Patient Safety & Quality Improvement Journal
http://psj.mums.ac.ir
PSQI

A Retrospective Cohort Study on the Impact of Bariatric Surgery on BMI and Comorbidities: Sleeve Gastrectomy versus Gastric Bypass

*Shahow Abdulrehman Ezzaddin[1], Karzan Seerwan Abdullah[2], Warvin Farhad Fadhil[3], Tina Ako Jamal[3], Dina Bakr Raheem[3]

1. MBChB, MSc, PhD in Community Medicine- Branch of Clinical Sciences, College of Medicine, University of Suleimani, Iraq.
2. MBChB, HDGS, FIBMS, MRCS (glasg.), PDF in HPB - Branch of Clinical Sciences, College of Medicine, University of Suleimani, Iraq
3. 4th year Medical Student, University of Suleimani, College of Medicine. University of Sulaimani, Iraq.

ARTICLEINFO

Article type:
Original Article

***Article History*:**
Received: 27 Oct 2025
Accepted: 23 Nov 2025

Key words:
Bariatric Surgery; Sleeve Gastrectomy; Gastric Bypass; Body Mass Index; Comorbidity; Obesity

ABSTRACT

Introduction:
Obesity is a many-sided health problem affecting millions of people around the world, which require interventions to minimize its effect on human's health and health care system. Bariatric surgery has appeared vital assist for copying with obesity and associated complications, but in-depth understanding of its outcomes and patient's satisfaction has yet to be developed, especially within our community context.
Objective; To compare the short-term effects of sleeve gastrectomy and Roux-en-Y gastric bypass on BMI reduction and resolution of obesity-related comorbidities.

Materials and Methods:
A retrospective cohort study was conducted at Zhyan Private Hospital, Sulaymaniyah, between December 2023 and April 2024. Data from 226 patients who underwent bariatric surgery were analyzed. Pre- and postoperative BMI, hypertension (HT), and type 2 diabetes mellitus (DM) were assessed. Statistical analyses were performed using SPSS v26.0; McNemar's test was applied for paired categorical outcomes, and Chi-square tests for between-group comparisons.

Results:
Median BMI reduction was significantly greater in the bypass group (17.49 kg/m^2) than in the sleeve group (11.70 kg/m^2; $p = 0.002$). Both procedures produced significant remission of HT (from 40 to 13 cases; $p < 0.001$) and DM (from 17 to 3 cases; $p < 0.001$). No significant difference in absolute weight loss was observed between groups ($p = 0.15$).

Conclusion:
Bariatric surgery, particularly gastric bypass, was associated with marked BMI reduction and comorbidity remission within six months, supporting its role in managing severe obesity and metabolic disease in our population.

► ***Please cite this paper as:***
Abdulrehman Ezzaddin Sh, Seerwan Abdullah K, Farhad Fadhil W, Ako Jamal T, Bakr Raheem D. A Retrospective Cohort Study on the Impact of Bariatric Surgery on BMI and Comorbidities: Sleeve Gastrectomy versus Gastric Bypass. Journal of Patient Safety and Quality Improvement. 2026; 14(2): 77-83. Doi: 10.22038/psj.2025.92299.1505

**Corresponding author:* *E-mail: shahow.ezzaddin@univsul.edu.iq*

Introduction

Background; Obesity is a many-sided chronic disease that arises because of the genotype and environment interaction. It's a term used to describe abnormal or excessive fat accumulation that puts a BMI of over 25 is overweight and to over 30 is obese. Obesity has reached widespread outbreak around the world, with 1,9 billion overweight people and 650 million obese adults, according to WHO. In 2016, 26% of adult and 10% of children in England were obese, with the UK's NHS spending £6.1 billion per year on obesity-related illness, which is projected to double by 2050 (1,2). Obesity is associated with a marked increase in mortality, with a decrease in life expectancy of 5–10 years. Patients who are obese are at a high risk of developing a variety of comorbidities conditions, including cardiovascular diseases (CVD), Gastrointestinal disorders, Diabetes mellitus type 2 (3), joint and muscular injuries, respiratory problems, and psychological problems, which may significantly impact their daily, and early-onset metabolic syndrome. Every 5 kg of weight gain increases the chance of knee osteoarthritis by 36% (4-5). Greater weight loss can have additional benefits, particularly for dyslipidemia, hyperglycemia, and hypertension according to A meta-analysis of 15 studies showed that modest weight loss (an average of 5.5 kg in the treatment group VS. 0.2kg with placebo) from an average BMI of 35kg/m^2 led to a 15% decrease in all-cause mortality (6).

