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Quality of life in patients who underwent bariatric surgery at a tertiary hospital in Madina, Saudi Arabia: A cross-sectional study

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ABSTRACT

Background: Body mass index and comorbidities determine surgical indications for bariatric surgery. The study aimed to evaluate health-related quality of life (QoL) in patients following laparoscopic sleeve gastrectomy to determine their perceptions of the surgical outcome and identify potential QoL-related factors. **Patients and Methods:** This cross-sectional study, conducted at King Fahad Hospital, Al-Madina, comprised 383 patients aged ≥ 18 years who had undergone bariatric surgery ≥ 3 months earlier. Sociodemographic and surgical complication data were collected using the Short Form Health Survey (SF-36)-QoL. **Results:** "Social functioning" had the highest mean (78.7 ± 19), followed by "role limitations due to physical health" and "pain" (76.8 ± 36.4 and 76.2 ± 25.3 , respectively). One-third of the patients had diabetes mellitus, and two-thirds had hypertension. Older age, higher educational level, marriage, shorter post-operative period, and absence of complications were associated with higher scores in the "role limitations due to emotional issues" domain. Younger age, higher income, a more extended post-operative period, and being single were associated with higher scores in the "physical functioning" domain. **Conclusion:** Age, educational level, income, marital status, history of chronic disease, time since surgery, and complications were associated with QoL. Physical health functioning, emotional issues, energy/fatigue, and general health all had high QoL scores. Gastroesophageal reflux disease, gallbladder stones, and malnutrition were common complications post-operatively.

Keywords: Bariatric surgery, gastric bypass, laparoscopic sleeve gastrectomy, obesity, quality of life

1. INTRODUCTION

A health concern associated with improper or excessive fat storage is obesity. Overweight people have a body mass index above 25 kg/m², and obese people have a BMI over 30 kg/m² (Kirkil et al., 2018). Approximately 20% of children and adolescents and 40% of adults worldwide are obese or overweight (World Health Organization, 2022; Peng et al., 2022). In Saudi Arabia, obesity prevalence has increased from approximately 21% in 1992 to 78% in 2022 in females and from 12% to 41% in males (Al-Quwaidhi et al., 2014).

An option for treating obesity is bariatric surgery, including gastric bypass, sleeve gastrectomy, adjustable gastric band, and biliopancreatic diversion with a duodenal switch (American Society for Metabolic and Bariatric Surgery (ASMBS), 2021). The global demand for bariatric surgery has increased owing to the rising prevalence of obesity. In 2020, the estimated number of bariatric operations in the United States was 198,650 (ASMBS, 2022). In Saudi Arabia, 15,000 bariatric procedures are reportedly performed yearly (Al-Khalidi, 2016).

In the same way as any surgical procedure, bariatric surgery has benefits and risks; therefore, assessing patients' overall quality of life (QoL) following bariatric surgery is essential. According to the World Health Organization (WHO), quality of life (QoL) refers to how individuals perceive their position regarding their goals, standards, expectations, and concerns within the framework of their culture and value systems of residence (WHO, 2022).

Two previous studies have been conducted in Saudi Arabia, one in the Al-Gassim region and the other in Jeddah city, concerning patient QoL following bariatric surgery. Both studies reported improvements in all QoL domains. The study in Jeddah reported a more remarkable physical and emotional health improvement. It showed that the positive effects of surgery on QoL were observable in the first three months post-operatively (Aljohani et al., 2017).

The study conducted in Al-Gassim showed improvement in all QoL domains except for sexual interest (Alsaigh et al., 2019). The quality of life (QoL) following bariatric surgery has been the subject of numerous studies; however, only limited data are available about the Saudi Arabian population. The study aimed to evaluate health-related QoL in patients following laparoscopic sleeve gastrectomy to determine their perceptions of the surgical outcome and identify potential factors associated with QoL.

