

Impact of Body-contouring Surgery Post Bariatric Surgery on Patient Well-being, Quality of Life, and Body Image: Saudi Arabia-based Cross-sectional Study

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Background: Body-contouring surgery is commonly performed to address functional and aesthetic issues that can arise following bariatric surgery. However, there is limited understanding of the psychological impact of this procedure on Saudi Arabian patients who have undergone bariatric surgery. This study aimed to explore the effects of body-contouring surgery on the psychological well-being, quality of life, and body image of individuals who have undergone bariatric surgery. **Methods:** This cross-sectional study assessed the psychological impact of body-contouring surgery by measuring levels of depression and generalized anxiety disorder using the Patient Health Questionnaire-9 (PHQ-9) and the Generalized Anxiety Disorder-7 (GAD-7) scale, respectively.

Results: The study included a total of 227 participants, with 112 (49.3%) undergoing body-contouring surgery. Among the entire sample, 77.5% experienced excess skin folds following bariatric surgery. The prevalence of depression was 6% in the body-contouring group, lower than the 8% observed in the non-body-contouring group ($P = 0.073$). Notably, anxiety was significantly lower in the body-contouring group, with a prevalence of 4% compared with 6% in the non-body-contouring group ($P = 0.006$). Additionally, patients who had undergone body-contouring surgery reported higher scores for emotional well-being when compared with those who had not undergone body-contouring ($P = 0.011$).

Conclusions: The study suggests that body-contouring surgery improves the physical appearance of bariatric-surgery patients and reduces anxiety and depression, leading to improved psychological well-being. Further research, including larger and more diverse populations, such as multicenter studies at a regional or international level, is needed to validate these findings. (*Plast Reconstr Surg Glob Open* 2024; 12:e5666; doi: 10.1097/GOX.0000000000005666; Published online 19 March 2024.)

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Received for publication July 11, 2023; accepted January 25, 2024.

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DOI: 10.1097/GOX.0000000000005666

INTRODUCTION

Bariatric surgery has proven to be an effective treatment option for obesity and its associated health complications, resulting in significant weight loss and overall health improvement.¹ Typically, individuals with a body mass index (BMI) greater than 40 or a BMI greater than 35 with obesity-related comorbidities are considered candidates for bariatric surgery.² Various surgical techniques can be used, including gastric bypass, gastric sleeve surgery, and laparoscopic adjustable gastric banding. Although bariatric surgery offers numerous

Disclosure statements are at the end of this article, following the correspondence information.

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advantages such as substantial weight loss and improved metabolic indicators,³ a common concern for individuals who undergo this procedure is the development of excess skin and soft tissue in different body areas due to the significant weight reduction. This can lead to psychological distress, diminished quality of life, and negative body image.^{4,5} To address these concerns, body-contouring surgery has emerged as a potential solution to remove excess skin and enhance overall body contours following bariatric surgery.⁶

Body-contouring surgery is a procedure that aims to improve the aesthetic appearance by removing excess skin and fat from different areas of the body. Evidence from various studies indicates that body-contouring surgery, when performed after bariatric surgery, can have favorable impacts on psychological well-being, overall quality of life, and body image.⁷ In a specific study conducted by de Zwaan et al.,⁸ it was observed that patients who underwent body-contouring surgery following bariatric surgery demonstrated significantly improved quality of life and higher satisfaction with their physical appearance compared with those who did not undergo body-contouring surgery.

Although the positive effects of combining body-contouring surgery with bariatric surgery on quality of life and psychological well-being have been established globally, there remains a gap in knowledge specifically regarding the impact on Saudi patients. This study provides insights for plastic surgeons, bariatric surgeons, and researchers regarding the positive psychological effects of body-contouring surgery after bariatric procedures. It can also guide patients and offer a reference point on the psychological benefits of aesthetic treatment options available after bariatric surgery, specifically in Saudi Arabia. This cross-sectional study aims to assess the effects of body-contouring surgery following bariatric surgery on the psychological well-being, quality of life, and body image of Saudi patients.

