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Predictors and Outcomes of Adolescent Bariatric Support Group Attendance

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Abstract

Background—Attending support groups connects adults undergoing bariatric surgery to peers and may improve weight loss efficacy. Predictors and outcomes of support group attendance of adolescents undergoing bariatric surgery are unknown.

Objective—The objective of this cohort study was to determine the rate, predictors, and outcomes of support group attendance in a free-standing adolescent bariatric program.

Setting—Academic children's hospital in the U.S.

Methods—Charts of 68 consecutive adolescents who underwent laparoscopic Roux-en-y gastric bypass or vertical sleeve gastrectomy were retrospectively reviewed, recording demographic and anthropometric variables, support group, and clinic visit attendance. Prospectively collected vitamin adherence data were also analyzed. Univariate analyses evaluated characteristics and multivariate analyses evaluated predictors of support group attendance, clinic visit, and vitamin adherence.

Results—Of the 68 subjects, one third attended 1–3 support sessions, one third attended 4, and one third were non-attenders. Greater distance from clinical center ($p=0.01$) and caregiver bariatric history ($p=0.05$) were associated with decreased attendance. Only high pre-operative body mass index (BMI) ($p < 0.01$) and caregiver bariatric history ($p < 0.01$) were independently associated with decreased attendance. Increased attendance was associated with higher 6 ($p=0.03$) and 12 month ($p<0.01$) clinic visit attendance but not with multi-vitamin adherence ($p=0.33$).

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Disclosures

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Conclusions—Caregiver bariatric history and higher pre-operative BMI were associated with decreasing attendance at an adolescent bariatric support group program. This highlights a need to encourage attendance in these patients since adolescent attendance at support group sessions was positively associated with greater adherence to scheduled clinic visits post-operatively which may positively influence long-term outcomes.

Keywords

support group; laparoscopic Roux-en-y gastric bypass; sleeve gastrectomy; adolescent bariatric surgery; adherence

Introduction

The prevalence and severity of obesity in the United States have increased dramatically during the past several decades in both adults and adolescents ^(1, 2). Severe obesity in adults is defined as a body mass index (BMI) ≥ 35 kg/m² and is estimated to reduce life expectancy by 5 to 13 years ^(3, 4). Severe obesity in adolescents is typically defined as a BMI ≥ 120 percent of the 95th percentile or ≥ 35 kg/m² and carries a significantly higher risk of serious medical comorbid diseases ^(5, 6). Surgical treatment for severe obesity is at present the most effective means of achieving significant and sustainable weight loss and reducing comorbidities ^(1, 3).

In addition to surgery, support groups are an integral part of the surgical weight management program. The American Society for Metabolic and Bariatric Surgery and organizations which accredit bariatric programs have recommended support groups as a critical component of comprehensive bariatric treatment programs ⁽⁷⁾.

A growing body of research suggests that support groups provide adult patients who have undergone bariatric surgery with a sense of connection to peers and promote adherence to weight loss programs ⁽⁸⁾. Several studies have identified a positive association between support group attendance and greater percent of post-operative weight loss at 12 months post surgery ^(9–13). The mechanisms by which support group attendance is associated with greater weight loss are not yet known, but one obvious hypothesis is that support groups provide psychosocial support to aid patients with the required dietary and lifestyle changes that promote successful outcomes after bariatric surgery. They are also an ideal forum for continuing education after surgery, particularly as post-operative patients have demonstrated forgetting facts related to care or complications that were known pre-operatively ^(11, 14, 15).

Given these benefits, understanding barriers to attendance proves equally important. Reported barriers to attendance at adult bariatric surgery support groups have included patient's family demands and the patient's belief about the necessity of support group ^(9, 11). The relationship between greater distance or travel time to reach clinic and attendance at support group has been inconsistent ⁽¹¹⁾.

To date, no data characterize the predictors and outcomes of support group attendance for adolescent patients undergoing bariatric surgery, nor are there data to guide the optimal and age-salient structure of the support group for adolescents in bariatric surgery programs. Adolescents face unique developmental challenges that may affect optimal adherence, including lifestyles with a wide range of competing demands (e.g., participation in extracurricular activities), limited skills for negotiating these demands, and a drive for independence and autonomy. The normal adolescent transition periods, such as moving from junior high to high school or obtaining after school employment, place adolescents at higher risk for non-adherence. It is also difficult to generalize adult study findings to adolescents

because they uniquely remain more directly under the influence of their parents/caregivers^(17, 18). Caregivers play a key role in providing adolescents with emotional and social support. They also facilitate adherence as they are primarily responsible for providing meals, for ensuring prescriptions are filled, for monitoring activities and for transporting the adolescent patient to pre- and post-operative appointments and support groups. There are however little data on the effects of family support in either adult or adolescent weight loss literature and uncertainty on how best to involve families⁽¹⁶⁾.