2. METHODS

Study methods

Our cross-sectional study was conducted at King Fahad Hospital, in the Al-Madina region, Saudi Arabia, from October 2021 to November 2022. The patients were selected using non-random convenience sampling. In KFH, they only do Laparoscopic sleeve gastrectomy. The study's target population was patients undergoing bariatric surgery in KFH. Patients aged ≥ 18 years who had undergone laparoscopic sleeve gastrectomy ≥ 3 months earlier were eligible to be included in the study. Exclusion criteria comprised patients aged < 18 years and those who had undergone surgery < 3 Months earlier. We used Raosoft calculator software to calculate the sample size based on a 5% margin of error, a 95% confidence interval (CI), and a proportion of 50%. The estimated sample size was 345, then adjusted to 383 to allow for a 10% non-response rate.

Data collection

A self-administered, standardized, validated, and reliable questionnaire was used to assess QoL, which consisted of three sections, namely: (i) patient sociodemographic characteristics such as age, sex, income, marital status, and history of chronic diseases; (ii) questions concerning surgical complications; and (iii) a QoL assessment questionnaire. The Short Form Health Survey (SF-36)-QoL was used to assess eight health domains, namely, physical functioning, energy/vitality, emotional well-being, general health, social functioning, bodily pain, and role limitations due to emotional and mental health issues (Ware and Sherbourne, 1992). The data collectors contacted the study patients via telephone or WhatsApp to complete the electronic questionnaire. The information technology department at the hospital provided patient contact information. The data collection took three months.

Statistical analysis

All data were analyzed using IBM-SPSS (version 23) software. Descriptive statistics are expressed as percentages and frequencies for categorical variables, while continuous variables are expressed as mean and standard deviations (SD). The statistical significance of subgroup differences in qualitative data was evaluated using Pearson's chi-square test or Fisher's exact test. Student's t-test or Student's variance analysis was used for quantitative data to detect significant differences in the mean values for QoL domains. The P-value was set at < 0.05 .

Generalized linear modeling was used to build appropriate models using R program (version 2022.02.1) software. Regular Poisson regression was used to model the predictors of each QoL domain. The Akaike information criterion (AIC) was used to compare nested models and variable selection as it provides more information than a *P*-value.

3. RESULTS

Our study comprised 383 patients who had undergone bariatric surgery. Most patients were <50 years (*n* = 134, 35%), with only 4.4% aged ≥55 years. Regarding educational level, 49% (*n* = 189) of patients had a university education, and 43% (*n* = 166) had secondary education. Approximately 38% (*n* = 146) earned ≤11,999 SAR per month, while 2.6% (*n* = 10) earned a monthly income of ≥20,000 SAR. Most patients (64%, *n* = 245) were married (Table 1). Table 2 shows the clinical characteristic of the participants.

Table 1 Demographic characteristics of the study patients (*n* = 383)

Characteristics	Frequency	Percent (%)
Age (years)		
18–29	112	29.3
30–39	120	31.3
40–54	134	35
≥55	17	4.4
Educational level		
Illiterate	13	3.4
Secondary school	166	43.3
University	189	49.3
Postgraduate	15	3.9
Income		
<4,000 SAR	166	43.3
4,000–11,999 SAR	146	38.1
12,000–19,999 SAR	61	15.9
≥20,000 SAR	10	2.6
Marital status		
Single	106	27.7
Married	245	64.0
Divorced/widow	32	8.3

Table 2 Clinical characteristics of the study patients (*n* = 383)

Characteristics	Frequency	Percent (%)
Chronic illnesses		
Diabetes mellitus	116	30.3
Hypertension	267	69.7
Time since surgery		
<3 months	8	2.1
3–5 months	12	3.1
6–11 months	77	20.1
12–24 months	98	25.6
>24 months	188	49.1
Presence of post-operative complications		
Yes	111	29.0
No	272	71.0
Complications due to surgery		
Leaky gut syndrome	2	1.5

Dumping syndrome	1	0.7
Gall bladder stones	30	22.1
Hernia	8	5.9
Hypoglycemia episodes	7	5.1
Malnutrition	25	18.4
Peptic ulcer	3	2.2
Gastroesophageal reflux disease	34	25.0
Complications due to another operation	5	3.7
Other complications	23	16.9

Figure 1 shows the mean for the QoL domains in study participants. The QoL domains showed a non-normal distribution with right skewness, which is typical for count data. The highest mean was 78.7 ± 19 in the social functioning domain, followed by role limitations due to physical health and pain (76.8 ± 36.4 and 76.2 ± 25.3 , respectively). The lowest mean was 63.5 ± 21.6 in the energy/fatigue domain.

