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The impact of sleeve gastrectomy on quality of life and mental health one year after surgery: a single-center prospective cohort study

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Abstract

Objectives The prevalence of impaired health-related quality of life (HRQOL) and some mental health complications, such as anxiety and depression, were previously reported to be higher in cases with obesity. However, the prevalence and changes before and after metabolic bariatric surgery (MBS) are less well-defined in various populations of individuals with severe obesity.

Methods In this prospective study, the status of HRQOL, anxiety, and depression symptoms of 32 cases with severe obesity who underwent sleeve gastrectomy (SG) were investigated one month before and one year after surgery. The assessments were performed through the Hospital Anxiety and Depression Scale (HADS) and the Impact of Weight on Quality of Life-lite (IWQOL-Lite) questionnaires.

Results One year after surgery, Patients' average body mass index (BMI) decreased significantly by 9.14 kg/m^2 (95% CI: -10.76; -7.52. At baseline, the incidence rates of probable/possible anxiety or depression disorders were 65.6% and 46.9%, respectively. However, these symptoms did not improve significantly after surgery. In contrast, HRQOL scores significantly improved across all domains.

Conclusion The point prevalence of mental health complications appears to be relatively higher among patients who underwent MBS compared to the general population. While the surgery effectively reduced weight and improved the HRQOL of patients, the impact on anxiety and depression was insignificant. Due to the small sample size, especially the limited number of patients with abnormal HADS scores, these findings should be interpreted cautiously.

Keywords Weight loss, Anxiety, Depression, Metabolic bariatric surgery, Psychology

Introduction

Obesity is a chronic disease with a rising global prevalence, causing mortality and severe morbidities such as ischemic heart disease, cancers, and type 2 diabetes mellitus [1, 2]. Further to impacting physical health, severe obesity adversely affects mental health and patient's well-being [1, 3]. Systematic reviews have shown a correlation between obesity and mental disorders, including depression, anxiety, and binge eating disorders [4, 5]. The presence of these mental health conditions, combined with

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the social stigma experienced by individuals with severe or complex obesity, often results in impaired health-related quality of life (HRQOL) [6]. Previous studies demonstrated that patients seeking metabolic bariatric surgery (MBS) have a higher prevalence of mental illness compared to the general population [7–9].

Although MBS is the most effective treatment option regarding weight loss and reducing mortality in patients with severe obesity, the role of metabolic surgery in modifying the quality of life (QOL) of patients and mental-related outcomes is less well-defined [2, 10]. There seems to be a modification in the prevalence and severity of depression in a short period after MBS [4, 11]. Further reviews demonstrated the possible beneficial role of MBS in HRQOL in 1–2 years following the surgery [6, 10]. Nevertheless, some studies reported impaired mental HRQOL and high anxiety levels, even more than perioperative levels, after short-term alleviation [1, 12]. Furthermore, some articles reported a higher risk of depression and suicidal rate in individuals postoperatively compared to the control group [13, 14].

Given the increasing incidence of severe obesity and the growing number of metabolic bariatric surgeries performed worldwide, there is a critical need for further research into the impact of MBS on HRQOL and mental health. Therefore, the objective of this study was to evaluate anxiety and depression symptoms, as well as HRQOL, in patients undergoing MBS.

Materials and methods

Participants

We prospectively investigated the cohorts of patients with obesity who underwent SG at Shariati Hospital (Tehran, Iran) between March 2023 and March 2024. Eligible participants were adults (≥ 18 years) with class III obesity (BMI >40 kg/m^2) or class II obesity (BMI 35–40 kg/m^2) accompanied by at least one obesity-related comorbidity. We excluded individuals with a documented history of severe psychiatric disorders or those receiving ongoing psychiatric treatment. After obtaining written informed consent, patients completed the required assessments for measuring HRQOL, anxiety, and depression at baseline (one month before surgery) and 12 months postoperatively. To assess potential confounding factors affecting depression and quality of life, we evaluated postoperative outcomes, such as rate of major complications (bleeding, staple line leak, gastric stenosis), need for re-operation, and length of hospital stay after surgery.

