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ORIGINAL ARTICLE

Psychological well-being and marital satisfaction in response to weight loss after bariatric surgery

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Abstract

Purpose To compare the marital satisfaction (MS) and psychological well-being (PWB) of men and women before and after bariatric surgery for obesity.

Methods The subjects of this prospective observational study were obese patients who underwent bariatric surgery. MS and PWB were assessed before, and 6 months after the surgery, using specific scales for MS and PWB.

Results The correlation matrix showed that age was not correlated with any of the scores from the PWB scales, and only with the total MS scores of men ($P < 0.05$). The pre-surgical BMI–post-surgical BMI (ΔBMI) was correlated negatively and significantly with the post-surgical total MS, especially for women, but it was not correlated with the sexual satisfaction of either gender. The score of positive interpersonal relationships was negatively correlated with the ΔBMI, especially for women ($P < 0.05$), whereas personal improvement was positively correlated for men ($P < 0.05$). There was also a significant correlation between ΔBMI and purpose in life for both genders. Post-surgical ΔBMIs were not associated with the other two indicators of PWB, namely, autonomy and environmental mastery for both genders.

Conclusions For women, weight loss after bariatric surgery seemed to improve PWB and MS when assessed 6 months post-operatively; however, the psychiatric assessment of patients before and after the surgery is crucial.

Keywords Bariatric surgery · Marital satisfaction · Obesity · Psychological well-being

Introduction

The global prevalence of bariatric surgery has been rising steadily over the past three decades, largely because of the dramatic increase in the obesity rate and the success of

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bariatric surgery for achieving fast weight loss and helping to curb co-morbid conditions [1–5]. Studies indicate that the prevalence of overweight and obese Turkish adults are 44% and 13%, respectively [6–8].Various factors, including genetics, age, gender, diet, lack of exercise, eating disorders, psychiatric disorders, and socioeconomic status, can lead to obesity [8]. Based on its side effects and sequela, researchers are continually seeking solutions to prevent and treat obesity. Diet therapy, medication, exercise, cognitive and behavior therapy, and bariatric surgery are the current interventions used to treat obesity [9–12].

Obesity and bariatric surgery are in a reciprocal relationship with psychiatric disorders and psychosocial variables. The presence of psychopathology, the level of knowledge about the surgical procedure, and patients' expectations about the physical, psychological, and social changes that may occur after surgery are significant parts of the evaluation of bariatric surgery patients [3, 4, 6, 7]. However, there are few studies on the impact of this surgical intervention on the mental health, social, and psychological well-being (PWB) of obese patients. Some studies show overall improvement in depressive symptoms, self-esteem, body image, and health-related quality of life after the surgery. Yet, the findings have been heterogeneous: in some studies, patients experienced post-operational (post-op) mental health benefits, whereas others reported emotional problems after the surgery [13, 14]. The impact of bariatric surgical intervention on mental health, PWB, and marital satisfaction (MS) may differ across cultures [15, 16]. There have been few studies on this subject in Turkey [14]. Thus, we conducted this study to evaluate the impact of weight loss on the PWB and MS of obese patients in Turkey, before and after bariatric surgery.

Methods

This was a prospective observational study with data collected from January to September, 2017 in Bagcilar Public Education and Research Hospital in Turkey.

Subjects

All the patients were attending our outpatient obesity clinic. The sampling method was convenient, with an effect size of 4.25 and an alpha set of 0.05. To be consistent with power analyses, we used list-wise deletion based on all variables in the procedure when computing Cronbach's alpha coefficients [17]. Power analysis was performed by the G*Power 3.1 program. According to a two-tailed post hoc power analysis, the confidence interval was 95% and the sample size was $n = 80$, from a total sample size of 88, subsequent to the list-wise deletion. The power of the study was calculated as 95%. All patients included in the study were candidates for sleeve gastrectomy surgery.

The study was approved by the ethical committee of Bagcilar Public Education and Research Hospital, Istanbul, Turkey (No: 2017-585). Written informed consent was sought from 88 eligible patients, 80 (90%) of whom agreed to participate. Thus, 80 obese patients (40 men and 40 women) were included in this study, with an age range of 20–55 years. They were free from other co-morbidities, such as respiratory, kidney, liver, and neurological disorders, and orthopedic problems inhibiting treadmill training. All participating patients were asked to complete a questionnaire about sociodemographic, MS, and PWB. Exclusion criteria were being unmarried, no interest in participating in the study, comorbidity of axis I psychiatric status, and inability to complete the questionnaire because of cognitive problems or insufficient education.