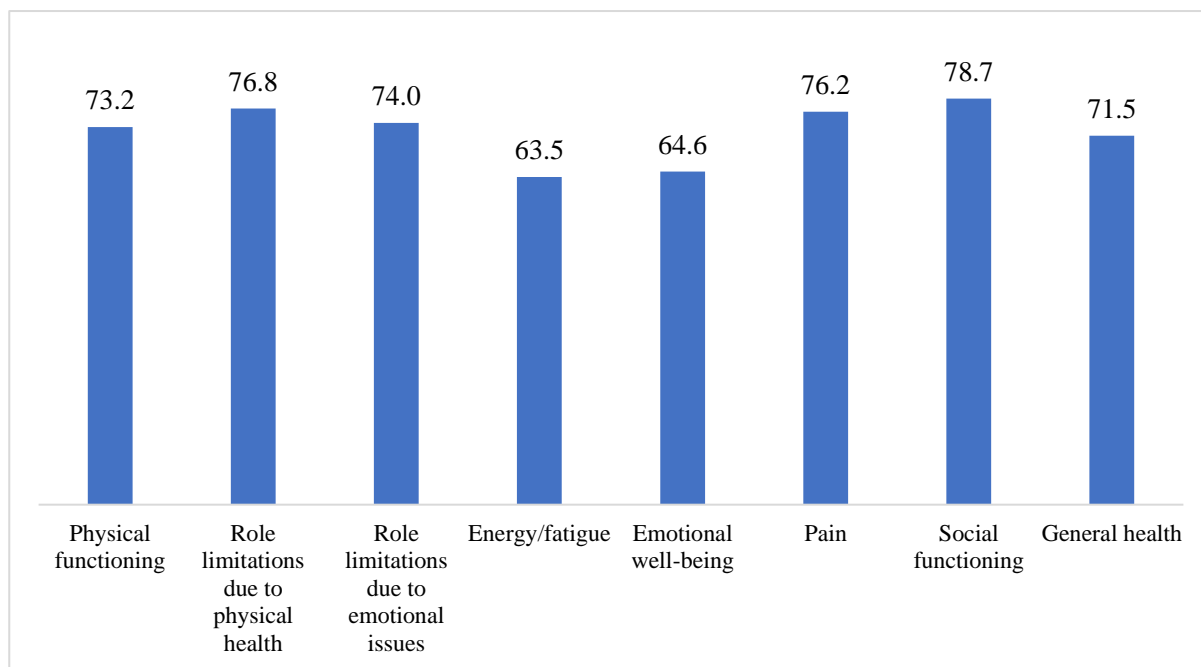


Figure 1 Mean of QoL domains in study participants

Table 3 shows the association between QoL domains and time after surgery. The means for QoL showed a nonlinear change after the operation, as they increased with time, peaked within 6 and 24 months, and declined after that. Emotional well-being, social functioning, and general health domains significantly differed across periods ($P < 0.005$).

The relationship between clinical variables such as age, educational level, income, marital status, history of chronic diseases, time since the operation, and presence of complicating factors, as well as physical functioning, role limitations due to physical health, role limitations due to emotional issues, energy/fatigue, emotional well-being, social functioning, pain, and general health, was determined using regression analysis. These outcome variables were rarely normally distributed because they resulted from counting and averaging the scores within each domain. Hence, we expected the data generation mechanism to follow a Poisson distribution.

However, dispersion in the model in terms of physical functioning and limitations due to physical and emotional status was very high (between 13 and 16), which may have led to an unrealistic estimation of β - and P -values, as the optimal dispersion is 1. The dispersion was lower in the Poisson models for energy/fatigue, emotional well-being, social functioning, pain, and general health. The dispersion in these models ranged from 3 to 6; however, more improvement was indicated. Dispersion measures show the extent to which the distribution of scores follows Poisson distribution assumptions.

