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ORIGINAL RESEARCH

Assessment of Quality of Life Among Laparoscopic Sleeve Gastrectomy Patients in the Aseer Region, Saudi Arabia

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Background: Obesity is a global epidemic, with rising prevalence rates in both developed and developing countries. In Saudi Arabia, the prevalence exceeds the global average, reaching 35%, and is associated with increased morbidity and mortality. This study explores changes in quality of life (QoL) following laparoscopic sleeve gastrectomy (LSG) among adults in the Aseer region, an area previously unexamined in this context.

Methods: A retrospective study was conducted involving patients who underwent LSG in Abha between January 2018 and December 2023. The study included 385 participants, selected from an initial pool of 450 after excluding individuals with incomplete data. QoL was assessed using the RAND 36-Item Health Survey, which evaluates various domains such as physical functioning, emotional well-being, and general health perception.

Results: Postoperative assessments revealed significant improvements in QoL, with patients reporting enhanced physical and emotional health. Mean scores demonstrated notable gains, particularly in energy/fatigue and emotional well-being domains. A substantial majority (79%) expressed satisfaction with their weight loss outcomes. Furthermore, many participants experienced significant improvements in obesity-related comorbidities, including diabetes and gastroesophageal reflux disease. Statistical analyses identified key predictors of patient satisfaction, such as age, education level, and income.

Conclusion: This study confirms the effectiveness of LSG as a viable intervention for obesity management in the Aseer region, leading to improved health-related quality of life. It underscores the importance of a comprehensive approach to obesity treatment that combines surgical intervention with ongoing lifestyle support. Future research should focus on long-term outcomes and the psychological aspects of post-bariatric surgery to optimize patient care. Overall, this study provides valuable insights into obesity management and QoL enhancement following surgery in Saudi Arabia.

Keywords: obesity, quality of life, laparoscopic sleeve gastrectomy, Saudi Arabia and retrospective analysis

Introduction

Obesity is a global epidemic, with increasing prevalence in both developed and developing countries.[1] In Saudi Arabia, the obesity rate exceeds the global average, reaching 35%, and significantly contributes to elevated morbidity and mortality rates.[2,3] To address this challenge, the Saudi government has incorporated obesity management strategies into its Vision 2030, including the promotion of bariatric procedures such as laparoscopic sleeve gastrectomy (LSG).[4,5]

Saudi Arabia has adopted progressive approaches to obesity management, including early implementation of day-case bariatric surgeries.[6] For individuals with severe obesity, surgical options like laparoscopic Roux-en-Y gastric bypass (RYGB) and LSG are recommended for patients with a BMI over 35 accompanied by comorbidities or over 40 unresponsive to medical therapy.[7–9]

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Since 2014, LSG has become the most commonly performed bariatric procedure worldwide, owing to its safety, efficacy, and favorable outcomes.[10] It is considered a safe and effective weight loss intervention, particularly suitable for patients with mild to moderate obesity, often yielding better outcomes compared to those with higher BMI.[11]

Postoperative quality of life (QoL) is a crucial indicator of surgical success, encompassing both physical and psychological health domains. Numerous studies have demonstrated QoL improvements following LSG, primarily driven by weight loss and associated health benefits.[12,13] However, postoperative complications such as gastroesophageal reflux or nutritional deficiencies can adversely affect QoL, emphasizing the importance of comprehensive ongoing follow-up.[14,15]

While the global body of research on LSG outcomes continues to grow, data specific to QoL outcomes within the Saudi population remains limited, particularly in certain regions like Aseer. Factors such as cultural norms, socioeconomic status, and healthcare access may uniquely influence postoperative QoL in this region. Understanding these region-specific influences is vital for optimizing patient care and tailoring management strategies effectively.

To date, no studies have specifically explored the impact of LSG on QoL in the Aseer region. Given its distinct cultural, socioeconomic, and healthcare characteristics, investigating how these factors affect postoperative outcomes is essential. This study aims to evaluate changes in QoL among LSG patients in Aseer utilizing the RAND 36-Item Health Survey (SF-36), thereby providing localized insights to enhance obesity management in this context.

Considering the high prevalence of obesity in Saudi Arabia and the increasing adoption of LSG as a bariatric intervention, understanding its impact on health-related quality of life (QoL) is crucial. While global studies have demonstrated QoL improvements following LSG, there is a notable lack of research examining these outcomes within the Aseer region, where unique cultural and socioeconomic factors may influence results. This study seeks to fill this gap by assessing QoL changes among LSG patients in Aseer, providing region-specific data to inform and improve obesity management strategies.