Obesity surgery

Sleeve gastrectomy is a two-stage operation involving dissection and then resection of the stomach. We mobilized the greater curvature of the stomach by dividing the gastrocolic and gastrosplenic ligaments. This dissection was extended to the left crus of the diaphragm to complete resection of the fundus. In the second stage, we resected the greater curvature of the stomach from the antrum starting opposite of the Latarjet nerve up to the angle of His. About two-thirds of the stomach was removed with this surgery [18].

Measures and tools

All participating patients had anthropometric measurements taken in the hospital by trained research staff using standardized procedures and equipment. All patients wore light clothing, with no shoes, for height and weight measurements. Height was measured to the nearest 0.1 cm using a TGZ type height tester (JH-1993 T, weighing Apparatus Co. Ltd. Dalian). Weight was measured to the nearest 0.1 kg using an electronic scale (JH-1993 T, weighing Apparatus Co. Ltd. Dalian). Body mass index (BMI) was calculated by dividing the weight in kilograms by the square of the height in meters (kg/m^2). According to the WHO classification, a BMI of < 18.5 kg/m^2 is underweight, 18.5–24.9 kg/m^2 is normal, and 25-29.9 kg/m^2 is overweight. A BMI of > 30 kg/m^2 is classified as obese and this group was further divided into moderate obesity (30–34.9 kg/m^2), severe obesity (35–39.9 kg/m^2), and morbid obesity (≥ 40 kg/m^2).

Psychological well-being

We used the PWB scale developed by Ryff, which is a 42-item scale with each item rated on a 6-point Likert scale,

ranging from 1 (strongly disagree) to 6 (strongly agree) [17]. The questionnaire is designed to assess how people perceive aspects of their own functioning. For example, "Do you feel that what you do in life is meaningful?" [19]. The scale consists of six separate dimensions: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance [17]. Sample items for each subscale were as follows: autonomy ("Do you agree that you have confidence in your decisions even if contrary to general consensus?"), environmental mastery ("Do you agree that you have been able to create a lifestyle that is much to your liking?"), personal growth ("Do you agree that you have the sense that you have developed a lot as a person over time?"), positive relationships with others ("Do you agree that you enjoy personal and mutual conversations with family and friends?"), purpose in life ("Do you agree that you sometimes feel as if you've done all there is to do in life?") and self-acceptance ("Do you agree that, in general, you feel confident and positive about yourself?"). Responses ranged from 1 to 6, with higher scores indicating better well-being. Each dimension represents a distinct facet of PWB. Cronbach's alpha reported satisfactory internal reliability for autonomy ($\alpha = 0.73$), personal growth ($\alpha = 0.70$), positive relations ($\alpha = 0.75$), purpose in life ($\alpha = 0.70$), and self-acceptance ($\alpha = 0.86$). Environmental mastery was lower than 0.7 ($\alpha = 0.60$), but this can still be considered marginal reliability [17].

Marital satisfaction

To evaluate MS, the short version of the MS scale developed by Yazgan ve Çelik was utilized [20]. This questionnaire consists of 13 items and the responses range from 1 (strongly agree) to 5 (strongly disagree). An overall measurement of MS included sexual function, MS, communication with spouse and their parents, marital solidarity, and marital conflicts. Studies have reported an acceptable reliability for this scale, with Cronbach's alpha reported as 0.83 [19, 21].

Statistical methods

Data was analyzed using SPSS20 software (SPSS, Inc., Chicago, IL, USA). The normality of the distribution of variables was examined using the Kolmogorov–Smirnov test. The results of the two groups in terms of MS and PWB were evaluated using paired *t* test and Wilcoxon test. Other variables were compared using paired *t* test, Mann–Whitney, and covariance analysis. The two-tailed value of 0.001 was considered significant.