Table 3 The relationship between QoL domains and time since surgery

QoL domains		<3 months	3-5 months	6-11 months	12-24 months	>24 months	P-value
Physical functioning	Mean	53.1	76.3	73.1	72.3	74.4	0.545
	SD	40.4	28.5	33.8	37.0	33.7	
Role limitations due to physical health	Mean	62.5	80.7	79.3	78.9	75.0	0.645
	SD	37.6	30.0	33.8	36.3	37.9	
Role limitations due to emotional issues	Mean	70.9	80.5	78.4	76.9	70.4	0.470
	SD	37.6	36.2	38.2	37.2	39.7	
Energy/fatigue	Mean	51.8	53.8	66.2	68.6	60.8	0.006*
	SD	30.1	18.0	23.3	20.3	21.1	
Emotional well-being	Mean	56.0	59.3	68.9	67.7	61.9	0.040*
	SD	27.9	19.1	20.8	22.5	20.8	
Pain	Mean	68.3	78.6	73.8	79.5	75.9	0.501
	SD	26.9	27.9	26.7	22.8	25.5	
Social functioning	Mean	72.1	62.7	79.9	81.2	78.7	0.021*
	SD	21.0	22.7	16.4	19.1	19.2	
General Health	Mean	60.6	65.8	75.0	76.9	68.1	<0.001*
	SD	8.6	10.2	17.0	16.2	17.4	

QoL, quality of life; SD, standard deviation

Using quasi-Poisson to reduce overfitting did not lead to substantial improvement, which hindered the use of AIC for variable selection. The final model estimates, 95% CIs, and *P*-values are presented in (Tables 4A & 4B). Age, time since surgery and complications were significantly associated with emotional well-being scores. An increase in age from a lower to a higher age group was associated with a 1.03 increase in emotional well-being scores. An increase in the time since surgery from a shorter period to a more extended period was associated with a slight decrease in emotional well-being scores (relative risk, 0.96). Patients without complications were 1.22 times more likely to have higher emotional well-being scores than those with complications when other predictors in the model were held constant. Only the predictor that determined the presence of complications was significantly associated with energy/fatigue scores. Patients without complications were 1.19 times more likely to have higher energy domain scores than those with complications when other predictors in the model were held constant.

An increase in income from a lower- to a higher-income group showed a significant association with a 1.03 increase in general health domain scores. Patients without complications were 1.15 times more likely to have higher general health scores than those with complications when other predictors in the model were held constant. Only the predictor that determined the presence of complications was significantly associated with the pain domain scores. Patients without complications were 1.24 times more likely to have higher pain domain scores than those with complications when other predictors in the model were held constant.

Predictors including age, income, marital status, and time since the operation were significantly associated with scores in the physical functioning domain. Younger age, higher income, a longer time since the operation, and being single was associated with higher scores in the physical functioning domain. Predictors, including age, educational level, marital status, time since the procedure, and complications, were significantly associated with scores in this domain.

Older age, higher educational level, marital status, a shorter time since surgery, and the absence of complications were associated with higher scores in the role limitations due to emotional issues domain. Scores in this domain were significantly correlated with age and marital status. Older age and being married were associated with higher scores in the role limitations due to the physical health domain. Patients without complications were 1.10 times more likely to have a significantly higher social functioning score than those with complications when other predictors in the model were held constant.

Table 4A Predictors of QoL domains in the study patients based on a negative binomial model.