METHODS AND MATERIALS

Study Design and Participant Enrollment

This single-center cross-sectional study aimed to examine the impact of body-contouring surgery after bariatric surgery on the psychological well-being of patients. The study analyzed various variables, including primary outcomes such as depression, anxiety, and quality of life, as well as secondary outcomes related to demographics and other factors. Participants were recruited from a private center in Riyadh, Saudi Arabia, between January and March 2023. Inclusion criteria consisted of patients who had undergone both bariatric and body-contouring surgery, with a minimum interval of 6 months between the procedures. The exclusion criteria included patients with a history of mental health disorders or significant medical conditions that could affect the study outcomes. The questionnaire was distributed among individuals undergoing body-contouring surgery, 6 weeks postoperation.

Takeaways

Question: Does body-contouring surgery post bariatric surgery in a Saudi Arabian population impact psychological well-being, quality of life, body image, and rates of anxiety and depression?

Findings: Body-contouring surgery after bariatric procedures was found to enhance psychological well-being and quality of life among the Saudi Arabian sample. Although depression rates were not significantly different, anxiety rates were significantly lower in patients who underwent body-contouring surgery.

Meaning: The results suggest that body-contouring surgery after bariatric procedures can improve patients' psychological well-being and overall quality of life, particularly in terms of reducing anxiety levels. However, this procedure does not seem to have a statistically significant impact on depression rates.

Data Collection

During their follow-up visits, participants were given self-administered questionnaires to collect data. These questionnaires were obtained from a previously validated assessment tool used to measure depression and anxiety. To facilitate data collection, the survey was uploaded to Google Forms after obtaining permission for reuse. Participants received the survey through WhatsApp. Before their participation, all patients provided informed consent. Subjects who withdrew their consent or were absent during data collection were excluded from the study. The questionnaires utilized validated scales to evaluate psychological well-being, quality of life, and overall body image. Additionally, demographic and clinical information including age, sex, BMI, type of bariatric surgery, duration since bariatric surgery, and type of body-contouring surgery were collected from the participants.

Ethical Approval

The study received ethical approval from the institutional review board and research ethics committee, with the reference number 23/0025/IRB. All participants provided informed consent before their inclusion in the study. The research adhered to the guidelines outlined in the STROBE checklist.⁹

Study Tools and Scoring

Depression was assessed using the Patient Health Questionnaire-9 (PHQ-9),¹⁰ and the Generalized Anxiety Disorder Seven-Item Scale (GAD-7),¹¹ respectively. The PHQ-9 and GAD-7 questionnaires consisted of nine and seven questions, respectively. The responses to items in both surveys were collected on a four-point Likert scale from 0 (not at all) to 3 (nearly every day). An overall score was calculated by summing up the relevant items, and it ranged between 0 and 27 for PHQ-9 and 0 and 21 for GAD-7. An additional item was used in depression and anxiety surveys to assess the difficulties implied by these items in daily activities. Depression was categorized into minimal (1–4), mild (5–9), moderate (10–14), moderately severe (15–19), and

severe depression (>20). Anxiety was classified into minimal (0–4), mild (5–9), moderate (10–14), and severe (>15). In the current study, we defined depression at a cut-off value of greater than or equal to 15 and anxiety at a cut-off of greater than or equal to 10. For the quality of life measures, we used the 36-Item Short Form Survey (SF-36) to quantify eight health subdomains, including physical functioning, role limitations due to physical health problems or personal or emotional problems (separately), bodily pain, emotional well-being, energy/fatigue, social functioning, and general health perceptions. The original social functioning domain consisted of two items in the original survey (https://www.rand.org/health-care/surveys_tools/mos/36-item-short-form/scoring.html), whereas our data collection sheet consisted of one item. Items of each subdomain were coded as described previously (https://www.rand.org/health-care/surveys_tools/mos/36-item-short-form/scoring.html), and average scores were calculated accordingly. We used two subdomains of the BODY-Q survey, namely the appraisal of excess skin and body image subdomains, to measure patients' perceptions of body contouring and weight loss outcomes after surgery. The responses to these subdomains were collected on a two-point scale from “not at all” to “extremely bothered” for the appraisal of excess skin and from “disagree” to “agree” for the body image subdomain. These responses were coded as 0 and 1 for each response, respectively. Overall scores were computed by summing up response values, where higher scores indicated worse perceptions for the excess skin appraisal and good perceptions for the body image.