Descriptive statistics were utilized to correlate the pre-surgical and post- surgical statuses of MS and PWB with age and pre-surgical BMI–post-surgical BMI (ABMI). The parametric variables were correlated by the Pearson correlation test and nonparametric variables were correlated by the Spearman correlation test. *P* values < 0.05 were considered significant.

Results

Demographic findings

Table 1 summarizes the demographic characteristics of the 80 obese patients enrolled in the study. The mean age of the patients was 36.0 ± 8.3 [22–53] years and there were 40 men

Table 1 Demographic characteristics of the patients who underwent bariatric surgery

	Total ($n = 80$)
Age	
$X \pm$ SD (min–max)	36.0 ± 8.3 (22–53)
Gender (*N*/%)	
Male	40 (50)
Female	40 (50)
Living environment (*N*/%)	
Village/town	5 (6.3)
County	12 (15.0)
Metropolis	63 (78.8)
Educational status of the patient (*N*/%)	
Illiterate	0 (0)
Literate	2 (2.5)
Primary school	14 (17.5)
College	44 (55.0)
High school	11 (13.8)
Educational status of the mother (*N*/%)	
Undergraduate/graduate	9 (11.3)
Illiterate	4 (5.0)
Literate	10 (12.5)
Primary school	33 (41.3)
College	29 (36.3)
High school	3 (3.8)
Undergraduate/graduate	1 (1.3)
Educational status of the father (N/%)	
Illiterate	1 (1.3)
Literate	6 (7.5)
Primary school	33 (41.3)
College	34 (42.5)
High school	3 (3.8)
Undergraduate/graduate	3 (3.8)
Economic status	
Very low/low	11 (13.8)
Middle	59 (73.8)
High/very high	10 (12.5)

X ± SD [min–max] Mean ± standard deviation [minimum–maximum]

(50%) and 40 women (50%). Most of the patients lived in the city (78.8%), 55% had graduated from a college, 41.3% had mothers who finished primary school, and 42.5% had fathers who graduated from a college. None of the patients were illiterate, while the ratio of illiterate mothers vs. fathers was 5.0%: 1.3%. Most of the patients (73.8%) stated that they have middle income.

The pre- and post-surgical BMIs were 47.7 ± 3.9 [40.5–59.3] and 35.6 ± 3.4 [25.9–43.6], respectively (Table 2), representing a significant decrease after bariatric surgery, as expected ($P = 0.000$).

Mean levels of marital satisfaction and psychological well-being scales

Table 2 shows the pre- and post-surgical top scores of MS. Compared with the pre-surgical scores, total MS and sexual satisfaction after surgery increased significantly for both genders ($P < 0.001$). The six dimensions of PWB, namely, autonomy, environmental mastery, personal improvement, positive interpersonal relationships, and purpose in life, were reported as median in Table 2. Median levels of autonomy, environmental mastery, personal improvement, and purpose in life increased significantly after bariatric surgery, from the pre-surgical medians for both genders ($P < 0.01$ for autonomy and $P < 0.001$ for others), while the median levels of positive interpersonal relations decreased significantly after surgery, especially for men ($P < 0.01$).

Correlations between demographic variables and the marital status and psychological well-being scores

The correlation matrix between age or ΔBMI and total MS, sexual satisfaction, and the indicators of PWB demonstrated the relationship between variables (Table 3). Figure 1 shows the diagrams for significant correlations between the different parameters for both genders. Age was negatively correlated with pre-surgical and post-surgical marital status only for men ($P < 0.05$). There was a significant correlation between the ΔBMI and pre-surgical total MS for all patients and post-surgical MS for women ($P < 0.05$ for both). The six indicators of PWB were also not correlated with age in men or women ($P > 0.05$). One of the indicators of PWB, namely, positive interpersonal relationships, was negatively correlated with the ΔBMI, especially for women ($P < 0.05$); whereas personal improvement was correlated positively for men ($P < 0.05$). There was also a significantly negative correlation between the ΔBMI and purpose in life for both genders. Finally, ΔBMIs were not associated with the other two indicators of PWB, namely, autonomy and environmental mastery, for both genders.