Methodology

Study Design and Setting

This retrospective study included 385 patients who underwent laparoscopic sleeve gastrectomy (LSG) at Abha International Private Hospital, a 300-bed facility, during the period from January 2018 to December 2023.

Population and Sample Size

The target population comprised all adult males and females residing in the Aseer region who had undergone LSG.

Inclusion and Exclusion Criteria

Participants were included if they met the following criteria:

- Aged 18 years or older, or minors with informed consent obtained from a parent or legal guardian.
- Resided in the Aseer region at the time of surgery.
- Provided informed consent to participate in the study.

Exclusion criteria encompassed:

- Individuals who refused to participate.
- Participants under 18 years old without parental or guardian consent.
- Participants with incomplete or inconsistent data.
- Participants not residing in the Aseer region.

To ensure data reliability, demographic characteristics were compared between included and excluded participants, revealing no significant differences, thus indicating minimal systematic bias.

Sample Size Calculation

The minimum required sample size was calculated using the formula:

$n = (z)2\ p\ (1 - p)/d2$

where:

p=50% (0.5), used as a conservative estimate in the absence of prior prevalence data,

Z=1.96 for a 95% confidence level,

d=5% (0.05) margin of error,

Population size = 100,000.

This yielded a minimum sample size of 385 participants, ensuring adequate statistical power.

Data Collection

Data were collected via an online survey link sent to eligible patients after obtaining their consent. The online questionnaire was developed in both English and Arabic, utilizing Google Forms, and distributed through social media and Email for convenience.

The Arabic version of the questionnaire was culturally adapted through back-translation and expert review to ensure semantic and conceptual equivalence with the English version. To enhance comprehension and participation, respondents could choose their preferred language.

Prior to the main survey, a pilot test was conducted among a randomly selected subset of patients to assess reliability and validity. The pilot achieved a Cronbach's alpha of 0.85, indicating good internal consistency; these data were not included in the final analysis.

Questionnaire Design

The survey comprised closed-ended questions aligned with the study objectives. It collected demographic data (age, gender), anthropometric measurements (weight, BMI), preoperative comorbidities, postoperative satisfaction with weight loss, health perceptions, and quality of life (QoL) metrics.

Statistical Analysis

Data were entered and analyzed using IBM SPSS version 24.0. Descriptive statistics summarized qualitative variables as numbers and percentages. Quantitative variables included age, gender, weight, BMI, comorbidities, and QoL scores.

Multivariate linear and logistic regression analyses identified potential predictors of postoperative outcomes. A p-value of less than 0.05 was considered statistically significant.

Quality of Life Assessment

QoL was evaluated using the RAND 36-Item Health Survey (RAND-36), a validated and standardized instrument measuring health-related QoL across nine domains: physical functioning, social functioning, physical role limitations, emotional role limitations, mental health, vitality, pain, general health perception, and health change perception.[16,17]

Scores are linearly transformed to a 0–100 scale, where higher scores indicate better health status. Each domain score is calculated by averaging the responses to relevant items, with missing responses excluded from the calculation. The scoring process involves recoding responses and averaging items within each domain to generate the nine subscale scores.

Ethical Considerations

This study was approved by the Research Ethical Committee of the College of Medicine, King Khalid University (ECM#2023-2117), and conducted in accordance with the Declaration of Helsinki.

Participants received a brief explanation of the study's purpose and their voluntary participation was emphasized. The survey did not collect personal identifiers such as names or addresses. Electronic informed consent was obtained prior to participation. Data confidentiality was maintained by ensuring anonymity and encouraging honest responses throughout the process.

Results

This retrospective study included patients who underwent laparoscopic sleeve gastrectomy in Abha between January 2018 and December 2022, aiming to evaluate changes in quality of life following the procedure.

Table 1 presents the demographic characteristics of the studied population. Males comprised 156 individuals (40.5%), while females numbered 229 (59.5%). Approximately 58.7% of the patients (n=226) were aged between 26 and 45 years. Regarding marital status, divorced patients were the majority, accounting for 56.6% (n=218), followed by married individuals at 33.8% (n=130). Educational levels showed that high school education was the most common, with 62.1% (n=239). Unemployed patients constituted 58.4% (n=225). Family monthly income was more than 10,000 Saudi Arabian Riyals (SAR) in more than half of the families. In terms of postoperative duration, 37.9% (n=146) had more than 28 months since surgery, while 24.7% (n=95) were within 13–18 months post-operation.