Statistical Analysis

Data analysis was performed using RStudio (R version 4.2.2). Categorical variables were expressed as frequencies and percentages, whereas numerical variables were presented as median and interquartile range (IQR). Statistical differences between participants who underwent and those who did not undergo body-contouring surgery were assessed using a Wilcoxon rank sum test. To assess the role of undergoing a bariatric surgery as a predictor of the primary outcomes (depression, anxiety, quality of life, as well as the appraisal of excess skin and body skin), we used the outcomes of the bivariate inferential analysis to assess the statistically significantly associated outcomes with undergoing these procedures. That is, we used these significant variables as dependent variables in separate multivariate generalized linear regression models. In the preliminary model, undergoing a body-contouring surgery was used as an independent variable in addition to the following variables: age, gender, nationality, relationship status, level of education, employment status, household income per month, having comorbidities, years since bariatric surgery, type of bariatric surgery, time to achieve the best weight after bariatric surgery, and the presence of excess skin folds post bariatric surgery. However, we implemented a bootstrap procedure for a stepwise algorithm using a backward selection method to select the best fit variables for the model. The finally included independent variables were exclusively presented in the respective tables for each outcome. Results were expressed as beta-coefficients

and 95% confidence intervals (95% CIs). Statistical significance was considered at a *P* value less than 0.05.

RESULTS

Sociodemographic Characteristics and the Characteristics of Bariatric Surgery

The study included a total of 227 patients, out of whom 112 patients (49.3%) underwent body-contouring surgery. Among the sample, the majority fell into the age group of 31 to 50 years (66.8%), had a bachelor's degree (69.6%), were married (70.5%), and were employed (56.4%). Women constituted the majority of the patients (74.0%), and a large proportion were Saudi nationals (84.6%). In terms of income, approximately 37.0% of the patients had a monthly income ranging from 5000 to 10,000 SAR. It is worth noting that 42 patients (18.5%) had comorbidities, with diabetes (23.8%) and hypertension (19.0%) being the most common chronic conditions observed.

The majority of patients in the study underwent gastric sleeve surgery (93.4%). Among them, 91.6% had a time interval of more than two years between the surgery and the data collection period. About 52.0% of the population achieved their best weight one year after the bariatric surgery. Furthermore, 77.5% of the participants had excess skin folds following their procedures. (See **table, Supplemental Digital Content 1**, which displays sociodemographic characteristics and the characteristics of bariatric surgery (N = 227). <http://links.lww.com/PRSGO/D104>.) The study found significant associations between undergoing body-contouring surgery and several factors. These factors included gender (*P* = 0.006), nationality (*P* = 0.008), type of bariatric surgery (*P* = 0.046), and the time required to achieve optimal weight after bariatric surgery (*P* = 0.031) (See **Supplemental Digital Content 1**, <http://links.lww.com/PRSGO/D104>).

Characteristics of Body-contouring Surgery

Among the patients who underwent body-contouring surgery, 65.2% opted for abdominoplasty, whereas approximately one-third of them chose mastopexy (33.9%) and brachioplasty (31.3%, **Fig. 1**). Of the 112 participants who underwent body-contouring surgery, 23 (20.5%) had other additional procedures performed. The most common additional procedures were liposuction of the back, abdomen, and arms (23.8%); thigh lift (19%); and belt lipectomy (19%). Regarding satisfaction with body-contouring surgery results, 22 (19.6%) rated their outcome as poor, 47 (42%) as fair, and 40 (35.7%) as very good. The vast majority (95 of 101, 94.1%) paid for their body-contouring surgery entirely out of pocket, whereas only six (5.9%) had the surgery paid for by third party insurance or government funding.