Discussion

This study showed that weight loss in obese patients, assessed 6 months after bariatric surgery, led to increased PWB and MS scores for women. Other studies have found that the weight loss resulting from this surgery has a strong impact on the PWB of obese patients [23, 25, 26, 28–30]. This improvement was not associated with the amount of weight loss or the type of surgery [31–33]. Accordingly, a comprehensive research study on 4047 Swedish obese subjects (SOS) demonstrated a significant reduction in depression and anxiety scores 1 year after the surgery compared with those of the control group [24]. In contrast to the present study, a qualitative study showed an increase of psychological conflicts 3, 6, and 12 months after the surgery. Those authors concluded that identity change, anger towards others, and fear of losing food as a friend were the findings not reflected in the questionnaires of quantitative studies. Those results indicated that almost all patients reported an increased need for post-op psycho-social support. We presume that besides psychological improvement, patients could have some psychological conflicts after bariatric surgery [22, 26].

Some studies concluded that the duration of follow-up after bariatric surgery can affect the outcome of bariatric surgery on psychological improvement. Positive associations between weight and biopsychosocial status could become more significant after long-term follow-up, since before the surgery patients had the common problem of morbid obesity, and during the first months after bariatric surgery, they had the common problems of fast weight loss, losing food as a friend, and adjustment to a new life [14].

In the present study, bariatric surgery led to increased MS scores. This improvement was correlated with a significant decrease in the BMI, especially for women, but sexual satisfaction was not associated with weight loss for either gender. Concordantly, studies by Cooper and Wells on patients with obesity before and after gastric bypass surgery revealed that even after 3 months nearly 69% of the patients reported better MS [27, 34]. Hafner evaluated 69 married women before and 12 months after bariatric surgery and found a decrease in the post-op affection feeling/behavior scale on the marital-attitudes questionnaire. After the surgery, the women evaluated themselves as more social and attractive, but their husbands described their wives' social interaction as "excessive" [33].

Contrary to our findings, Jolfaei et al. did not find a positive change in MS 6 months after bariatric surgery in their assessment of MS and self-confidence before and 6 months after surgery in a cohort of patients in Tahran [15]. They attributed these findings in part to the short

Table 2 Body mass index, marital satisfaction, and the six dimensions of psychological well-being, before and 6 months after bariatric surgery

	Pre-surgery	6 months post-surgery	*P*
BMI (kg/m^2) X ± SD [min–max]			
M	47.5 ± 3.6 [40.5–58.3]	35.2 ± 3.4 [25.9–43.5]	< 0.001***
F	48.2 ± 4.1 [40.7–59.3]	35.9 ± 3.3 [30.2–42.6]	< 0.001***
T	47.7 ± 3.9 [40.5–59.3]	35.6 ± 3.4 [25.9–43.6]	< 0.001***
Total marital satisfaction *X* ± SD [min–max]			
M	34.7 ± 6.3 [20–50]	41,0 ± 6.5 [23–59]	< 0.001***
F	36.0 ± 6.2 [21–59]	40.2 ± 5.9 [23–61]	< 0.001***
T	35.38 ± 6.23 [20–59]	40.60 ± 6.16 [23–61]	< 0.001***
Sexual satisfaction *X* ± SD [min–max]			
M	10.9 ± 2.2 [7–17]	13.1 ± 2.9 [8–18, 22, 24]	< 0.001***
F	11.7 ± 2.1 [8–17]	13.1 ± 2.7 [9–16]	< 0.001***
T	11.3 ± 2.2 [7–17]	13.1 ± 2.8 [8–18, 22, 24]	< 0.001***
Autonomy Median [min–max]			
M	37.0 [25–47]	37.0 [23–49]	0.434
F	39.5 [20–47]	42.0 [26–58]	< 0.001***
T	38.0 [20–47]	39.0 [23–58]	0.001**
Environmental mastery Median [min–max]			
M	37.0 [27–44]	38.0 [20–45]	0.002**
F	35.0 [28–44]	37.0 [25–56]	0.004**
T	36.0 [27–44]	38.0 [20–56]	< 0.001***
Personal improvement Median [min–max]			
M	38.5 [29–51]	40.0 [25–54]	< 0.001***
F	38.5 [25–54]	41.0 [30–56]	< 0.001***
T	38.5 [29–54]	41.0 [30–56]	< 0.001***
Positive interpersonal relationships Median [min–max]			
M	38.0 [30–51]	36.5 [28–50]	0.014*
F	35.5 [25–53]	34.5 [28–51]	0.053
T	36.5 [30–53]	36.0 [28–51]	0.001**
Purpose in life Median [min–max]			
M	37.0 [29–48]	41.5 [31–52]	< 0.001***
F	34.0 [30–48]	39.0 [32–52]	< 0.001***
T	35.0 [29–48]	40.5 [32–52]	< 0.001***