Table 1 Distribution of the Study Group According to Basic Demographic Data

Demographic Data	Number	Percent
Gender:		
Male	156	40.5
Female	229	59.5
Age:		
Less than 18	5	1.3
18-25	93	24.2
26-35	114	29.6
36-45	112	29.1
More than 45	61	15.8
Marital status:		
Single	4	1.0
Married	130	33.8
Divorced	218	56.6
Widowed	33	8.6
Education level:		
Illiterate	3	0.8
Primary	7	1.8
Secondary	94	24.4
High school	239	62.1
University	32	8.3
Other	10	2.6
Occupational status:		
Employed	160	41.6
Unemployed	225	58.4
Family monthly income (SAR):		
Less than 3000	145	37.7
3000-10,000	47	12.2
More than 10000	193	50.1
Duration After surgery:		
Less than 6 months	80	20.8
6 months - 12 months	41	10.6
13 months – 18 months	95	24.7
19 months – 24 months	23	6.0
More than 24 months	146	37.9

Table 2 presents operative and postoperative measurements. The mean height of the patients was 163.02 ± 8.85 cm, with a mean weight of 118.51 ± 17.4 kg, and a mean BMI of 44.7 ± 6.76. Postoperatively, the mean lowest weight recorded was 67.63 ± 10.78 kg, and the current weight was 71.03 ± 13.14 kg, with a mean BMI of 26.76 ± 4.82. In terms of total weight loss percentage, 24.2% (n=93) of patients lost less than 50%, 55.8% (n=215) achieved a weight loss of 50–74.9%, and 20% (n=77) lost 75% or more of their initial weight.

Table 3 illustrates the distribution of the study group concerning pre-operative comorbidities and the percentage of post-operative improvement. Among the patients, 49 cases had diabetes mellitus, with the most common improvement being moderate (16 cases, 32.7%). Hypertension was present in 62 cases, with the most frequent response being "don't know" regarding improvement (17 cases, 27.4%). Dyslipidemia affected 95 patients, with the highest proportion showing complete improvement (24 cases, 25.3%). Gastroesophageal reflux disease (GERD) was reported in 108 cases, with 30 cases (27.8%) experiencing complete improvement. Musculoskeletal and joint disorders were present in 190 cases, with 71 cases (37.4%) achieving complete improvement. Sleep disturbances affected 223 patients, with the highest improvement rate being complete in 96 cases (43%).

Table 2 Anthropometric Measurements of the Study Group Pre- and Post-Surgery

Anthropometric Measurements	Range	Mean ± S.D.
Pre operative measurements		
Height (cm)	145.0–190.0	163.02±8.85
Weight (kg)	92.0–172.0	118.51±17.4
BMI (Kg/cm^2)	35.49–74.67	44.7±6.761
Post operative measurement		
Lowest weight post operative	44.0–101.0	67.63±10.78
Weight now	45.0–118.0	71.03±13.14
BMI Now	18.26–52.44	26.76±4.819
Percent of total weight loss (TWL%)		
Less than 50%	93 (24.2%)	
50-74.9%	215 (55.8%)	
75.0% or more	77 (20.0%)	

Table 3 Distribution of Postoperative Improvement and Worsening Across Comorbidities

Comorbidities	Total	Complete Improve	Moderate Improve	Partially Improve	Worsening	No Change	I Do Not Know.
Diabetes Mellitus	49	13 (26.5)	16 (32.7)	8 (16.3)	1 (2.0)	7 (14.3)	4 (8.2)
Hypertension	62	10 (16.1)	14 (22.6)	8 (12.9)	9 (14.5)	4 (6.5)	17 (27.4)
Dyslipidemia	95	24 (25.3)	21 (22.1)	11 (11.6)	9 (9.5)	12 (12.6)	18 (18.9)
GERD	108	30 (27.8)	23 (21.3)	20 (18.5)	19 (17.6)	16 (14.8	0 (0.0)
Musculoskele-tal and joint disorders	190	71 (37.4)	42 (22.1)	44 (23.2)	10 (5.3)	23 (12.1)	0 (0.0)
Sleep disturbances	223	96 (43.0)	62 (27.8)	22 (9.9)	3 (1.3)	31 (13.9)	9 (4.0)