Treatment of obesity:

Dietary advice for obesity: a recent meta-analysis of low-fat diets shows significant weight loss when compared to baseline intake (-5.41 kg), but not when compared to other dietary interventions, including high-fat diets. Pharmacotherapy: in addition to a low-calorie diet and optimal physical fitness, the following are suggested: (Orlistat, Liraglutide, Naltrexone, bupropion). Intragastric balloons: they are made from an endoscopically deployed silicone balloon that is filled with saline and inflated in the stomach for a period of 6 months. IGBs is an alternative option for losing weight in patients who refuse or not fit for bariatric surgery.

Bariatric surgery: when all other therapies have failed, bariatric surgery is the most appropriate option. Gastric bypass and other weight loss procedures, also referred to as bariatric or metabolic surgery, involve making changes to your digestive system to help you lose weight. Bariatric surgery is done when diet and exercise haven't worked or if you have serious health problems because of your weight. Some weight loss techniques limit how much you can eat. Some procedures reduce the body's ability to absorb fat and calories, while others do both. Although bariatric surgery can have many benefits, it is not the only one (7-8). The reasons for seeking bariatric surgery are based on the BMI and the presence of disease. Patients with a BMI of 40 kg/m2 or greater with no preexisting health problems and for whom bariatric surgery does not pose a significant risk should be able to participate in one of the procedures discussed above. Patients with a BMI greater than or equal to 35 kg/m2 and 1 or more severe obesity-related disorders, such as type 2 diabetes, hypertension and hyperlipidemia. Patients with a BMI of 30 to 34,9 kg/m2 who have diabetes or metabolic disorder may also benefit from weight loss surgery, although there are no reliable studies to show long-term benefits for such patients (9-10).

Types of bariatric surgery:

Gastric bypass: this is the most common method of bariatric surgery. This surgery is not reversible at all. It works by decreasing the amount of food you can eat in one sitting and reducing the absorption of fat and calories.

Sleeve gastrectomy: about 80% of the stomach is removed with the sleeve gastrectomy, leaving a tube-like pouch. This smaller stomach doesn't have enough room to hold as much food. SG is also found in foods that contain less of the appetite-regulating hormones ghrelin, which may reduce the desire to eat. Biliopancreatic diversion duodenal switch: This is a two-part surgery that can be performed in one direction. The first stem involves a SG. During the second step, the surgeon closes the middle section of the intestine and then attaches the last part directly to the last part of the small intestine (11).

Single-anastomosis duodeno-ileal bypass with sleeve gastrectomy: The opening of the new stomach is connected to a portion of the lower small intestine. This method reduces the distance required for food absorption (12-14). Study justification: Although the global efficacy of bariatric surgery is well-established, data from the Kurdistan Region of Iraq remain limited. To date, no published study from Sulaymaniyah has compared outcomes of sleeve gastrectomy and gastric bypass. This research addresses that gap by providing locally relevant evidence from a high-volume private hospital.

Aims: To provide insights into the immediate health benefits of the two types of bariatric surgery (Bypass and sleeve).

Objectives:

- To assess the short-term impact of bariatric surgery on overall health outcomes within the initial 6 months following the surgical intervention.
- To assess changes in comorbidities.

Materials and Methods

Research design: This is a retrospective cohort study which quantifies the impact of bariatric surgery overall health outcomes.

Research setting: the research was done in city of Sulaymaniyah at zhyan private hospital from 1st of December 2023 to 1st of April 2024. Research subjects and participants: All patients who underwent bariatric surgery at Zhyan Private Hospital between December 1, 2023, and April 1, 2024, and met inclusion criteria were included (N = 226). This represents a complete census of eligible cases.

A post-hoc power analysis confirmed 80% power to detect a clinically meaningful 5 kg/m^2 difference in BMI change between groups.