Description of Depression and Anxiety

Among the participants, 11.5% experienced moderately severe depression, 5.7% experienced severe depression, and 12.3% reported severe anxiety (**Fig. 2**). These psychological conditions had an impact on patients'

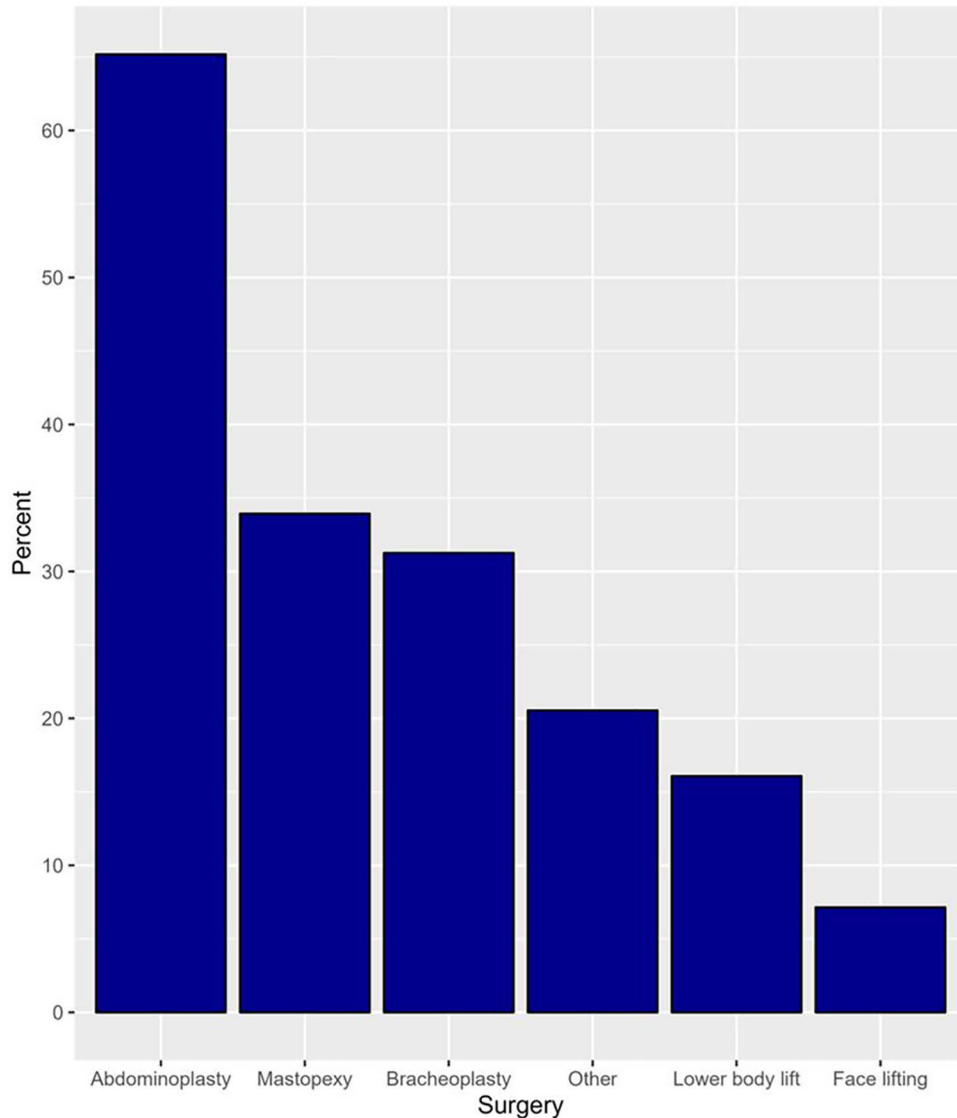


Fig. 1. The distribution of body-contouring surgery performed for the patients under study.

ability to work, take care of things at home, and get along with others, causing difficulties for 36.9% and 43.5% of patients, respectively (Fig. 3). The scales measuring depression, anxiety, body image, and quality of life demonstrated good to excellent internal consistency, as indicated by Cronbach alpha values (all values >0.700). Statistical analysis revealed that participants who underwent aesthetic surgery had higher anxiety scores (median = 6.0, IQR = 3.0 to 11.2 versus median = 4.0, IQR = 2.0 to 8.0, $P = 0.006$) and higher emotional well-being scores (median = 4.0, IQR = 3.6 to 4.2 versus median = 3.8, IQR = 3.4 to 4.2, $P = 0.011$). Therefore, anxiety and emotional well-being were included as dependent variables in separate regression models, and the results are presented below.