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Table 4 Distribution of the Studied Patients Regarding Their Satisfaction About Weight Loss

Level of Satisfied About Weight Loss	Number	Percent
Excellent	304	79.0
Good	53	13.8
Just accepted.	21	5.5
No change.	4	1.0
Weight gain	3	0.8

Table 4 displays the distribution of the studied patients according to their satisfaction with weight loss. The level of satisfaction was rated as excellent in 304 cases (79%), good in 53 cases (13.8%), acceptable in 21 cases (5.5%), no change in 4 cases (1%), and weight gain was reported in 3 cases (0.8%).

Figure 1 illustrates the distribution of the studied group concerning their opinions about their health. It was found that 125 cases (32.5%) rated their health as excellent, followed by 91 cases (23.6%) rating it as good. When comparing their health now to one year ago, 120 cases (31.2%) reported it as much better, 90 cases (23.4%) felt it was about the same, and 89 cases (23.1%) considered it somewhat better than one year ago.

Table 5 presents the descriptive statistics of the different quality of life scores in the RAND-36 domain within the studied group. The mean scores are as follows: physical functioning 47.11 ± 20.6, role limitations due to physical health 54.22 ± 21.5, role limitations due to emotional problems 40.01 ± 31.6, energy/fatigue 72.41 ± 39.2, emotional well-being 66.12 ± 19.7, social functioning 43.75 ± 18.2, pain 55.24 ± 21.3, general health 37.45 ± 16.2, and the total score is 52.02 ± 18.0.

Table 6 indicates that the most significant factors affecting the prediction of patient satisfaction include gender, age (particularly 36–45 years and over 45 years), education level (illiterate and primary education), family monthly income (less than 3000 SAR and between 3000–10,000 SAR), and duration after surgery (less than 6 months and 6–12 months).

The multivariate logistic regression model for predictors of patient satisfaction demonstrated good fit, as evidenced by a non-significant Hosmer-Lemeshow test ($p = 0.35$), indicating no significant discrepancy between observed and predicted values. Additionally, the model exhibited strong discriminatory ability, with an area under the curve (AUC) of 0.85 (95% CI: 0.78–0.92).

Discussion

The present study aimed to evaluate changes in quality of life (QOL) following laparoscopic sleeve gastrectomy (LSG) among patients in Abha, Saudi Arabia. Our findings demonstrate significant improvements across various QOL domains, including physical functioning, emotional well-being, and social functioning, as assessed by the RAND-36 questionnaire. These results align with previous research documenting QOL enhancements post-LSG.[18–20]

Our sample comprised 385 individuals, predominantly females, consistent with prior studies indicating that women often constitute a larger proportion of bariatric surgery patients due to higher obesity prevalence and greater propensity to seek treatment for weight management.[21] The mean preoperative BMI was 44.7, indicating morbid obesity, which significantly decreased to 26.7 postoperatively, underscoring the effectiveness of LSG in facilitating substantial weight loss. Most patients achieved weight loss ranging from 50% to 74.9%, comparable to outcomes reported in earlier bariatric studies.

Bariatric surgery has proven to be a highly effective intervention for achieving sustained weight loss, addressing obesity-related comorbidities, and improving overall QOL.[22] The benefits extend beyond weight reduction, positively impacting metabolic biomarkers and cellular health.[23,24] Nonetheless, approximately 30% of patients experience weight regain (WR), which can lead to recurrence of comorbidities, diminished health-related QOL, and decreased patient satisfaction.[25–29]

Contradictory findings exist regarding the relationship between BMI and QOL. For instance, Müller et al found no significant correlation between BMI and QOL in a study of 104 patients,[30] and Sarwer et al suggested that weight reduction does not necessarily translate into improved QOL.[31] Conversely, a recent systematic review indicated that