To address gaps in our knowledge base regarding the value and contribution of support groups for adolescent bariatric patients and their families, we studied our experience with adolescent patients attending a family-based support group in a freestanding, tertiary care children's hospital in the U.S. The primary aim of this study was to determine the rate and predictors of support group attendance. Based on our clinical observations related to caregiver bariatric history and adult studies identifying distance from clinic as a potential though inconclusive barrier, it was hypothesized that distance lived from clinic and caregiver's history of prior bariatric surgery would predict lower attendance. The secondary study aim was to determine outcomes of support group attendance, with the hypothesis that increased attendance at support group sessions would positively correlate with adherence to prescribed multi-vitamin supplementation and scheduled clinical follow-up visits at 6 and 12 months postoperatively. In addition to objectively measurable multivitamin adherence, we measured adherence to scheduled clinical follow-up visits as these visits are considered mandatory and are the forum for reviewing and encouraging adherence to lifestyle and exercise recommendations.

Methods

Subjects

This study was conducted as a retrospective chart review of 68 consecutive patients who underwent laparoscopic Roux-en-y gastric bypass (RYGB) or sleeve gastrectomy (SG) from January 2007 to November 2010 in an adolescent-only bariatric program in a free-standing, tertiary care children's hospital. The study was approved by the hospital's Institutional Review Board.

Pre-operative protocol

All patients completed a required preparatory program before surgery ranging from 3–6 months in length depending on the individual patient's insurance company's requirement and pace of learning. The preparatory program included monthly consultations with the program's surgeons, nurse practitioner, psychologist, social worker and registered dietitian. After completion of the preparatory program and insurance approval, the candidates were eligible to undergo RYGB or SG. All the operations were performed by the same team of surgeons.

Postoperative protocol

Postoperative follow-up visits were scheduled at 2 and 6 weeks, 3, 6, 9, 12, and 18 months, and annually thereafter. Data on weight loss, eating habits, family involvement, adherence to multivitamins and lifestyle recommendations were collected at every follow-up visit, each of which included a counseling session with the social worker, nurse practitioner and dietitian.

Support group structure

The pre- and post-operative treatment program also included every other month support group meetings. The program's licensed professional social worker served as the support group moderator and leader. A patient advisory committee consisting of 4 to 5 adolescent

bariatric patients assisted in planning the support group sessions. This committee met monthly with the support group leader. Patients and their family members (parent or primary guardian) were invited and encouraged at each clinic visit to attend at least 1–2 support groups during the pre-operative treatment phase and to attend all the support groups after surgery. Maximum recommended attendance was therefore 8 sessions in the time period from 6 months before to 12 months post-surgery.

Invitations were sent via U.S. mail, electronic mail, social media, and mobile phone text messages by the patient advisory committee members. The support group was conducted in an open forum, with participants and their family members sitting around a large table, sharing success stories and challenges. The support group meetings took place on the hospital campus and lasted 1 to 2 hours. The format was semi-structured with one planned ice-breaking activity followed by an open discussion. Individual participation in the discussion was voluntary and not documented⁽¹²⁾. The topics of group discussion were patient-generated. Representative discussion topics included discussing challenges faced by the adolescent through the surgery process and the importance of full family participation, as well as exchanging information on resources for protein shakes, exercise classes and more. Families and patients also shared their personal stories of weight gain, bariatric surgery and post-operative recovery. The moderator facilitated participation and discussion and provided education or clarification of information, as needed. The support group meetings were attended by patients and families at various time-points in their preoperative and postoperative course, enabling participants to both teach and learn during the same session⁽¹²⁾.

Measures

Medical and demographic data—Demographic, anthropometric, and medical variables were collected from medical chart review, including: age, gender, race, ethnicity, primary residential address, caregiver's history of bariatric surgery, educational level of primary care-giver, household income, weight, height, BMI, and type of surgery.