Predictors of Anxiety

In the regression analysis of anxiety, the selected variables included age, type of bariatric surgery, presence

of excess skin folds, the existence of comorbidities, and undergoing body-contouring surgery. The results showed that anxiety was independently predicted by undergoing body-contouring surgery (beta = 2.15, 95% CI 0.74–3.57, $P = 0.003$), as well as undergoing a Roux-en-Y gastric bypass bariatric surgery (beta = 4.98, 95% CI 1.04–8.92, $P = 0.014$), presence of excess skin folds (beta = 2.10, 95% CI 0.40–3.79, $P = 0.016$), and having comorbidities (beta = 2.67, 95% CI 0.83–4.50, $P = 0.005$). These variables were found to be significant predictors of anxiety in the study.

Predictors of Emotional Well-being

In the regression analysis to predict emotional well-being scores, the variables included were household income, comorbidities, undergoing body-contouring surgery, and four factors related to bariatric surgery (years since surgery, surgery type, presence of excess skin folds after surgery, and time to achieve best weight

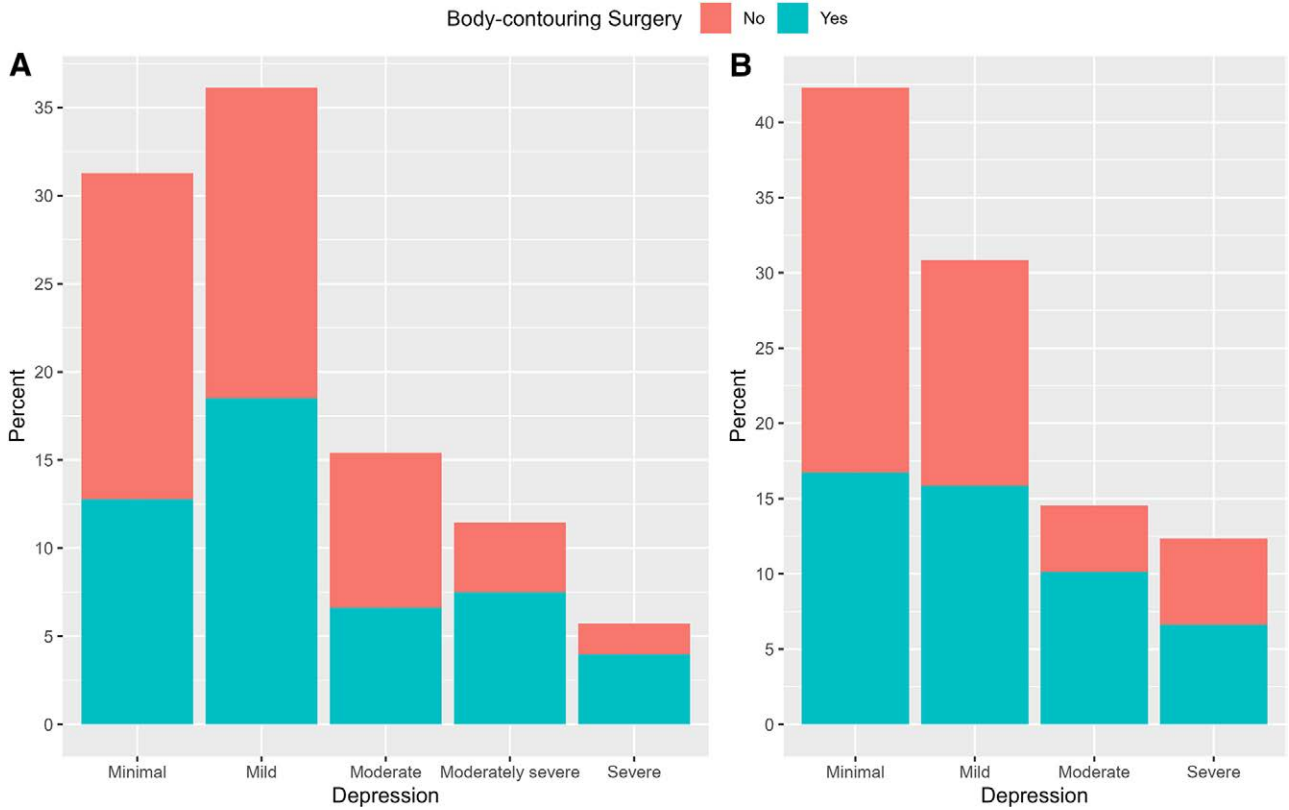