Parameter	Emotional well-being			Energy/fatigue			Pain			Social functioning		
	Rate ratio beta	CI	P-value	Rate ratio beta	CI	P-value	Rate ratio beta	CI	P-value	Rate ratio beta	CI	P-value
Age	1.03	1.01–1.06	0.007	1.02	0.99–1.05	0.115	0.99	0.96–1.03	0.674	1.02	1.00–1.04	0.058
Education level	1.02	0.98–1.07	0.307	0.98	0.93–1.03	0.450	0.95	0.89–1.02	0.117	1.01	0.97–1.05	0.709
Income	1.00	0.97–1.04	0.904	1.03	0.99–1.07	0.133	1.02	0.98–1.07	0.275	0.96	0.94–1.00	0.10
Marital status (married)	0.99	0.90–1.09	0.798	0.97	0.86–1.08	0.559	0.97	0.85–1.11	0.662	0.96	0.89–1.04	0.344
Marital status (divorced)	1.01	0.87–1.18	0.914	0.99	0.83–1.19	0.943	0.91	0.74–1.12	0.367	0.95	0.83–1.08	0.398
Marital status (widowed)	0.93	0.50–1.87	0.816	0.66	0.32–1.51	0.281	0.81	0.37–2.15	0.632	0.94	0.56–1.65	0.812
Chronic conditions	1.08	0.99–1.19	0.074	1.03	0.93–1.14	0.597	0.97	0.86–1.09	0.598	1.02	0.95–1.10	0.637
Time since the operation	0.96	0.92–0.99	0.035	0.97	0.93–1.02	0.240	1.01	0.96–1.06	0.715	1.03	1.00–1.06	0.091
Post-operative complications	1.22	1.12–1.32	<0.001	1.19	1.08–1.31	0.001	1.24	1.11–1.39	<0.001	1.10	1.02–1.18	0.011

CI, confidence interval

Table 4B Predictors of QoL domains in the study patients based on a negative binomial model.

Parameter	General health			Physical functioning			Limitations due to physical health			Limitations due to emotional issues		
	Rate ratio beta	CI	P-value	Rate ratio beta	CI	P-value	Rate ratio beta	CI	P-value	Rate ratio beta	CI	P-value
Age	1.01	0.99–1.03	0.223	0.99	0.980–0.999	0.011	1.02	1.01–1.03	<0.001	1.01	1.009–1.02	0.005
Education level	1.00	0.97–1.04	0.892	0.98	0.97–1.00	0.073	1.01	1.00–1.03	0.141	1.02	1.01–1.04	0.022
Income	1.03	1.01–1.05	0.038	1.05	1.04–1.07	<0.001	1.00	0.99–1.01	0.719	1.00	0.99–1.01	0.825
Marital status (married)	0.97	0.90–1.04	0.390	0.93	0.90–0.96	<0.001	1.04	1.00–1.08	0.030	1.05	1.01–1.08	0.015
Marital status (divorced)	0.94	0.84–1.05	0.282	0.94	0.89–0.99	0.028	0.95	0.89–1.00	0.052	0.99	0.93–1.05	0.664
Marital status (widowed)	0.72	0.45–1.19	0.184	1.30	1.06–1.60	0.011	1.14	0.93–1.40	0.216	1.18	0.96–1.45	0.114
Chronic conditions	0.97	0.91–1.04	0.422	1.00	0.97–1.04	0.797	1.03	1.00–1.06	0.088	1.00	0.97–1.03	0.812

Time since the operation	0.97	0.95–1.00	0.068	1.03	1.01–1.04	<0.001	0.99	0.98 – 1.01	0.365	0.96	0.94 – 0.97	<0.001
Post-operative complications	1.15	1.08–1.22	<0.001	1.00	0.97–1.03	0.958	1.01	0.97 – 1.04	0.715	1.06	1.03 – 1.10	<0.001

CI, confidence interval

4. DISCUSSION

Globally, obesity has been reported to affect all age groups, ethnicities, and countries, leading to increasing health-related issues (Kirkil et al., 2018; Felsenreich et al., 2016). In 2016, the worldwide prevalence of obesity was >1.9 billion adults aged ≥ 18 years, and >650 million adults were reported to be obese (WHO, 2022). Obesity is a chronic disease associated with comorbidities such as coronary heart disease, diabetes mellitus, obstructive sleep apnea, and hypertension (Felsenreich et al., 2016). Bariatric surgery is the most successful method to treat morbid obesity (Kirkil et al., 2018). Laparoscopic sleeve gastrectomy is a weight-loss technique that has grown in popularity; in 2015, it accounted for 53.8% of all bariatric surgeries (Jambhekar et al., 2018).