X ± *SD [Min–Max]* Mean ± standard deviation [minimum–maximum], *M* male ($n = 40$), *F* female ($n = 40$), *T* total ($n = 80$)

*$p < 0.05$

**$p < 0.01$

***$p < 0.001$

follow-up period and the fact that patients had the common problems of fast weight loss, losing food as a friend, and adjusting to a new life in the first post-operative months.

Contradictory to our findings, another study of women before and 6 months after bariatric surgery revealed improvement in their sex life. Dano and Hahn-Pedersen and Crisp et al. also reported that patients experienced a lower rate of sexual problems post-operatively [31, 35]. The present study suggested gender differences in PWB and MS scales, finding a significantly higher correlation

Table 3 Correlation matrix between demographic variables (age and pre-surgical–post-surgical body mass index) of the bariatric patients ($n=80$) and their marital status and psychological well-being scores

	Age		Post-Surgical ΔBMI	
	Spearman r	*p*	Pearson r	*p*
Pre-surgical total marital satisfaction				
M	−0.335	0.035*	−0.223	0.067
F	−0.023	0.889	−0.211	0.096
T	−0.195	0.083	−0.241	0.032*
Post-surgical total marital satisfaction				
M	−0.349	0.027*	0.210	0.097
F	0.251	0.118	−0.241	0.049*
T	−0.062	0.585	−0.004	0.973
Pre-surgical sexual satisfaction				
M	−0.243	0.131	−0.188	0.123
F	−0.176	0.276	−0.167	0.151
T	−0.207	0.065	−0.174	0.123
Post-surgical sexual satisfaction				
M	−0.035	0.832	0.172	0.145
F	0.162	0.317	0.074	0.324
T	0.061	0.589	0.121	0.284
Pre-surgical autonomy				
M	−0.205	0.204	−0.098	0.273
F	−0.079	0.624	0.006	0.486
T	−0.146	0.197	−0.039	0.731
Post-surgical autonomy				
M	−0.196	0.225	−0.093	0.284
F	0.092	0.574	0.018	0.456
T	−0.049	0.664	−0.029	0.792
Pre-surgical environmental mastery				
M	0.162	0.318	−0.145	0.187
F	−0.076	0.641	−0.190	0.120
T	0.021	0.855	−0.167	0.139
Post-surgical environmental mastery				
M	0.143	0.379	−0.206	0.101
F	0.198	0.221	0.224	0.083
T	0.158	0.161	−0.122	0.280
Pre-surgical personal improvement				
M	−0.193	0.232	0.224	0.083
F	0.229	0.155	0.069	0.336
T	0.006	0.958	0.144	0.203
Post-surgical personal improvement				
M	−0.209	0.195	0.330	0.019*
F	0.145	0.372	−0.001	0.498
T	−0.030	0.793	0.154	0.172
Pre-surgical positive interpersonal relationships				
M	0.089	0.581	−0.147	0.183
F	−0.029	0.860	−0.272	0.044*
T	0.046	0.685	−0.209	0.063
Post-surgical positive interpersonal relationships				
M	−0.067	0.682	−0.262	0.052
F	−0.010	0.949	−0.323	0.021*
T	−0.027	0.812	−0.292	0.009*
Pre-surgical purpose in life				
M	−0.052	0.784	0.033	0.420
F	0.005	0.975	−0.092	0.285
T	−0.014	0.901	−0.185	0.099
Post-surgical purpose in life				
M	−0.079	0.625	−0.279	0.041*
F	0.038	0.815	−0.291	0.034*
T	−0.032	0.779	−0.134	0.235

M Male ($n=40$), *F* female ($n=40$), *T* total ($n=80$), *ΔBMI* Pre-surgical BMI − Post-surgical BMI