Fig. 2. Prevalence of depression and anxiety among patients undergoing body contouring compared to those who did not. A, Distribution of depression. B, Distribution of anxiety in individuals who have undergone body contouring surgery versus those who have not.

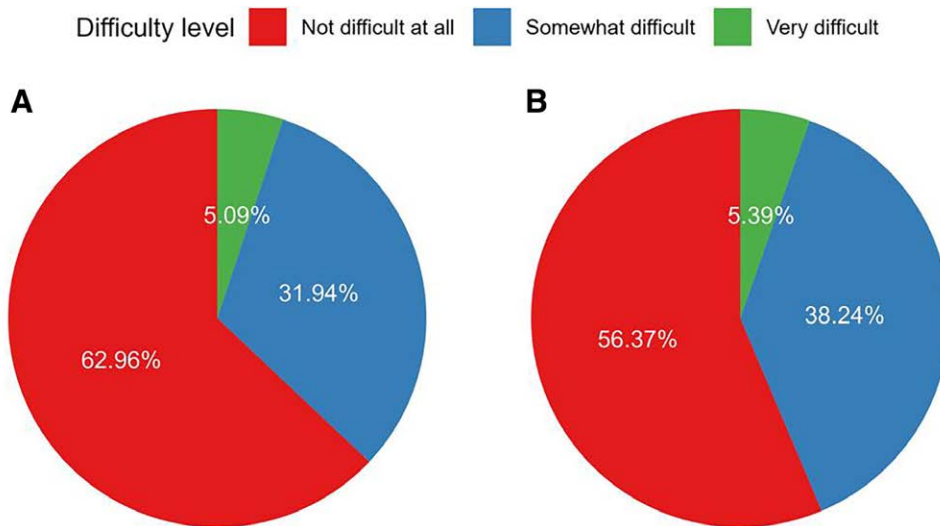


Fig. 3. Effects of depression and anxiety on work, home responsibilities, and social interactions. A, Impact of depression. B, impact of anxiety on the ability to perform work-related tasks, manage home responsibilities, and maintain social relationships.

after surgery). The results indicated that lower emotional well-being scores were independently associated with having a monthly income of US \$1333.69–\$2667.38 (beta = -0.24; 95% CI, -0.43 to -0.05; $P = 0.012$) and longer times to achieve the best weight after bariatric surgery

(beta = -0.21 for 2 years and beta = -0.46 for >2 years, $P < 0.05$). On the other hand, higher emotional well-being scores were predicted by undergoing body contouring after bariatric surgery (beta = 0.19, $P = 0.015$), other types of bariatric surgery (beta = 0.83, $P < 0.001$), and more

years since the bariatric surgery (beta = 1.36 for 1–2 years and beta = 1.41 for >2 years, $P < 0.05$). These variables were found to be significant predictors of emotional well-being scores in the study.