Peri-operative assessment and protocols

In our center, all patients are assessed preoperatively by a multidisciplinary team consisting of a cardiologist, anesthesiologist, sports medicine physician, psychiatrist, and dietitian. The cardiologist evaluates cardiovascular risk and screens for underlying cardiac conditions to ensure patients are fit for surgery. The anesthesiologist performs a comprehensive assessment of airway and anesthesia-related risks and optimizes management plans for perioperative safety. The sports medicine physician assesses patients' baseline physical function and recommends preoperative physical optimization and postoperative activity. The psychiatrist screens for psychiatric comorbidities, such as depression or eating disorders, and evaluates psychological readiness for surgery. The dietitian conducts a nutritional assessment, addresses deficiencies, and provides individualized dietary counseling before surgery. Preoperative assessments include a detailed medical history, physical examination, routine laboratory tests (including nutritional and metabolic markers), and psychological and functional evaluations. Postoperatively, patients were routinely followed at 12 months, with assessments including anthropometric measurements and validated questionnaires.

Questionnaires

To assess anxiety and depression among individuals who underwent SG, the Hospital Anxiety and Depression Scale (HADS) [15] was completed before surgery and one year post-operation. HADS is a self-report 14-item questionnaire comprising seven items assessing anxiety ($HADS_A$) and seven assessing depressions ($HADS_D$), with a response score between 0 and 3 for each question and a total score of 0 to 21 in each subscale. According to the literature, a cut-off score of 8 was used for each subscale total score to differentiate individuals without probable or possible anxiety and depression disorders from those likely to be affected [8, 16].

The Impact of Weight on Quality of Life-lite (IWQOL-Lite) is a questionnaire designed with 31 items in 5 main domains, including physical function, self-esteem, sexual life, public distress, and work [17]. Scores range from 0 to 100 in each domain and total score. Scores of 100 represent the best quality of life in that domain or overall [18, 19]. Previous literature revealed the reliability, validity, and utility of IWQOL-lite in patients with obesity [17, 20, 21].

Statistical analyses

Statistical analysis was conducted using IBM SPSS statistics (Version 26.0 for Windows, SPSS Inc., Chicago, IL). The categorical variables were shown in numbers and percentages, while numeric variables were presented as mean and standard deviation (SD). The Spearman rank correlation coefficient method was employed to assess the associations between continuous variables. The paired T-test for continuous and the Wilcoxon signed-rank test for categorical outcomes were used to compare

patients before and after surgery. The P value ≤0.05 was considered statistically significant in all tests.

Results

Participants and clinical changes

The current study included 32 individuals with obesity who underwent SG. The majority of participants were women ($n=28$), and the mean age was 42.91 (SD = 12.69) years. Table 1 provides baseline and postoperative characteristics of patients. Participants were assessed at 11.22 (SD = 0.79) months postoperatively. The mean weight loss was 23.42 (95% CI: 19.17; 27.60) Kg, with an average BMI reduction of 9.14 (95% CI: 7.52; 10.76) kg/m^2.

Hospital anxiety and depression scale (HADS)

Table 1 represents the values of the HADS questionnaire and the classification of an individual's anxiety and depression status. The total scores for $HADS_A$ and $HADS_D$ were 9.53 (SD = 3.66) and 8.81 (SD = 4.08), respectively. Although the mean scores of both subclasses diminished after surgery, the changes were not statistically significant.

Furthermore, the prevalence of patients with probable anxiety or depression was not significantly alternate postoperatively. The prevalence of individuals with ≥8 scores for anxiety and depression before surgery was 65.6% ($n=21$) and 46.9% ($n=15$), respectively. Regarding the HADS-A category, one year after surgery, four cases (12.5%) experienced improved symptoms, three patients (9.4%) demonstrated worsening symptoms, and the status of 25 subjects (78.1%) did not change from their baseline category (Table 1). In HADS-D classifications, 4 (12.5%) patients were categorized worse, while 5 (15.6%) individuals experienced improvement one year after surgery. Additionally, the category for 23 (71.9%) subjects remained the same as the baseline evaluation.