Adherence to prescribed multivitamin therapy—For a subset of subjects (n=30 of 68), 6-month postoperative multivitamin adherence was measured via, the Medication Event Monitoring System (MEMS® 6 Track Cap) made by AARDEX Corporation (Union City, CA), which consisted of a bottle and electronic cap. The cap has a time/date stamp recording each time the bottle is opened to monitor adherence to their multivitamin therapy when discharged from the hospital. Data from the TrackCaps were downloaded at each visit. This information was not shared with the medical team. Adherence rates (0–100%) were calculated by dividing the number of doses taken by the number of doses prescribed and multiplying by 100. Bariatric surgeons and/or nurse coordinators completed a Prescribed Treatment Plan form at the time of surgery and at subsequent clinic visits, noting the type and dose of multivitamin.

Support Group attendance—The number of support group sessions attended by each subject was abstracted from the support group attendance sheet.

Post-operative Clinic visit attendance: attendance at scheduled clinical follow-up visits at 6 and 12 months were determined from chart review. All patients received a follow up call prior to their scheduled clinic visits, irrespective of support group attendance.

Data analysis

Variables in the analysis included demographic characteristics (age, gender, race/ethnicity), adherence to scheduled clinic follow-up visits at 6 and 12 months after surgery, adherence to

post-operative multivitamin supplementation, primary caregiver's baseline BMI, and history of caregiver's bariatric surgery, education level of primary caregivers, household income, subject's weight, height, BMI and surgery type. Support group attendance was categorized as follows (out of a maximum of 8 recommended sessions in the 6 months pre-operatively through the 12 months post-operatively): 0 sessions attended ("non-attenders"), 1–3 sessions attended ("attenders"), 4 or more sessions attended ("frequent attenders"). We geographically coded (geocoded) each subject's residential address to estimate distance from clinical center. The distance between the geocoded location of each subject's residence and clinical center was calculated using the Great Circle Method.⁽¹⁹⁾ This metric determines the shortest straight-line distance between two points (i.e., geocoded x and y coordinate values), accounting for the curvature of the earth. Descriptive statistics were generated to characterize subject attributes. For aim 1, Chi-square and analysis of variance (ANOVA) were conducted to univariately evaluate characteristics by support group attendance level. Cumulative logit modeling was used to evaluate predictors of support group attendance – the proportional odds assumption was verified. For aim 2, to assess predictors of clinical follow-up attendance at 6 and 12 months post-operatively, a generalized estimating equations (GEE) model was performed. To account for withinsubject correlations, an unstructured correlation structure was selected based on Akaike's Information Criterion (AIC). Also for aim 2, multiple linear regressions were used to evaluate predictors of log-transformed vitamin adherence. Covariates were retained in each model when changes in estimates were 10% or greater. A p -value < 0.05 was considered statistically significant.

Results

Participants—Data from 68 consecutive patients were collected; 82.4% were female, 77.9% were white, 16.2% were African-American, 5.9% were other races and none were Hispanic. Mean pre-operative BMI was 51.0 kg/m², ranging from 34.0 to 71.2. Mean age at surgery was 17.5 ± 2.7 years. Most (58.8%) underwent RYGB, while the remainder (41.2%) underwent SG. Median distance lived from our clinical center was 59.2 miles (Min: 2.8, Max: 638.9).

Rate and predictors of attendance—Table 1 lists participant characteristics by frequency of support group sessions attended. Of the 68 patients, 23 (33.8%) were attenders, while 22 (32.4%) were frequent attenders. One third of subjects (n=23) were non-attenders. There were no significant differences in gender, race, age, BMI, surgical procedure, household income, caregiver education, or caregiver BMI by attendance level. Greater distance from clinical center was associated with fewer sessions attended ($p = 0.01$). The majority of regular attenders (91%) lived within 99 miles of the clinical center, compared with non-attenders (48%) and attenders (56%). A total of 11 caregivers had previously undergone bariatric surgery. Such a history was associated with decreased attendance ($p = 0.05$). Specifically, one-third (36.8%) of those never attending support group sessions had a bariatric caregiver, compared to 15% among those who attended 1–3 sessions and 5% of those with four or more sessions attended.

Multivariate analyses evaluated each of the aforementioned characteristics as predictors for support group attendance. After adjustment, pre-operative BMI (odds ratio (OR): 0.18; 95% confidence interval (CI): 0.06–0.53; $p < 0.01$) and caregiver bariatric history (OR: 0.06; 95% CI: 0.01–0.32; $p < 0.01$) were independently associated with decreasing levels of attendance.