Individual variations, however, in terms of long-term weight loss after this kind of bariatric surgery have been noted. Weight gain has been reported to range from 5.7% at two years post-operatively to 75.6% at six years post-operatively (Lauti et al., 2016). Concerning bariatric surgeries, including laparoscopic sleeve gastrectomy, behavioral factors in relation to food and exercise have been shown to affect post-surgical outcomes (Lufti et al., 2006). Excess weight loss, patient health condition changes, and QoL are factors used to evaluate bariatric surgery outcomes (Kirkil et al., 2018). The most common questionnaires to assess QoL outcomes following bariatric surgery are the SF-36 and the Moorehead–Ardelt Quality of Life Questionnaire II (MA-QoLQII) (Major et al., 2020).

This study assessed QoL improvement in patients who had undergone laparoscopic sleeve gastrectomy. Physical functioning, social life, emotional well-being, and ability to work showed high QoL scores for most of the study patients. Our results were in line with a Brazilian study, which claimed that most patients had experienced significant improvements in QoL scores, except in the sexual and social life domains, which most patients stated were “unchanged” (Amichaud et al., 2016). The QoL measures in our study showed high scores in domains associated with age, higher educational level, a shorter time since the operation, and fewer complications, in line with the findings of Fezzi et al., (2011), in which QoL was assessed one year post-operatively.

A recent systematic review reported that improvements occurred as early as three months post-operatively (Aljohani et al., 2021). While this finding was obtained from a study evaluating patients who had undergone gastric bypass, it accords with our study findings. Our study patients had good mean QoL scores for emotional well-being, physical and social functioning, and energy/fatigue. Similar findings were observed in a systematic review and meta-analysis of long-term health-related QoL in patients undergoing bariatric surgery (Fiore, 2013). In a Polish study, SF-36 scores differed statistically in all parameters ($P < 0.05$) except for role limitations due to emotional issues and mental health (Lier et al., 2011).

According to a comprehensive systematic review, bariatric surgery significantly improved QoL, with a more substantial positive effect on physical QoL than mental QoL (Lindekilde et al., 2015; Hachem and Brennan, 2016). Our study had some limitations. The lack of BMI data may have influenced our QoL assessment. Furthermore, data concerning the improvement or remission of obesity-related comorbidities after bariatric treatment were unavailable and could not be assessed.

5. CONCLUSIONS

Many sociodemographic factors, including age, educational level, income, marital status, history of chronic disease, time since the operation, and complications, were associated with QoL in the study of patients who had undergone bariatric surgery. The effects of these factors differed across each QoL domain. A high QoL score was observed among individuals who had undergone laparoscopic sleeve gastrectomy in domains such as physical health functioning, emotional issues, energy/fatigue, and general health. The most common surgical complications were gastroesophageal reflux disease, gallbladder stones, and malnutrition (25%, 22%, and 18.4%). Further research is required to understand the different factors that may affect QoL following bariatric surgery, focusing on the various types of bariatric surgeries and the time since surgery. Further studies that include longer follow-up times and outcomes for all bariatric procedure types are recommended.

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Author contributions

Nouf Alkalbi, carried out the study design, collecting of data and writing the manuscript, Sami A AlDubai guided the study design and critically reviewed the paper. Abdulhamid Alharbi and Maha Almutairi carried out data collection and writing first draft. Zahrah Alsharif and Masheal Abdulmasqsd analyzed the data and interpretation. Arwa Almalki and Zeidan Abdu Zeidan participated in writing manuscript. All authors reviewed the article critically and approved the final version of the manuscript.

Ethical approval

The Medical Ethics Committee approved the study in Al-madinah Health Cluster, Saudi Arabia (Ethical approval code: IRB 003-2022).

Informed consent

Written & Oral informed consent was obtained from all participants in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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Conflict of interest

The authors declare that there is no conflict of interest.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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