Impact of weight on quality of life-lite (IWQOL-Lite) questionnaires

Regarding the quality of life, IWQOL-Lite scores significantly improved both overall and across all domains (All P values <0.05) (Table 2). The mean total score changed from 60.89 (SD = 17.40) one month before surgery to 77.04 (SD = 14.83) one year after MBS. The most significant enhancement was in the sex life domain with a mean score change of 25 (95% CI: 16.28; 33.71), and less significant progress was in the work's domain with a mean score change of 8.98 (95% CI: 11.73; 20.57).

Relationship between changes in questionnaire scores and anthropometric variables

Table 3 shows the two-tailed Spearman-rank correlation between some variables. The changes in the $HADS_A$ and $HADS_D$ subclasses were positively and significantly correlated ($r_s = 0.47$). The changes in IWQOL-Lite did not significantly correlate with $HADS_A$ ($r_s = -0.27$) or

Table 1 Changes in anthropometric variables and HADS scores and distribution of patients

Variable	Before surgery ($n=32$)	After surgery ($n=32$)	Change (95% CI)	P value[3]
Weight (kg)[1]	111.47 ± 13.98	88.05 ± 12.44	−23.42 (−27.60; −19.17)	<.001
BMI (kg/m^2)[1]	43.86 ± 4.39	34.72 ± 4.76	−9.14 (−10.76; −7.52)	<.001
$HADS_A$ (Total score)[1]	9.53 ± 3.66	8.88 ± 3.32	−0.65 (−1.69; 0.37)	.20
$HADS_A$ (Total score)[2]	9 (6–12.5)	9 (6–11.75)		.44
$HADS_A$ Score ≥ 8				.70
No	11 (34.4%)	12 (37.5%)		
Yes	21 (65.6%)	20 (62.5%)		
$HADS_D$ (Total score)[1]	8.81 ± 4.08	7.75 ± 3.40	−1.06 (−2.21; 0.08)	.06
$HADS_D$ (Total score)[2]	7 (6–11)	7 (5–9)		.21
$HADS_D$ Score ≥ 8				.99
No	17 (53.1%)	18 (56.3%)		
Yes	15 (46.9%)	14 (43.7%)		

HADS Hospital Anxiety and Depression Scale, *BMI* Body Mass index

[1] Values are presented in mean ± SD

[2] Values are presented in median and IQRs

[3] Paires t-test for numerical variables and Wilcoxon Signed-Rank Test for categorical variables

Table 2 Changes in IWQOL-Lite scores before and 12 months after SG

Domain[1]	Before surgery ($n=32$)	After surgery ($n=32$)	Change (95% CI)	*P* value[2]
Total	60.89 ± 17.40	77.04 ± 14.83	16.15 (11.73 to 20.57)	<.001
Physical function	62.21 ± 21.7	79.47 ± 17.99	17.25 (11.55 to 22.96)	<.001
Self-esteem	60.38 ± 21.16	77.00 ± 19.18	16.62 (11.19 to 22.05)	<.001
Sexual life	43.94 ± 21.91	68.94 ± 19.98	25 (16.28 to 33.71)	<.001
Public distress	62.03 ± 24.98	73.75 ± 20.63	11.71 (4.52 to 18.90)	.002
Work	73.63 ± 22.15	82.61 ± 17.30	8.98 (11.73 to 20.57)	.002

IWQOL-Lite Impact of Weight on Quality of Life-lite, *SG* Sleeve Gastrectomy

[1] Values are presented in mean ± SD

[2] Based on the paired t-test

$HADS_D$ ($r_s = -0.05$). No significant correlations were found between BMI changes and $HADS_A$ ($r_s = 0.09$), $HADS_D$ ($r_s = 0.21$), or IWQOL-Lite ($r_s = 0.13$). Further investigation did not show significant correlation between weight loss and $HADS_A$ ($r_s = 0.14$), $HADS_D$ ($r_s = 0.19$) or IWQOL-Lite ($r_s = 0.07$).

Post-operative outcomes and complications

No mortality, major complications, or re-operations occurred within the first postoperative year. All patients were discharged one day after surgery. Feeding tolerance was achieved in all cases before discharge. The only minor complication was transient nausea, which occurred in 3 cases (9.4%) on day one after surgery and resolved with conservative management (Table 4).