Outcomes of support group attendance—Post-operative multivitamin adherence was evaluated in a subset of subjects (n=30). The median level of multivitamin adherence at 6 months was 23.3% (Min: 1.1%, Max: 88.0%). Adherence was not found to vary by level of attendance ($p = 0.33$).

Overall, 85.3% of the cohort returned for the 6 month clinical follow-up visit and 79.4% returned for the 12 month clinical follow-up visit (Table 1). However, when categorized by frequency of support group attendance, increased support group attendance was associated with significantly higher 6 and 12 month clinic visit attendance ($p=0.03$ and $p<0.01$, respectively). Regular support group attendees were the most adherent with 100% follow up at 6 and 12 month clinic visits.

Multivariate analyses evaluated characteristics shown in Table 1 as predictors for clinical follow-up. Increasing levels of support group attendance were associated with greater adherence to the scheduled clinical follow-up ($p = 0.01$). No other factors were found to have a significant relationship with clinical follow-up. However, distance to clinical center did approach significance ($p = 0.09$). Separately, support group attendance and other factors were evaluated as predictors for multivitamin adherence. Neither support group attendance ($p = 0.33$) nor any other factor was found to be associated with 6-month multivitamin adherence.

Discussion

This is the first study to examine the predictors and outcome of adolescent bariatric support group attendance. Our study showed a positive association between support group attendance and adherence to clinic visits at 6 and 12 months postsurgery. Adherence to clinic visits was greatest for those who attended 4 or more support groups, followed by those attending 1–3 groups. We also found that the caregiver's history of bariatric surgery was inversely proportional to the adolescents' attendance at support group, whereas caregiver BMI was not significant. In this retrospective study, we were unable to assess the reasons for non-attendance, but we hypothesize that caregivers who had bariatric surgery may be less likely to bring their adolescent to support groups as they may feel better prepared to support their child following surgery given their personal experience with bariatric surgery.

Bariatric surgery has been shown to effectively achieve and maintain weight loss in both adults and adolescents ^(1, 2). Although surgery is the most effective treatment for severe obesity, successful weight loss outcomes can be compromised by poor dietary choices and lifestyle decisions ⁽⁸⁾. According to Van Hout et al. ⁽²⁰⁾ 'bariatric surgery is a forced behavior modification' but psychosocial factors can affect the adherence of patients to the proper post-operative dietary and follow up recommendations. A Swiss study by Buddeberg- Fischer et al. ⁽²¹⁾ showed that severely obese patients should receive pre- and post-surgery counseling to increase adherence. Support groups are an ideal structure in which to provide and facilitate ongoing counseling. Support group programs help patients to understand what to expect pre-operatively and postoperatively, as well as to adhere to dietary and lifestyle recommendations which aim to maximize weight loss efficacy. Another important role of support groups is to promote realistic expectations of weight loss ⁽²²⁾. This is achieved through well-directed information, orientation, and supervision as needed. Psychosocial support may also be necessary for many patients to adapt to the new postoperative demands and deal with psychological, social, and environmental challenges.

There are some important similarities and differences between this retrospective adolescent cohort study and studies conducted in adult cohorts. In both age groups, support groups were regularly scheduled and provided a forum for patients to connect to peers and help them adhere to the weight loss program ^(8, 12). Both adult and adolescent support groups included continued education to help sustain long term health behaviors. The support group structures in the adult retrospective cohort studies included a variety of health care professionals facilitating the groups, such as nurses, dietitians, physicians, psychologists, and social workers. Our adolescent support group was facilitated by a licensed social worker. The definition of adequate support group attendance was also different across studies with some

accepting any attendance and others requiring at least 50% attendance⁽¹⁰⁾. Our study defined at least 50% attendance (at least 4 out of 8 recommended support groups) as frequent attendance.

