4], sedentary routines [5], and lack of self-weighing [6], have also been proposed. Support groups are an integral part of the surgical weight management program [7]. However, the mechanisms by which support group attendance is associated with greater WL are not yet known. It seems logical to think that support groups provide psychosocial support to aid patients with the required dietary and lifestyle changes that promote successful outcomes after BS. They are also an ideal forum for continuing education after surgery, particularly as postoperative patients often forget details related to care or complications that were known preoperatively [8–10]. Although evidence is scarce, a systematic review including seven non-randomized retrospective cohort studies [11] suggests a positive association between support group attendance and WL after BS. However, the authors acknowledge that the studies were heterogeneous, with limited sample sizes and relatively short-term follow-up (FU) of less than 2 years. Since weight regain is frequently observed beyond two years [3], longer-term follow-up studies are needed. Therefore, to better understand the role of support group on WL trajectories, the primary aim of this study was to evaluate the effect of support group lifestyle program attendance on WL at short- (1 year) and long-term follow-up (5 years) after BS.

Methods

Study Design and Participants

All patients with severe obesity undergoing Roux-en-Y gastric bypass (RYGB) or sleeve gastrectomy (SG) for the first time at our Institution from January 2009 to December 2011 were included in this non-randomized prospective cohort study. Patients were considered for BS according to current guidelines [12]. Technical aspects and criteria for the selection of RYGB and SG have been previously reported [13]. In our institution, selection of SG was based on the presence of a large body mass index (BMI) (i.e., $\text{BMI} \geq 50 \text{ kg/m}^2$), high estimated operative risk, or the presence of an enlarged liver. Before surgery, medical history, medication use, height, body

weight (BW), systolic and diastolic blood pressure, hemoglobin A1C, fasting plasma glucose, total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglycerides levels were obtained. After surgery, individual medical and nutritional follow-up visits were done at 4, 8, 12, 18, 24, 30, and 36 months and yearly thereafter. BW was determined at each follow-up visit on a precision scale with participants wearing light clothes and no shoes. The Ethics Committee of Hospital Clinic Barcelona, Spain, approved this study. Participants were > 5 years post-op at the time of informed consent was obtained.

Bariatric Support Group Program

After BS and during the nutritional appointments, all patients were encouraged to attend the Bariatric Support Group Program (BSGP) as a part of the standard follow-up care. The BSGP was led by two trained Registered Dietitian Nutritionists (AA, VM), in an open forum format. The main aim of the BSGP was the development of strategies to enable patients to control their behaviors for long-term weight management. To encourage attendance, the BSGP was offered at different times and days during the week (see *supplementary* Table 1 for a more in-depth program description and schedule). The number of BSGP sessions attended was used as a measure of adherence. We differentiated 2 subprograms: (1) The Novel-Bariatric Support Group Program (N-BSGP) addressed patients during the first year after surgery. The aims were to train patients to increase adherence to the new dietary recommendations, avoid the nutritional complications especially prevalent during this period, and address emotional changes. (2) The Experienced-Bariatric Support Group Program (E-BSGP) offered support beyond the first year and at long-term FU. Each session included a discussion of specific cognitive-behavioral strategies to motivate behavior change. Data of support groups attendance was prospectively collected and expressed as the number of sessions attended during the first postoperative year (N-BSGP) and the number of sessions attended from 2nd through 5th postoperative year (E-BSGP).

Outcomes

Main study outcome was WL expressed as percentage of total body weight lost (%TBWL) or as percentage of excess weight lost (%EWL) at one year and two, three, four, and five years after BS. %TBWL was calculated as $100 \times [\text{initial BW} - \text{current BW}] / (\text{initial BW})$. %EWL was calculated as $100 \times (\text{initial BW} - \text{current BW}) / (\text{initial BW} - \text{BW corresponding to BMI} = 25)$.

Statistical Analysis

Statistical analyses were performed using the IBM SPSS Statistics v. 22.0 program (SPSS Inc., Chicago, IL).

Continuous variables are expressed as mean \pm standard deviation or median (interquartile range) as appropriate. Differences between groups were evaluated using parametric tests (χ^2 for categorical variables and t test for continuous variables). Variables with non-normal distribution were log transformed prior analysis.