DISCUSSION

The study aimed to assess the psychological well-being of bariatric surgery patients who underwent body-contouring surgery. The PHQ-9 and GAD-7 questionnaires measured depression and anxiety. The SF-36 measured overall well-being. The study included 227 patients from a private center in Riyadh. While Saudi Arabia has studied the psychological impact of body contouring, this study focused specifically on bariatric patients. Therefore, it fills a gap in the literature. The study found a high prevalence of gastric sleeve surgery among participants, exceeding international guidelines. This may be because private clinics in countries like Sweden perform the surgery on patients with lower BMIs, even without comorbidities.¹²

The results indicated a higher inclination towards body-contouring surgery among older participants. This may be because older individuals are more financially stable, since body-contouring is often not covered by insurance. A study by Ehuad et al supported this, finding older patients had a higher likelihood of life expectancy enhancement from the surgery compared with younger patients.¹³ Despite benefits in quality of life and body image, body-contouring surgery has a low rate among postbariatric patients. Underlying psychological issues like trauma and dissatisfaction may create hesitation. More significantly, financial barriers exist, since bariatric surgery is often covered by insurance while body-contouring is not. This prevents access and quality of life improvement. Recognizing body-contouring as necessary referral management rather than a luxury would improve comprehensive postbariatric care and enhance physical and psychological well-being.^{14,15}

Women exhibit a higher prevalence of undergoing body-contouring surgery, aligning with social expectations. Women also tend to develop more redundant skin compared with men, causing contour nonuniformity and skin flapping. These factors contribute to the higher tendency among women to seek body-contouring procedures.^{16,17} Furthermore, high satisfaction rates have been observed among those who undergo body-contouring surgery. Refining one's appearance can increase confidence, improve mental well-being, and enhance quality of life. These positive outcomes are consistently reported.¹⁸ In Mexico, there is a belief that patients inclined to cosmetic surgery may have higher anxiety prevalence, reaching 92% on average. This association could be due to several factors. Many patients have a history of obesity, a contributor to anxiety. Needing two procedures for body transformation may increase anxiety. Comorbidities can also increase postoperative complications, further increasing anxiety.^{19,20} The results showed most patients achieved their best weights within one year after bariatric surgery. Interestingly, the tendency for body-contouring surgery was lower after one year compared with after two years. This suggests a time

lag or hesitation in pursuing body-contouring immediately after weight loss. The presence of excess skin folds for two years, along with dissatisfaction with one's appearance, contributes to a higher likelihood of body-contouring surgery. The impact on quality of life is positive, attributed to high satisfaction with physical appearance and overall self-perception reported by patients.^{7,21} Body-contouring surgery had beneficial effects on reducing anxiety and depression symptoms measured by GAD-7 and PHQ-9 scales.²² Awareness of the association between anxiety, depression, and body-contouring is crucial, as these factors significantly impact functionality and social communication. The study by van der Beek et al showed sustained improvement in quality of life among postbariatric patients after body contouring.²² This underscores body contouring as crucial to complete the weight loss journey and sustain improvements in appearance and quality of life.

LIMITATIONS AND FUTURE RECOMMENDATIONS

The main limitations were the cross-sectional single-center design with a relatively small sample size, restricting generalizability and regional variation representation. Patients' retrospective recall of prebariatric weight introduced potential recall bias. Patient fatigue and random response bias from multiple questionnaires administered at one time were also possible. Despite being in Saudi Arabia, implications likely extend regionally given shared sociocultural characteristics and healthcare practices. Our findings resonate with previous Saudi research across procedures, suggesting consistent patient responses and outcomes. Future studies should use multiple centers to assess regional variations with larger samples for more definitive results. Addressing potential biases through improved design could provide deeper insights. Analyzing postoperative complications in relation to quality of life and psychological well-being could foster a deeper understanding of factors affecting patient experiences and satisfaction. Exploring clinical implications, particularly medication management postsurgery, is also essential.

CONCLUSIONS

This study found that body-contouring surgery has a significant positive impact on the psychological well-being of patients who have undergone bariatric surgery. Gender and nationality were correlated with undergoing body-contouring surgery. Depression and anxiety negatively affected daily tasks and interpersonal interactions. Patients reported high satisfaction rates and improved emotional well-being after body-contouring surgery.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

ACKNOWLEDGMENT

This work was supported by the College of Medicine Research Center, Deanship of Scientific Research, King Saud University Medical City, King Saud University, Riyadh, Saudi Arabia.

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