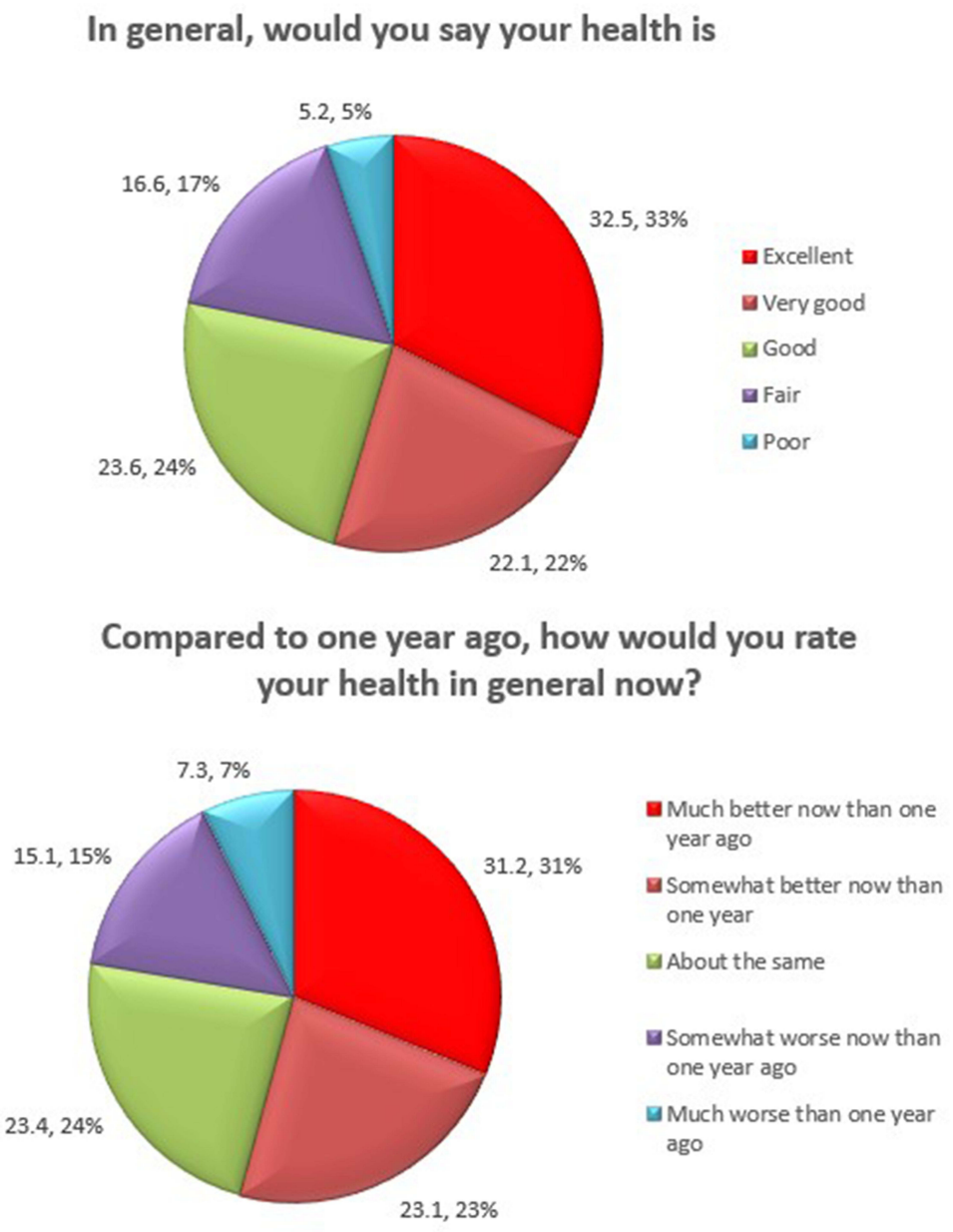

Figure 1 Distribution of the studied group regarding their opinion about their health.

preoperative HRQOL was impaired among bariatric candidates but improved markedly afterward, with greater weight loss associated with higher QOL, especially when patients were satisfied with their outcomes.[32] These discrepancies highlight the complex interplay of factors influencing postoperative QOL and warrant further investigation. Our study

Table 5 Descriptive Statistics of Quality of Life Scores in the RAND-36 Domains for the Studied Group

RAND-36 Domain	Range	Mean ± S.D.
Physical functioning	19.0–87.0	47.11 ± 20.6
Role limitations due to physical health	18.5–90.0	54.22 ± 21.5

(*Continued*)

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Table 5 (Continued).