Association between attendance to BSGP and WL was evaluated using linear regression analyses in which the number of sessions attended at first, second, third, fourth, and fifth postoperative year and from 2nd to 5th postoperative year were included as independent variable and %TBWL and %EWL at the end of the corresponding period were included as dependent variable. Covariates in the linear regression analyses included age, sex, baseline BMI, and type of surgery.

Results

We included five hundred and thirty-one participants (76.4% females) who underwent BS (RYGB: 233 (43.8%); SG: 298 (56.2%)). Mean age and BMI at the time of BS for the whole sample was 45.9 ± 11.1 years and 45.8 ± 5.4 kg/m², respectively. Demographic, clinical, and anthropometric characteristics and body WL trajectories for the whole study cohort are shown in Table 1 and *Supplementary Figure 1*, respectively. Participants who underwent SG were older, had a higher BMI, and more obesity-related comorbidities prior-surgery.

Data on body weight was available for 512 participants (96.4%) at one year, 456 (85.9%) at two years, 408 (76.8%) at three years, 389 (73.2%) at four years, and 403 (75.9%) at five years after BS. Participants who completed follow-up were older and had more obesity-related comorbidities at pre-surgical evaluation than participants lost for follow-up (*Supplementary Table 2*).

Table 1 Clinical characteristics for the whole study cohort according to type of surgery

	RYGB (<i>n</i> = 233)	SG (<i>n</i> = 298)	<i>p</i>
Age (years)	42.9 \pm 9.9	47.8 \pm 11.8	< 0.001
Pre-surgical BMI (kg/m ²)	44.4 \pm 4.1	46.9 \pm 6.1	< 0.001
Females (<i>n</i> , (%))	194 (83.2)	210 (70.4)	0.001
T2D (<i>n</i> , (%))	37 (15.9)	82 (27.5)	0.001
Hypertension (<i>n</i> , (%))	81 (34.7)	155 (52.0)	< 0.001
Dyslipidemia (<i>n</i> , (%))	56 (24.0)	101 (33.9)	0.014
EWL at last follow-up (%)	71.2 \pm 24.7	61.9 \pm 22.8	< 0.001
TBWL at last follow-up (%)	30.6 \pm 10.5	28.2 \pm 10.9	0.012
Length of follow-up (years)	4.5 \pm 1.2	4.5 \pm 0.9	0.415

BMI, body mass index; RYGB, Roux-en-Y gastric bypass; SG, sleeve gastrectomy; T2D, type 2 diabetes; EWL, excess weight lost; TBWL, total body weight lost

Impact of Novel-Bariatric Support Group Program on Short- and Long-term Body Weight Loss

Three hundred and twenty-three (60.8%) of 531 participants attended at least one Novel-Bariatric Support Group Program (N-BSGP) session. Among attendees, the median number of sessions attended during the first postoperative year was 4.1 sessions (IQR 3.5 to 6.0). Session attendance during the first postoperative year was positively correlated with age ($r = 0.160$, $p < 0.001$). Participants who attended at least one session of the N-BSGP had a greater likelihood of attending to E-BSGP (odds ratio 27.5 (95%CI 6.6 to 115.2)).

Linear regression analysis, including age, baseline BMI, sex, and type of surgery as covariates, showed that the number of sessions attended during the first year was positively related to achieved %TBWL ($\beta = 0.381 \pm 0.109$, $p < 0.001$) and %EWL ($\beta = 0.928 \pm 0.262$, $p < 0.001$) at one year. Number of sessions attended during the first postoperative year was also positively related to %TBWL achieved at 2nd ($\beta = 0.338 \pm 0.128$, $p < 0.001$) and 3rd ($\beta = 0.332 \pm 0.141$, $p = 0.019$) but not at 4th ($p = 0.161$) or 5th ($p = 0.297$) postoperative year. However, when the number of sessions attended during the specific period of the analysis (i.e., 2nd or 3rd postoperative year, respectively) was included as a covariate, attendance to N-BSG was only significantly related to the 1-year achieved %TBWL. Results were similar when considering %EWL as dependent variable.

The association between higher attendance to N-BSGP and WL at one year after BS was unchanged when analyses were restricted to those participants who attended or not attended to N-BSGP but completed the five years follow-up as part of our standard clinical appointments (%TBWL: $\beta = 0.446 \pm 0.117$, $p < 0.001$ and %EWL: $\beta = 1.052 \pm 0.267$, $p < 0.001$).