Family member participation was not described in any of the adult cohort studies^(9, 11–13). There are scant data on the impact of family support in either adult or adolescent weight loss literature and resultant uncertainty on how best to involve families⁽¹⁶⁾. Some adult studies have suggested that spousal involvement may increase weight loss effectiveness in non-surgical weight loss interventions⁽¹⁶⁾. However, studies in adults undergoing bariatric surgery have suggested that family demands and obligations can negatively impact support group attendance^(11, 13). While we were unable to assess the impact of family obligations or degree of family involvement on support group attendance in our retrospective study, we did find an inverse association between caregiver bariatric history and attendance at support group. We hypothesize that greater parental familiarity and personal experience with the weight loss surgery process may lead the parent or caregiver to feel more knowledgeable about peri- and post-operative recommendations and feel more confident and empowered to provide support to their adolescent undergoing bariatric surgery. However, these adolescents then fail to access the support framework that can be provided by their peers which we hypothesize may also positively impact an adolescent's weight loss surgery experience and outcomes.

Adolescents and their families require a well-planned, developmentally appropriate pre-operative and post-operative program of education, preparation and psychosocial support which can be provided in the context of support group sessions. Further, the addition of a peer education framework within the support group is beneficial because the similarity of experience between young people facilitates communication and provides a positive model for behaviour change without the inherent power problems of the adult-adolescent relationship⁽²³⁾. Adolescents' ability for adherence is also influenced by their developmental level. Non-adherence may occur when self-management responsibilities outweigh their maturity and cognitive capacity. Caregiver involvement and monitoring is essential to assist adolescents in developing self-management skills and to provide ongoing support as the adolescent transitions into adulthood⁽²⁴⁾. Adolescents who have undergone bariatric surgery must adhere to many lifestyle and nutritional recommendations, including routine intake of multiple vitamin and mineral supplements. Supplements minimize the risks of nutritional deficiencies as a result of chronically reduced food intake and the potential of malabsorption after bariatric procedures such as gastric bypass^(25–27). Adolescents however are often non-adherent to recommended post-bariatric supplementation⁽²⁸⁾. We did not find an association between support group attendance and 6 month vitamin adherence. However, prospectively collected data tracking vitamin adherence was only available in a smaller subset of patients participating in an adherence sub-study, which may have precluded finding significant associations in this pilot study.

In addition to micronutrient adherence, adherence to lifestyle and exercise recommendations is believed to be important to achieve and maintain successful weight loss. In this retrospective study, we did not have access to objective measurements of lifestyle and exercise adherence, as this was documented subjectively within care providers' notes. Post-operative clinic attendance was therefore chosen as a proxy, as clinic visits are required and are the forum for reviewing and reinforcing adherence to lifestyle and exercise recommendations. Although this is the hypothesized utility of the postoperative visit, at present there are no published data to support or reject whether clinic visit attendance is in fact associated with better adherence to lifestyle and exercise measures. However, at least one study in adults has shown an association between greater excess weight loss in bariatric surgery patients who returned for more frequent follow-up visits⁽²⁹⁾. Follow-up studies of

bariatric surgery in adolescents and adults have not included methods to measure adherence or outcomes in those who have not returned for postoperative clinic visits. The ongoing Teen-Longitudinal Assessment of Bariatric Surgery (Teen-LABS) prospective observational study, which has enrolled 242 adolescents undergoing bariatric surgery across 5 centers nationally, will include home visits for those choosing not to return to clinic which will provide greater clarity about the role and significance of clinic visits in promoting adherence to lifestyle and exercise recommendations and clinical outcomes ⁽³⁰⁾.

The main limitation of our study is our retrospective design as well as relatively small sample size which may have limited our ability to detect significant associations. Our study was also limited by narrow ethnic and racial diversity, restricting generalizability. Larger and more long-term prospective studies investigating support group participation are needed to determine a causal influence on these parameters and to further explore whether support group attendance increases adherence to multivitamin and lifestyle recommendations, resulting ultimately in better long-term weight and health outcomes.

Another limitation of our retrospective study is that we could not determine active participation in support group from our abstracted support group attendance data. Attendance served as a proxy for participation, especially in patient-directed roundtable discussion groups, but some patients might benefit more from support groups than others. The participation levels were purposefully not measured during the support group meetings in an effort to allow patients to feel at ease with no pressure to speak. We encouraged an open discussion forum in the support group. In future prospective studies, it would be feasible to measure participation by documenting the general gauge of heavy, moderate, or light participation for patients at the end of each support group meeting.