Discussions

This prospective study evaluated changes in HRQOL, anxiety, and depression in patients with severe obesity one year after SG. Our results revealed a significant reduction in BMI and enhancement in overall HRQOL and its domains, including physical function, self-esteem, sexual life, public distress, and work. The findings regarding the physical QOL were consistent with the literature confirming the beneficial role of MBS [21, 22]. Kolotkin et al. reported more impaired QOL in baseline measurement in cases who underwent surgery than in non-surgical intervention cases. However, at 2, 6, and 12 years after surgery, the IWQOL-lite scores of the surgical group were significantly improved and higher than those of non-surgical cases [19]. In 2020, a comparative study assessing the efficacy of SG and Roux-en-Y gastric bypass (RYGB) in enhancing the QOL and mental health outcomes revealed no statistically significant differences between the two surgical interventions [2]. While previous studies primarily reported greater improvements in the physical domains of QOL [22], our findings demonstrated significant enhancements in both mental and physical aspects of QOL. In contrast to our results, Szmulewicz et al., based on the meta-analysis of RCTs, reported that mental health QOL was not significantly improved after surgery [23]. We hypothesize that the diversity in the literature regarding the changes in mental aspects of QOL may contribute to the different questionnaires used for measurements. Most of the studies that used the SF-36 (the short form, 36 items) questionnaire [24], which was designed for the more general population, reported non-significant improvement in mental health aspects of QOL [12, 23, 25–27]. On the other hand, assessments using the IWQOL-Lite tool, which explicitly evaluates weight-related QOL, demonstrated a significant improvement in mental health in our study and the existing literature [25, 28]. Further investigation regarding the association between changes in weight and IWQOL-Lite domain scores showed no significant correlations in our patients. Similar to our results, other articles reported limited or no significant correlation between the amount of weight changes and QOL score changes [12, 25, 28].

The pre-operative proportion of individuals with possible or probable mood disorders in our investigation (46.8% in $HADS_D$ and 65.6% in $HADS_A$ subclasses) was relatively higher compared to previous studies [2, 25, 29]. In the SOS study [29] based on the 655 patients with surgical intervention with mean baseline BMI of 41.9 kg/m^2, the prevalence of individuals with abnormal $HADS_D$ and $HADS_A$ scores were 24% and 34%, respectively, notably lower than the current study. However, some articles reported nearly the same as our study's prevalence of possible or probable mood disorders among the cases with obesity in pre-operative investigation [1, 8]. An RCT study based on the UK population reported a notably higher prevalence of patients with impaired HADS scores (48.2% and 46.1% for $HADS_D$ and $HADS_A$, respectively) [8]. The variability may have contributed to the higher mean BMI of our cases (43.86 kg/m^2) compared to the mean BMI of patients in studies with less mood disorder prevalence. The discrepancies between studies regarding

Table 3 The Spearman rank correlation coefficient r. Values between various variables and BMI and Weight changes

Variable	$\Delta HADS_A$	$\Delta HADS_D$	ΔIWQOL−Lite	ΔBMI	ΔWeight
$\Delta HADS_A$	-	0.473*	−0.270	0.094	0.144
$\Delta HADS_D$	0.473*	-	−0.057	0.214	0.195
ΔIWQOL-Lite	−0.270	−0.057	-	0.137	0.071
ΔBMI	0.094	0.214	0.137	-	0.969*
ΔWeight	0.144	0.195	0.071	0.969*	-

HADS Hospital Anxiety and Depression Scale, *IWQOL-Lite* Impact of Weight on Quality of Life-lite, *BMI* Body Mass index

* *P* value <.01

Table 4 Postoperative outcomes and complications

Outcome	Incidence, n (%)
Mortality	0 (0%)
Major complications[a]	0 (0%)
Re-operation	0 (0%)
Length of stay (days)	1 day[b]
Transient nausea	3 (9.4%)

[a] Major complications include leakage, bleeding, stenosis, or thromboembolic events

[b] Similar for all cases

the prevalence of mood disorders prior to surgery may be attributed to individual differences and sociocultural factors, especially the pre-operative BMI.