Impact of Experienced-Bariatric Support Group Program on Long-term Weight Loss

One hundred and twenty-nine of 531 (24.3%) attended at least one session of Experienced-Bariatric Support Group Program (E-BSGP). The proportion of participants who attended E-BSGP decreased from 24.1% at 2nd postoperative year to 7.1% in the 5th postoperative year ($p = 0.024$). Among attendees, median number of sessions attended from 2nd to 5th postoperative years was 4.0 sessions (IQR 2.0 to 14.0). The number of sessions attended was positively correlated with age ($r = 0.212$, $p < 0.001$) and with the number of sessions attended during the first year ($r = 0.564$, $p = 0.003$). A higher number of sessions attended during 2nd, 3rd, and 4th, were positively related to the 2nd, 3rd, and 4th, year achieved %TBWL, respectively. A non-significant statistical trend was observed between number of sessions attended during the 5th year and 5-year achieved %TBWL. A higher number of

sessions attended from 2nd thru 5th year after BS was related to larger WL in the 5th postoperative year. When the analysis was restricted to those participants who attended or not attended to E-BSGP but completed the five years follow-up, the association between attendance and weight loss did not change (Table 2).

Discussion

We observed a significant beneficial effect of continued attendance to a post-surgical support group program on both short- and long-term WL outcomes after RYGB and SG. Our results support the integration of long-term postoperative treatment support programs after BS and highlight the need for strategies primarily addressed to engage surgical patients over the long-term.

We observed a significant positive association between the number of sessions attended during the first postoperative year and 12-months %TBWL that was independent of pre-surgical BMI, age, sex, and type of surgery, consistent with previous studies [14–16].

Nonetheless, in our study, short-term intervention (N-BSGP) was related to better short-term outcomes and had no impact beyond the effect of continued longer-term attendance. A primary reason for the correlation between short-term attendance and 2–3 year weight loss may have been through increasing the likelihood of ongoing support group attendance in those years. Attendance to E-BSGP was independently associated with larger WL at mid- and long-term after BS. These data highlight the importance of long-term attendance to

maintain the beneficial effects commonly observed over the first year. To our knowledge, only three studies have evaluated the impact of BSGP in WL trajectories beyond the first postoperative year with inconsistent results. In a study of 46 participants (72% who underwent RYGB), Orth et al. [10] showed higher % BMI lost (42% vs. 32%) 25 months after surgery in those who attended BSGP compared with those who did not. In contrast, two studies failed to observe any significant impact of support group attendance and achieved %EWL at 30 months after vertical banded gastroplasty [17] or 2–3 years following RYGB [18]. However, neither of these studies provided detail regarding the start and duration of the support group or the continuity in participant attendance over time. Thus, these negative results might be explained by the absence of continued long-term support programs or by a decrease in attendance over time.

We observed a linear relationship between the number of sessions attended and short- and long-term weight outcomes. This relationship was also observed in previous studies [10] and underscore the need for strategies to promote long-term attendance to BSGP. In this regard, we observed a marked decrease in attendance from the 1st to the 5th postoperative year (60.8% vs. 7.1%). The lack of statistical significant between attendance and weight loss at 5th year could in part be attributed to low variability in attendance at that time. This observation is consistent with another study that reported decreased adherence to support group sessions from 50% at 1 year to 30% at 2 years after surgery [19] even when BSGP seems to be highly desired by patients [20]. Reasons for lack of long-term

Table 2 Multivariable linear regression models for the association between attendance to E-BSGP and %TBWL and %EWL at 2nd, 3rd, 4th, and 5th postoperative year