We also did not have access to weight loss outcomes in this cohort as these results are being measured and will be reported in the ongoing prospective multi-center NIH funded Teen-LABS study in which these participants are also enrolled ⁽³⁰⁾. Adult studies have shown a positive correlation between post-surgery support group attendance and weight loss, therefore future prospective studies should investigate whether support group attendance in adolescents also positively correlates with greater weight loss and maintenance of lost weight ⁽³¹⁾. However, a study of 61 adolescents undergoing RYGB found that mean percent decrease in BMI at one year postoperatively was a uniform 37% across a wide range of BMI categories ranging from 40 to 95 kg/m², therefore the impact of support group on short-term 1 year weight loss ⁽³²⁾ may be less evident but merits further study.

Conclusions

We found that adolescent attendance at support group sessions was associated with greater adherence to scheduled clinic visits post-operatively. Because those adolescents with higher BMI and with parental history of bariatric surgery had decreased support group attendance, programs should consider developing strategies directed at improving attendance in these subgroups

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Table 1

Participant characteristics by frequency of support group sessions.

% (N)	Total (N=68)	Support Group Sessions Attended			p-value
		0 (n=23)	1-3 (n=23)	4 (n=22)	
Female	82.4 (56)	82.6 (19)	78.3 (18)	86.4 (19)	0.92
White	77.9 (53)	78.3 (18)	82.6 (19)	72.7 (16)	0.71
Age at Surgery					0.51
13-15 yrs.	26.5 (18)	26.1 (6)	34.8 (8)	18.2 (4)	
16-17 yrs.	38.2 (26)	34.8 (8)	43.5 (10)	36.4 (8)	
18 yrs.	35.3 (24)	39.1 (9)	21.7 (5)	45.5 (10)	
Baseline BMI					0.23
30-39 kg/m ²	2.9 (2)	0.0 (0)	0.0 (0)	9.1 (2)	
40-49 kg/m ²	48.5 (33)	39.1 (9)	52.2 (12)	54.6 (12)	
50 kg/m ²	48.5 (33)	60.9 (14)	47.8 (11)	36.4 (8)	
Distance to clinic					0.01
< 25 miles	30.9 (21)	17.4 (4)	34.8 (8)	40.9 (9)	
25-99 miles	33.8 (23)	30.4 (7)	21.7 (5)	50.0 (11)	
100 miles	35.3 (24)	52.2 (12)	43.5 (10)	9.1 (2)	
Surgical Procedure					0.74
Gastric Bypass	58.8 (40)	56.5 (13)	65.2 (15)	54.6 (12)	
Sleeve Gastrectomy	41.2 (28)	43.5 (10)	34.8 (8)	45.4 (10)	
Household Income					0.13
< \$50,000	60.7 (37)	60.0 (12)	80.0 (16)	42.9 (9)	
\$50,000-74,999	19.7 (12)	20.0 (4)	15.0 (3)	23.8 (5)	
\$75,000	19.7 (12)	20.0 (4)	5.0 (1)	33.3 (7)	
Caregiver Education					0.34
Less than High School	12.7 (8)	23.8 (5)	4.8 (1)	9.5 (2)	
High School Graduate	28.6 (18)	28.6 (6)	38.1 (8)	19.1 (4)	
Some College / Tech	25.4 (16)	19.1 (4)	33.3 (7)	23.8 (5)	
College Degree +	33.3 (21)	28.6 (6)	23.8 (5)	47.6 (10)	
Caregiver-Bariatric History	19.0 (11)	36.8 (7)	15.0 (3)	5.3 (1)	0.05

% (N)	Total (N=68)	Support Group Sessions Attended			p-value
		0 (n=23)	1-3 (n=23)	4 (n=22)	
Caregiver BMI*					
< 30 kg/m ²	31.5 (17)	41.2 (7)	35.0 (7)	17.7 (3)	0.40
30-39 kg/m ²	31.5 (17)	29.4 (5)	20.0 (4)	47.1 (8)	
40 kg/m ²	37.0 (20)	29.4 (5)	45.0 (9)	35.3 (6)	
Completed 6 month follow-up	85.3 (58)	73.9 (17)	82.6 (19)	100.0 (22)	0.03
Completed 12month follow-up	79.4 (54)	60.9 (14)	78.3 (18)	100.0 (22)	<0.01
6-month vitamin adherence					
N	30	12	11	7	0.33
Mean (SD)	30.7 (21.85)	34.4 (19.65)	22.0 (19.01)	37.9 (27.76)	
Median (Min, Max)	23.3 (1.1,88.0)	32.9 (12.7,80.6)	14.1 (6.1,69.6)	32.8 (1.1,88.0)	

Abbreviations: BMI: body mass index; SD: standard deviation.