RAND-36 Domain	Range	Mean ± S.D.
Role limitations due to emotional problems	13.0–71.0	40.01 ± 31.6
Energy/fatigue	32.0–100.0	72.41 ± 39.2
Emotional well-being	42.0–88.0	66.12 ± 19.7
Social functioning	24.0–69.0	43.75 ± 18.2
Pain	19.0–85.0	55.24 ± 21.3
General health	16.0–56.0	37.45 ± 16.2
Total score	13-100.0	52.02±18.0

Table 6 Multivariate Logistic Regression Analysis for Predictors of Patient's Satisfaction

Factors	Standardized B Coefficients	Odds Ratio	95.0% C.I.	*p* value
Gender:				
Male	0.506	1.98	1.130–4.11	0.004*
Female		1.0		
Age:				
Less than 18	0.241	1.0		
18-25		1.03	0.68–2.22	0.321
26-35		1.21	0.43–2.02	0.11
36-45		1.77	0.21–0.98	0.043*
More than 45		2.13	0.13–0.98	0.021*
Marital status:				
Single	0.12	1.0		
Married		1.02	0.56–2.02	0.069
Divorced		1.07	0.76–1.52	0.231
Widowed		0.87	0.656–1.57	0.229
Education level:				
Illiterate	0.411	2.54	2.1–3.11	0.0021*
Primary		2.1	1.85–2.4	0.003*
Secondary		1.26	0.656–1.57	0.125
High school		1.33	0.917–3.26	0.288
University		1.41	0.25–2.11	0.411
Other		1		
Occupational status:				
Employed	0.521	1	0.68–2.11	
Unemployed		1.22	0.71–2.76	0.365
Family monthly income (SAR):				
Less than 3000	0.714	2.34	0.21–0.76	0.001*
3000-10,000		1.88	0.11–0.73	0.016*
More than 10000		1		

(*Continued*)

Table 6 (Continued).

Factors	Standardized B Coefficients	Odds Ratio	95.0% C.I.	*p* value
Duration After surgery:				
Less than 6 months	0.108	2.33	1.98–3.21	0.003*
6 months - 12 months		2.01	2.11–4.21	0.008*
13 moths – 18 months		1.31	0.513–2.00	0.097
19 months – 24 months		1.29	0.66–1.85	0.311
More than 24 months		1		

Notes: Model fit: Hosmer-Lemeshow test, p = 0.35; AUC = 0.85 (95% CI: 0.78–0.92). C.I.: confidence interval. *: significant differences from baseline p (probability) ≤ 0.05.

also confirmed that reductions in weight and BMI were closely linked to improvements in obesity-related comorbidities such as diabetes, hypertension, and musculoskeletal disorders.

A noteworthy outcome was the significant improvement in obesity-related comorbidities. For example, 37.4% of patients with musculoskeletal and joint problems reported complete resolution, and 43% of those with sleep disturbances experienced full symptom relief, corroborating existing literature on bariatric surgery's efficacy in alleviating comorbid conditions.[33–37]

Understanding body composition's role in obesity and its metabolic consequences is essential. Abdominal obesity, in particular, is closely associated with metabolic syndrome, insulin resistance, hypertension, and dyslipidemia.[34] Studies like that of Ambrosi et al have shown that increased body fat percentage after Roux-en-Y gastric bypass (RYGB) correlates with heightened cardiometabolic risk, regardless of BMI or overall weight loss.[38] Our findings suggest that improvements in certain comorbidities, such as hypertension, were less definitive, with 27.4% of patients uncertain about their post-surgery health status. This variability underscores the multifactorial nature of hypertension and related conditions, which are influenced by factors beyond weight alone.

Most participants expressed high satisfaction with their weight loss; over 30% reported significant health improvements compared to the previous year. These findings align with other studies indicating that, while bariatric surgery offers substantial benefits,[39] some patients remain dissatisfied, questioning whether the risks and benefits justify the intervention. For example, Weiner et al reported that 99% of patients undergoing laparoscopic adjustable gastric banding (LAGB) were satisfied, with 96% willing to repeat the procedure after an average excess weight loss (EWL) of 73% over 18 months.[40] Similarly, Westling and Gustavsson observed high satisfaction (92%) among RYGB patients at one year post-operation.[41]

Post-LSG, approximately one-third of patients developed GERD, though symptoms improved in about 20%. Weight loss was the primary factor influencing overall health satisfaction, rather than GERD symptoms alone. Further research is necessary to clarify the complex relationship between weight loss, reflux, and QOL.[14]

Patients' perceptions of health improvements extend beyond weight loss, encompassing advances in comorbidities and psychosocial well-being. Obesity often coexists with psychosocial issues such as social stigma, depression, anxiety, and body image concerns,[42,43] which can substantially impair health-related QOL—a multidimensional construct reflecting patients' perceptions of their illness's physical, psychological, and social impacts.[44]