	Complete study cohort (<i>n</i> = 531)			Participants who completed five years of follow-up (<i>n</i> = 403)		
	β	95%CI	<i>p</i>	β	95%CI	<i>p</i>
Dependent variable: %TBWL at the end of the corresponding time period ^a						
Number of sessions attended during 2nd year	0.543	0.207 to 0.880	0.002	0.585	0.237 to 0.933	0.001
Number of sessions attended during 3rd year	0.675	0.264 to 1.085	0.018	0.720	0.319 to 1.122	<0.001
Number of sessions attended during 4th year	0.673	0.226 to 1.120	0.003	0.683	0.240 to 1.126	0.003
Number of sessions attended during 5th year	0.469	−0.058 to 0.997	0.081	0.470	−0.057 to 0.998	0.080
Number of sessions attended from 2nd to 5th year	0.162	0.032 to 0.291	0.014	0.162	0.032 to 0.291	0.014
Dependent variable: %EWL at the end of the corresponding time period ^a						
Number of sessions attended during 2nd year	1.156	0.379 to 1.932	0.004	1.250	0.447 to 2.053	0.002
Number of sessions attended during 3rd year	1.539	0.595 to 2.484	0.001	1.659	0.734 to 2.585	<0.001
Number of sessions attended during 4th year	1.521	0.485 to 2.556	0.004	1.544	0.519 to 2.570	0.003
Number of sessions attended during 5th year	1.153	−0.065 to 2.370	0.063	1.155	−0.63 to 2.372	0.063
Number of sessions attended from 2nd to 5th year	0.378	0.079 to 0.676	0.013	0.378	0.079 to 0.676	0.013

BMI, body mass index; RYGB, Roux-en-Y gastric bypass; SG, sleeve gastrectomy; T2D, type 2 diabetes

^a Adjusted for age, type of surgery, baseline body mass index and sex

adherence include psychological and social issues, such as lack of social support, presence of social and family barriers, and lack of self-efficacy. Clinic proximity and lack of free time have also been previously reported as major determinants of follow-up adherence after BS [21, 22]. In our series, participants who attended BSGP were older than non-attendant participants, which could be partially explained by their having fewer responsibilities and more free time. Differences between the types of programs offered after BS and its effects on WL were also explored. Beck and colleagues [23] evaluated whether postoperative psychological services (i.e., a psychotherapeutic intervention that are conducted by psychologists and support groups which are not led by a psychologist) influence WL midterm after BS (12–36 months). The results of this meta-analysis support with caution a beneficial effect of both postoperative psychotherapeutic interventions and support groups. In this regard, internet-based programs have been proposed as a useful approach as postoperative support, since they can be made widely available and easily accessible in the long term [24]. Although more evidence is needed on the effectiveness of virtual support groups after BS, a recent systematic review of group interventions utilizing videoconference in different chronic diseases showed that telehealth support groups could improve accessibility to treatment and was associated with positive outcomes [25], suggesting it could be a helpful strategy for a certain subgroup of patients.

Strengths of our study include a large sample size and long-term follow-up. There are also study limitations. First, voluntary nature of the BSGP in our institution might determine a selection bias. It is possible that patients with better weight outcomes after BS or worse clinical conditions prior to BS would be more highly motivated to adopt healthy lifestyle patterns and also to attend BSGP. Although we used multivariable models, it cannot be excluded that clinical differences might influence our results. Nonetheless, in our study, attendees were older and had more obesity-related comorbidities at the time of BS than non-attendees and both older age and obesity-associated comorbidities such as T2D have been previously related to worst WL outcomes after BS [26–28]. Second, although the proportion of missing data in our study is similar or even lower to that reported in previous studies of the field [19, 21], we recognize it as a study limitation. Nonetheless, when analyses were restricted to those participants who completed the five-year follow-up independently of their attendance to BSGP, results yielded similar results. Finally, other variables that might have an impact on weight outcomes after BS such as psychological and behavioral variables including quality of life, dietary patterns, or physical activity were not included in the analyses. Thus, the positive relation between WL and support group attendance in our series was associative, not causal. Well-designed randomized controlled trials with long-term follow-up are required.

Conclusions

Our results support the efficacy of a post-bariatric support group program to improve weight loss trajectories at mid-long term after BS. Following BS, an educational and supportive group intervention as a complement to individual follow-up sessions with an integrated multidisciplinary team was associated with weight loss. This favorable observation was more pronounced in participants with the highest attendance and continued follow-up contact.

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Compliance with Ethical Standards The Ethics Committee of Hospital Clinic Barcelona, Spain, approved this study. Participants were > 5 years post-op at the time of informed consent was obtained.

Conflict of Interest The authors declare that they have no conflict of interest.

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