Although our study demonstrated a decrease in the mean scores of both anxiety and depression, the changes were not significant. It is important to note that not all cases of depression in patients with obesity are directly related to body image or weight. Previous studies have shown that depression with other etiologies may not improve significantly after MBS. This may explain the non-significant improvement observed in our study [4, 30]. Similarly, multiple studies previously reported a non-significant improvement in anxiety symptoms following the surgery [2, 25, 31]. However, unlike our results, several investigations revealed significant post-operative improvement in depression symptoms [12, 25, 31, 32]. The observed discrepancy between our result and these studies may be attributed to the lower baseline depression score of their cases compared to our patients. On the other hand, a study of diabetic patients who underwent metabolic surgery reported a nonsignificant reduction in depression prevalence after surgery [2]. The observed heterogeneity across the effect of surgery on depression disorder may contribute to the variation in sample size, type of surgery, and population characteristics such as pre-operation BMI, depression severity, and medical and mental complications. Further investigation showed no significant associations between changes in anthropometric variables and mental health parameters, similar to some previous studies that could not find a significant correlation between these variables [2, 28].

Limitations

The current study has several limitations. The primary limitation of our study was the limited sample size, which restricts the generalizability of our findings and increases the risk of type II errors. Therefore, all results should be interpreted with caution. Since our follow-up duration was limited to one year postoperatively, the long-term effect of MBS on patients'mental conditions was not studied, and further investigation with a longer duration remained necessary to evaluate the observed association. Furthermore, assessing mental health via HADS and IWQOL-Lite questionnaires, despite their proven validity in patients with obesity, may not reflect all aspects of the mental condition of cases undergoing MBS, which may explain the lack of significant associations between some of our variables. Moreover, our study did not include early follow-up (one month) data after surgery, which may have led to some missing data on the short-term effect of surgery on mental health and HRQOL. Lastly, we were not able to control some of the potential confounding factors, such as concurrent lifestyle modifications, socioeconomic support, which may limit the clinical applicability of our findings. Further prospective studies with larger sample sizes, extended follow-up, and well-controlled confounding variables are still needed to determine the role of MBS in mental health. Despite the limitations, the current studies benefit from some strengths. Our cohorts of cases were relatively homogenous, undergoing similar surgical procedures in the same center. Furthermore, the findings of the current article provide novel insights into the mental health aspects of patients who underwent MBS in the Middle Eastern population, contributing to the limited research on this topic.

Conclusion

The current article revealed some evidence of the impact of SG on mental health and HRQOL in Middle Eastern patients with obesity. The incidence of possible mood disorders was higher compared to healthy populations and previous studies. While the surgery significantly improved HRQOL across all domains, its effects on anxiety and depression were limited. However, Due to the small sample size these findings should be interpreted cautiously.

Abbreviations

BMI	Body Mass Index
HADS	Hospital Anxiety and Depression Scale
HADSA	Hospital Anxiety and Depression Scale – Anxiety
HADSD	Hospital Anxiety and Depression Scale – Depression
HRQOL	Health-Related Quality of Life
IWQOL-Lite	Impact of Weight on Quality of Life – Lite
SG	Sleeve Gastrectomy
MBS	Metabolic Bariatric Surgery
QOL	Quality of Life
SOS	Swedish Obese Subjects

Clinical trial number

Not applicable.

Authors' contributions

F.E., M.A., A.S., R.E., A.M., N.M., AND F.K. designed the study. F.E., M.A., A.S., R.E., A.M., N.M., F.K., AND S.M.P. contributed to collecting data and conducting the study. S.M.P. analyzed the data. S.M.P., F.E., M.A., and N.M. contributed to writing the manuscript. F.E., M.A., A.S., R.E., A.M., N.M., F.K., AND S.M.P. revised the manuscript. All authors reviewed the final manuscript.

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Data availability
The datasets utilized and examined in the present study can be obtained from the corresponding author upon making a reasonable request.

Declarations

Ethics approval and consent to participate
The study was approved by the Research Ethics Committees of Shariati Hospital, Tehran, Iran (IR.TUMS.MEDICINE.REC.1401.309). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants involved in the study. All collected data were anonymized at the extraction point and stored securely by data protection regulations to ensure confidentiality. Access to the data was restricted to authorized research personnel only.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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