Data collection: Pre- and postoperative diagnoses of hypertension, type 2 diabetes, and dyslipidemia were verified using electronic medical records.

A brief demographic and procedural questionnaire, piloted on 10 patients and refined for clarity, was administered during follow-up visits. Ethical considerations: The study was approved by the Ethics Committee of the College of Medicine, University of Sulaymaniyah (Ref: USM-REC-2023-12). Informed consent was waived owing to the retrospective nature of data collection and the use of anonymized medical records.

Pilot study: pilot study was performed, and questionnaire was updated accordingly.

Questionnaire: The questionnaire collected demographic information (age, gender, residence, occupation), anthropometric measures (height, weight pre- and postoperatively), type of surgery, pre- and postoperative comorbidities (hypertension, type 2 diabetes, dyslipidemia), and history of prior weight-loss attempts. No formal assessment of patient satisfaction was conducted. Statistical analysis: The data collected was first recorded on an excel workbook sheet, but it was then imported onto a Social Sciences (SPSS) 26.0 software for qualitative analysis. Since majority of the data were categorical, Chi-Squared test was conducted to determine the association between certain categorical variables. A p-value of less than 0.05 was considered significant. Conflict of interest: There's no conflict of interest.

Result

A total of 226 patients were included in the final analysis, with 14 undergoing gastric bypass surgery and 212 undergoing sleeve gastrectomy. The study population comprised 64 males and 162 females. Significant associations were observed between age groups and the type of surgery ($p < 0.001$), as well as between diabetes mellitus ($p = 0.04$) and hypertension ($p < 0.001$) and the type of operation performed.

- Median Change in BMI: The median change in BMI for bypass surgery is calculated as the difference between the median preoperative BMI (43.54) and the median postoperative BMI (26.05).

This indicates a median reduction in BMI of 17.49 units after bypass surgery, while the Median Change in BMI for Sleeve Gastrectomy (difference between the median preoperative BMI (41.10) and the median postoperative BMI (29.40)). was 11.70 units and these differences were statistically significant (p-value = 0.002) i.e. on average, patients who underwent bypass surgery experienced a greater reduction in BMI compared to those who underwent sleeve gastrectomy (Figure 1).

Table 1. Comparison of Demographic and Clinical Characteristics between Bypass and Sleeve Patient.

		Type of operation		Total	P value
		Bypass	Sleeve		
Sex	Male	3	61	64	0.56
	Female	11	151	162	
Age	< 17 years	0	5	5	< 0.001
	18 - 44 years	8	178	186	
	45 years or more	6	29	35	
Dyslipidemia	Yes	3	25	28	0.30
	No	11	186	196	
DM	Yes	3	14	17	0.04
	No	11	198	209	
HT	Yes	9	31	40	< 0.001
	No	5	181	186	
Total		14	212	226	

There were no significant differences between the two groups regarding gender and Dyslipidemia (Table. 1)

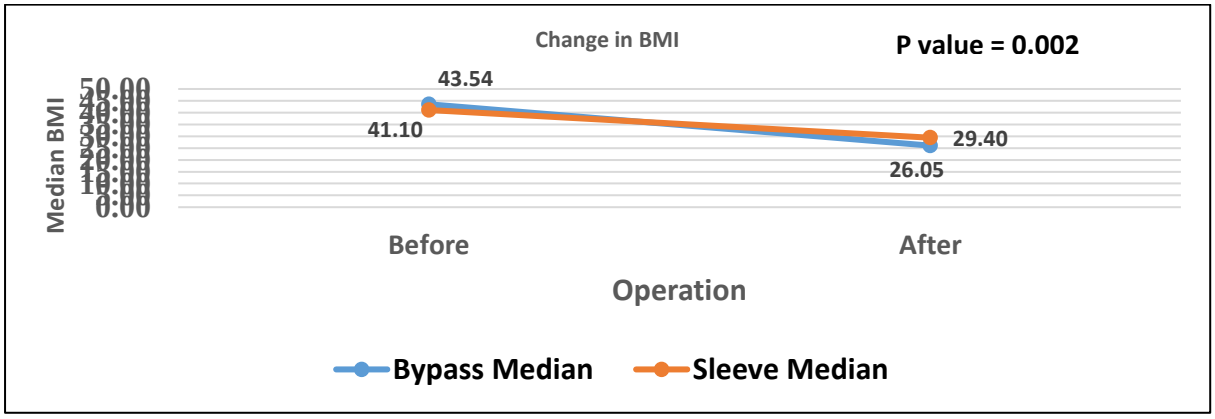

Figure1. Comparison the median change of postoperative BMI between bypass and sleeve surgery