*$p<0.05$

for MS and positive interpersonal relationships with post-surgical BMI in women compared to men, whereas men had a significantly more positive correlation for personal improvement. Scores for purpose in life were correlated negatively for both genders, but not in the total status. Most other studies found that both men and women improved in all psychological measures and body image post-operatively [31, 33]. Preoperatively, women had a significantly worse body image score and PWB, but fewer comorbidities. Other studies reported that men had significantly higher PWB scores, and lower self-reported depression scores than their female counterparts post-operatively [35]. To date, most studies have found that obese women tend to be more concerned about body image, have higher depressive symptoms and perceived stress, and unhealthy habits in relation to their body image [31, 33]. Concordantly, there is a marked gender difference in patients undergoing bariatric surgery (men 20% vs women 80%). However, it remains unclear whether the physiologic and/or psychological characteristics of men and women contribute to this gender gap in bariatric surgery.

The most important limitations of this study were its small sample size and the short-term follow-up. The decrease in BMI by 6 months after bariatric surgery generally improved PWB and MS; however, the psychiatric assessment of patients and long-term observation are important.

In conclusion, the findings of this study showed that the weight loss achieved 6 months after bariatric surgery generally improved the PWB and MS of obese patients of both genders. However, the psychiatric assessment of patients before and after the surgery is crucial. Prospective studies on larger sample sizes with longer follow-up are needed to evaluate other psychosocial variables influencing MS and PWB.