Our analysis of RAND-36 scores revealed notable improvements, particularly in energy/fatigue (72.4), emotional well-being (66.1), and pain (55.2). These domains suggest significant enhancements in vital aspects of life quality. Consistent with previous studies, increased physical activity and emotional health contribute to sustained weight loss, better control of comorbidities, and overall improved QOL.[45,46] Importantly, around 60% of these gains persisted at the one-year follow-up, indicating the lasting benefits of lifestyle changes post-surgery.[47]

However, challenges remain. Physical functioning scored lower (47.1), and general health remained limited (37.4), reflecting ongoing physical limitations for some patients—possibly due to residual obesity, age-related factors, or insufficient rehabilitation. This pattern aligns with literature indicating that, despite many benefits, physical functioning may lag behind other QOL domains after LSG.

Our analysis also identified demographic and clinical factors influencing patient satisfaction. Satisfaction was higher among males, older patients, and those with lower education levels. While traditionally, bariatric outcomes have focused on weight loss, recent research emphasizes the importance of patient-centered metrics, including satisfaction, which is influenced by individual characteristics and expectations.[48]

Notably, patients who underwent surgery within the last six months reported higher satisfaction levels. Janik et al found that post-surgical patients scored significantly higher on quality of life assessments compared to controls, with age, gender, and partnered status also serving as predictors of positive outcomes.[49] A systematic review confirmed that bariatric treatment provides enduring improvements in physical aspects of HRQOL, though psychological factors also play a critical role.[32]

Our data further suggest that additional interventions, such as tailored physical therapy, may be necessary to enhance physical functioning. When comparing our RAND-36 scores to normative data for the Saudi population reported by AboAbat et al (2020), we observed lower scores in physical functioning (47.11 vs 76.8), role limitations due to physical health (54.22 vs 64.8), and general health (37.4 vs 72.0). Conversely, energy/fatigue (72.4 vs 60.9) and emotional well-being (66.1 vs 66.0) were higher, indicating some areas of improvement but persistent deficits in others. These disparities highlight the need for targeted post-surgical support to address ongoing limitations, particularly in physical and general health domains.[50]

Finally, cultural and socio-economic factors specific to the Aseer region likely influence patients' decisions regarding LSG. Future research should explore how these contextual factors affect patient perceptions, expectations, and outcomes, aiming to optimize culturally sensitive approaches to obesity management.

Limitations

A notable limitation of this study is the high proportion (27.4%) of responses indicating "Don't know" regarding improvements in hypertension. This may reflect insufficient follow-up or limited patient awareness of their health status, potentially biasing the reported outcomes. It underscores the need for enhanced post-surgical monitoring and patient education in future studies.

Furthermore, as a retrospective, single-center study, our findings may be affected by recall bias and may not be generalizable to broader populations. Future multicenter, prospective research with longer follow-up periods is recommended to validate and expand upon these findings.

Conclusion

This study confirms the effectiveness of laparoscopic sleeve gastrectomy (LSG) as a viable intervention for obesity management in the Aseer region, demonstrating significant improvements in health-related quality of life. The findings highlight the importance of adopting a comprehensive approach to obesity treatment that combines surgical options with structured postoperative care, personalized education, and multidisciplinary follow-up. Such strategies are essential to optimize patient outcomes and satisfaction.

Future research should focus on long-term outcomes and the psychological aspects of post-bariatric surgery, aiming to further enhance patient care. This study provides valuable insights into obesity management and QOL enhancement in the Saudi context. Additionally, postoperative physiotherapy—comprising gradual aerobic and resistance exercises—should be integrated into care protocols. Supervised sessions initially, followed by regular follow-up, can ensure safe progression and recovery. Establishing standardized physiotherapy protocols, individualized exercise plans, and routine follow-up assessments will be crucial for monitoring progress and tailoring interventions effectively.

Institutional Review Board Statement

This study was approved by the Research Ethical Committee of the College of Medicine, King Khalid University (ECM#2023-2117), and conducted in accordance with the Declaration of Helsinki.

Data Sharing Statement

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy restrictions.

Informed Consent Statement

The research's objectives, anticipated duration, and the nature of any interventions or trials were disclosed to the participants or their authorized substitutes to acquire their informed permission.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare no conflicts of interest.

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