However, there were no significant difference in weight reduction between the patients of these two types of operative procedure as both groups shown an average of more than 30 Kg reduction in weight and the p value of this difference was 0.15 i.e. both procedures were equally effective in promoting weight loss among patients Figure 2.

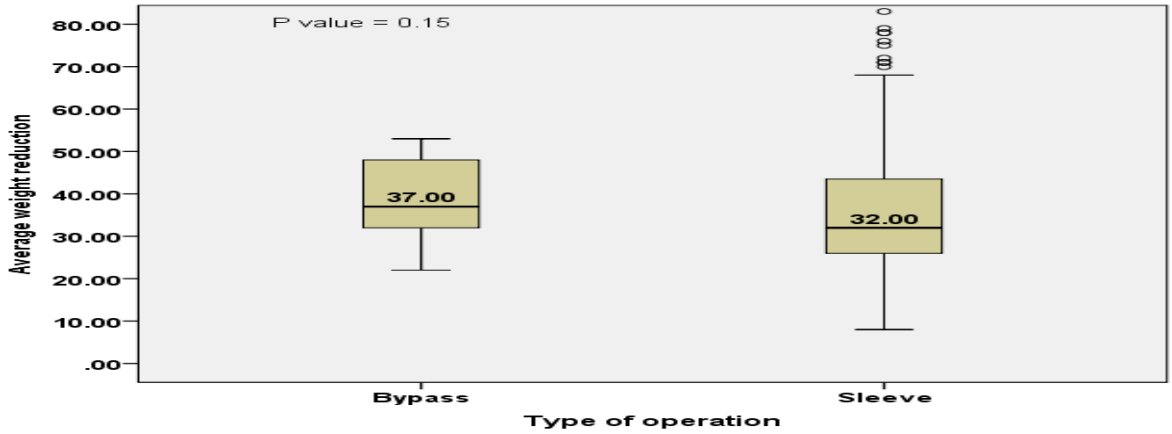

Figure 2. Comparing the average weight reduction between patients who underwent bypass and sleeve gastrectomy.

Change in comorbidity after operation: Table 2 summarizes the post-operative outcomes, specifically related to HT, and DM, in comparison to their presence before the operation. Resolution of hypertension and diabetes was analyzed using McNemar's test for paired nominal data. Among 40 patients with preoperative HT, 27 (67.5%) achieved remission postoperatively ($p < 0.001$). Similarly, 14 of 17 (82.4%) patients with DM achieved remission ($p < 0.001$). Overall, the results suggest that the operation had a positive impact on the prevalence of hypertension, snoring, and diabetes mellitus among the patients, leading to a reduction in these conditions post-operatively.

These findings highlight the potential benefits of the operation in improving patients' health outcomes and quality of life.

Table 2. Improvement in health outcomes following bariatric surgery

		After operation		Total	P value
		Yes	No		
HT before operation	Yes	13	27	40	< 0.001
	No	0	182	182	
DM before operation	Yes	3	14	17	< 0.001
	No	0	209	209	

* Performed by Mc- Nemar test

Discussion

This retrospective cohort study has investigated the impact of bariatric surgery among individuals underwent bariatric surgery regarding BMI, and comorbidities in Sulaymaniyah. 226 participants were responded among them 28.3% were male 71.7% were female. The age of majority of participants were from 18 – 44 years (82.3%).

Type of operation:

There was no statistically significant difference in post-operative weight reduction between patients who underwent bypass surgery and those who underwent sleeve gastrectomy, with a p-value of 0.15. ($p > 0.05$). In contrast to current research this research which done in Iran AUGUST 18, 2023, showed RYGB significantly higher weight loss compared to LSG, ($p < 0.05$), the difference may be due to the low number of our participants that underwent gastric bypass (15).