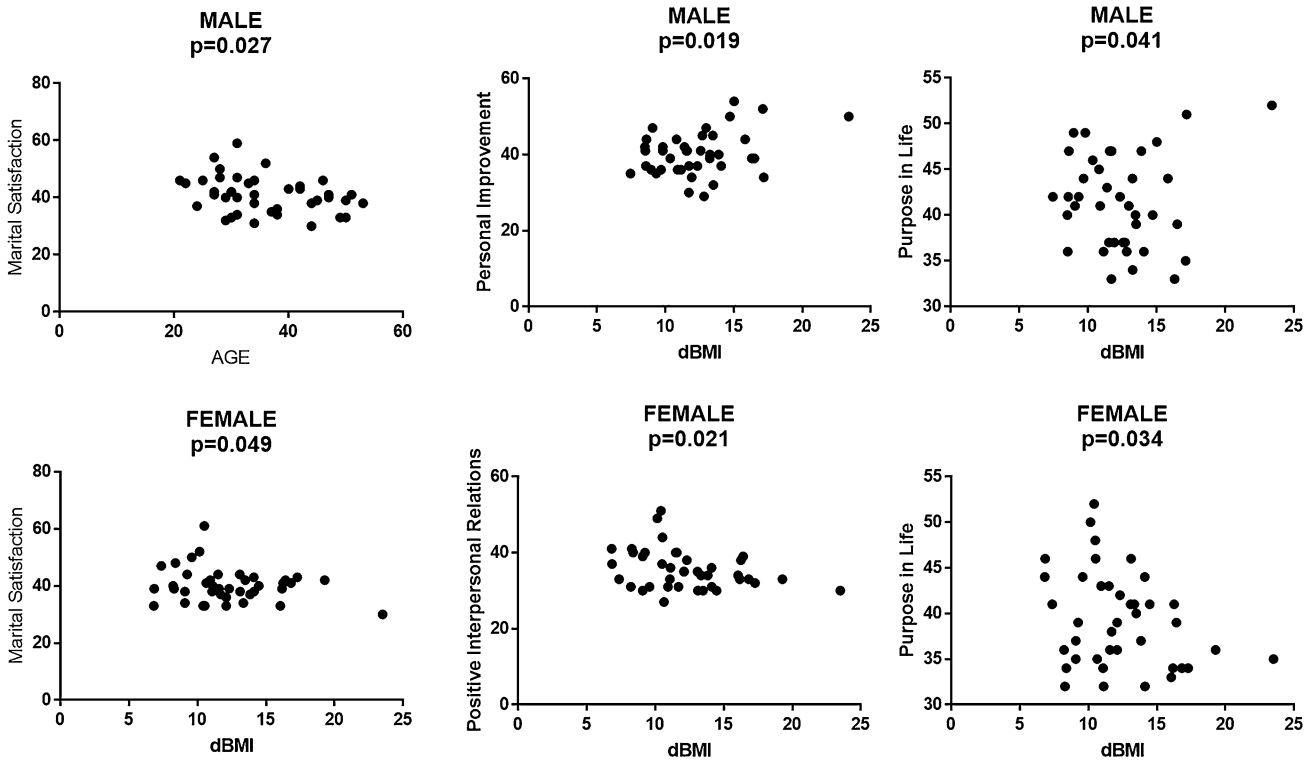

Fig. 1 Diagram presenting all significant correlations between the scores of marital satisfaction and psychological well-being and BMI change (ΔBMI) for both genders

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Compliance with ethical standards

Conflict of interest We have no conflicts of interest and no financial support in relation to this study. All authors actively participated in the work and manuscript preparation, with full control of all primary data. All authors agree to allow the journal to review their data if requested.

References

1. Hedley AA, Ogden CL, Johnson CL, Carroll MD, Curtin LR, Flegal KM. Prevalence of overweight and obesity among US children, adolescents and adults, 1999–2002. JAMA. 2004;291:2847–50.
2. Sturm R, Hattori A. Morbid obesity rates continue to rise rapidly in the United States. Int J Obes. 2012;37:889–91.
3. Kalarchian MA, Marcus MD, Levine MD, Courcoulas AP, Pilkonis PA, Ringham RM, et al. Psychiatric disorders among bariatric surgery candidates: relationship to obesity and functional health status. Am J Psychiatry. 2007;164:328–34.
4. Sarwer DB, Wadden TA, Fabricatore AN. Psychosocial and behavioral aspects of bariatric surgery. Obes Res. 2005;13:639–48.
5. Buchwald H. Bariatric surgery for morbid obesity: health implications for patients, health professionals, and third-party payers. J Am Coll Surg. 2005; 200;593–604.
6. Herpertz S, Kielmann R, Wolf AM, Langkafel M, Senf W, Hebebrand J. Does obesity surgery improve psychosocial functioning? a systematic review. Int J Obes Relat Metab Disord. 2003;27:1300–14.
7. Marcus MD, Kalarchian MA, Courcoulas AP. Psychiatric evaluation and follow-up of bariatric surgery patients. Am J Psychiatry. 2009;166:285–91.
8. Satman I, Yilmaz T, Sengül A, Salman S, Salman F, Uygur S, et al. Population-based study of diabetes and risk characteristics in Turkey: results of the Turkish diabetes epidemiology study (TURDEP). Diabetes Care. 2002;25:1551–6.
9. Perri MG, Corsica JA. Improving the maintenance of weight lost in behavioral treatment of obesity. Handbook of obesity treatment, vol 1. New York: Guilford Press; 2002. pp. 357–79.
10. Goodpaster BH, Delany JP, Otto AD, Kuller L, Vockley J, South-Paul JE, et al. Effects of diet and physical activity interventions on weight loss and cardiometabolic risk factors in severely obese adults: a randomized trial. JAMA. 2010;304(16):1795–802.
11. Cigaina V. Gastric pacing as therapy for morbid obesity: preliminary results. Obes Surg. 2002;12(1):12S–6S.
12. Bays HE. Current and investigational antiobesity agents and obesity therapeutic treatment targets. Obes Res. 2004;12(8):1197–211.
13. de Zwaan M, Lancaster KL, Mitchell JE, Howell LM, Monson N, Roerig JL, et al. Health-related quality of life in morbidly obese patients: effect of gastric bypass surgery. Obes Surg. 2002;12:773–80.
14. Sevinçer GM, Coşkun H, Konuk N, Bozkurt S. Psychiatric and psychosocial aspects of bariatric surger. Curr Approaches Psychiatry. 2014;6(1):32–44.
15. Jolfaei AG, Lotfi T, Pazouki A, Meybod AM, Soheilipour F, Jesmi F. Comparison between marital satisfaction and self-esteem before and after bariatric surgery in patients with obesity. Iran J Psychiatry Behav Sci. 2016;10(3):e2445.