Dyslipidemia: The p-value of (0.30) suggests that there's no statistically significant association between dyslipidemia and the type of operation performed, goes with the research was done in India 2017, There was a significant improvement in serum triglycerides and HDL cholesterol with no significant reduction in serum total cholesterol in both LSG and RYGB. however, there were not significant difference between type of operation and dyslipidemia as in both types there were significant reduction in dyslipidemia in current study (16).

DM: The p-value (0.04) indicates a statistically significant association between diabetes mellitus and the type of operation. Another systematic review of RCTs from 2020 in Norway suggested that RYGB and SG were equally effective in resolving T2DM in patients with obesity. The contrast may be due to Sample Size and Diversity. Our study may have had a smaller sample size or different participant demographics compared to the systematic review from Norway (17).

HT: The p-value (<0.001) suggest a highly significant association between hypertension and the type of operation.

In contrast to current study in California, 2021, Showed there were no statistically significant differences between VSG and RYGB for hypertension remission, relapse, or mean systolic and diastolic blood pressure at any time during follow-up. Differences is due to the current research only a small proportion of our participants performed their surgeries by Bypass while majority performed sleeve gastrectomy (18).

Post-operative BMI changes:

The data suggest that patients undergoing bypass surgery tend to have lower postoperative BMIs compared to those undergoing sleeve gastrectomy ($p > 0.05$). Goes with the study that done in Iran, 2023, RYGB showed significantly higher weight loss compared to LSG, ($p < 0.05$) (15).

Comparing the average weight reduction between patients who underwent bypass and sleeve gastrectomy: Although mean weight loss did not differ significantly between groups ($p = 0.15$), the small number of bypass patients ($n = 14$) limits statistical power. The apparent similarity should therefore be interpreted as inconclusive rather than indicating true equivalence in efficacy. Goes with the research was done in King Saud University, Riyadh, 2021.

The maximum mean weight-loss percentage in the RYGB and SG groups was seen at 3 years post-surgery and was similar (54.3% and 54.4%, respectively) (19).

Improvement in health outcomes following bariatric surgery:

HT: Before the operation, 40 patients had hypertension, and after the operation, only 13 of them still had hypertension, while 27 did not. This change was statistically significant ($p < 0.001$), indicating a reduction in the prevalence of hypertension after the operation. Goes with the study done by Zeller C et al, 2023, Bariatric surgery represents an effective and durable strategy to control hypertension and related polypharmacy in subjects with obesity (20,21). DM: Before the operation, 17 patients had diabetes mellitus, but after the operation, only 3 of them still had diabetes mellitus, while 14 did not. This change was statistically significant ($p < 0.001$), Goes with the study done in China by Wong et al, 2021, Diabetes remission, improvement of blood glucose control, and reduction of antidiabetic medications after bariatric surgery can be sustained for many years with a decrease in overall morbidity and mortality (22).

Strengths of the study:

- Comparative analysis regarding different types of bariatric procedures (gastric bypass versus sleeve gastrectomy).

Study limitations:

This study has several limitations.

- First, its retrospective, single-center design may introduce selection and information bias.
- Second, the small number of gastric bypass cases limits between-group comparisons.
- Third, the short follow-up period (≤6 months) prevents evaluation of long-term weight trajectories.

Finally, unmeasured confounders such as dietary adherence or physical activity may have influenced outcomes.

Conclusion

- Research Context and Significance: In focusing on the main need to understand the implications of bariatric surgery within our community, current research shows valuable insights into BMI reduction and post-surgical satisfaction outcomes. By focusing on a population with a significant prevalence of obesity-related comorbidities.
- Clinical Implications: The implications of current research extend to clinical practice, where healthcare practitioners can leverage our findings to optimize patient care and outcomes. By understanding the detailed relationship between BMI reduction, and surgical interventions as well as the significant change in certain comorbidities (HT and DM) that are associated with very high BMI , hence clinicians can tailor treatment plans to individual patient needs.

Acknowledgment

we extend our heartfelt gratitude to dedicated staff of the clinic of Dr. Karzan for their invaluable assistance in providing data and facilitating on pertinent topics. Their support was instrumental in the successful completion of this research project.

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