16. Aflakseir A, Nowroozi S, Mollazadeh J, Goodarzi MA. The role of psychological hardiness and marital satisfaction in predicting posttraumatic growth in a sample of women with breast cancer in isfahan. Iran J Cancer Prev. 2016;9(4):4080.
17. Rand CS, Kowalske K, Kuldau JM. Characteristics of marital improvement following obesity surgery. Psychosomatics. 1984;25(3):221–3.
18. Marceau P, Hould FS, Simard S, Lebel S, Bourque RA, Potvin M, Biron S. Biliopancreatic diversion with duodenal switch. World J Surg. 1998;22:947–54.
19. Abbot RA, Ploubidis GB, Huppert FA, Kuh D, Wadsworth MEJ, Croudace TJ. Psychometric evaluation and predictive validity of Ryff's psychological well-being items in a UK cohort sample of women. Health Qual Life Outcomes. 2006;4:76.
20. Yazgan İnanç B, Çelik M. Ç.Ü. Evlilik doyum ölçeği: geçerlilik ve güvenirlik çalışmaları. Sosyal Bilimler Enstitüsü Dergisi. 2009;18(2):247–69.
21. Batool A. Relationship between personality and marital satisfaction. Psychology. 2008;2(2):31–6 **(in Persian)**.
22. Magdaleno R, Chaim EA, Turato ER. Psychological recommendations in the massive weight loss for patients after bariatric surgery in public service outpatient in Southeast Brazil. Eur Psychiatry. 2011;1(26).
23. Faulconbridge L, Wadden T, Rubin R, Walkup A, Fabricatore A, Coday M, et al. One-year changes in weight and symptoms of depression in depressed vs. non-depressed individuals in the Look AHEAD study. Obesity. 2009;17(suppl 2):576.
24. Karlsson J, Sjostrom L, Sullivan M. Swedish obese subjects (SOS)—an intervention study of obesity: two-year follow-up of health-related quality of life (HRQL) and eating behavior after gastric surgery for severe obesity. Int J Obes Relat Metab Disord. 1998;22(2):113–26.
25. Wycherley T, Clifton P, Noakes M, Brinkworth G. Weight loss on a structured hypocaloric diet with or without exercise improves emotional distress and quality of life in overweight and obese patients with type 2 diabetes. J Diabetes Invest. 2014;5:94–8.
26. Akın A. Akılcı duygusal davranışçı terapi (SDDT) odaklı grupla psikolojik danışmanın psikolojik iyi olma ve öz-duyarlık üzerindeki etkisi. Sakarya: Doktora Tezi, Sakarya Üniversitesi Sosyal Bilimler Enstitüsü; 2009.
27. Cooper KM, Wells M. Effects of bariatric surgery on marital satisfaction. Surg Obes Relat Dis. 2006;2(3):334.
28. Lau DC, Teoh H. Benefits of modest weight loss on the management of type 2 diabetes mellitus. Can J Diabetes. 2013;7:128–34.
29. Grave R, Calugi S, Petroni M, Di Domizio S, Marchesini G. Weight management, psychological distress and binge eating in obesity. A reappraisal of the problem. Appetite. 2010;54:269–73.
30. Imayama I, Alfano C, Kong A, Foster-Schubert K, Bain C, Xiao L, et al. Dietary weight loss and exercise interventions effects on quality of life in overweight/ obese postmenopausal women: a randomized controlled trial. Int J Behav Nutr Phys Activ. 2011;8:118–29.
31. Dano P, Hahn-Pedersen J. Improvement in quality of life following jejunoileal bypass surgery for obesity. Scand J Gastroenterol. 1977;12(7):769–74.
32. Bond DS, Vithiananthan S, Leahey TM, Thomas JG, Sax HC, Pohl D, et al. Prevalence and degree of sexual dysfunction in a sample of women seeking bariatric surgery. Surg Obes Relat Dis. 2009;5(6):698–704.
33. Hafner RJ. Morbid obesity: effects on the marital system of weight loss after gastric restriction. Psychother Psychosom. 1991;56(3):162–6.
34. Ryff C, Keyes C. The structure of psychological well-being revisited. J Pers Soc Psychol. 1995;69:719–27.
35. Crisp AH, Kalucy RS, Pilkington TR, Gazet JC. Some psychosocial consequences of ileojejunal bypass surgery. Am J Clin Nutr. 1977;30(1):109–20.