



“ESTIMATION OF THE IMPACT OF GASTRIC SLEEVE SURGERY ON THE MORBIDITY AND THE EFFECTIVENESS AMONG SAUDIS AND EGYPTIANS”

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Abstract:

Background: Gastric sleeve surgery (GSS) is one of bariatric surgeries that improve obesity related comorbidities and more efficient than pharmacotherapy or lifestyle interventions.

Aim: To estimate the benefits of GSS and the complications in patients among Saudis and Egyptians.

Methods: A retrospective study was carried out among patients in Saudi Arabia and Egypt who underwent GSS, through interview with these patients postoperative. The interview questions were about Socio-demographic, advantages & disadvantages of GSS, obesity and comorbidity.

Results: The total number of patients who underwent GSS was 426 who completed their data. About 182(42.7%) from KSA and 244(57.3%) from Egypt. Good results were observed in weight loss by 92.3% Vs 78.6%, control of diabetes (57.1% Vs 23.8%), control of lipid profile (62.6% Vs 49.2%), control of heart problem (45.1% Vs 18.9%), increased the fitness (79.1% Vs 43.4%), better social communication (57.1% Vs 73.8%), improve the ability to work (54.9% Vs 32.0%). On the other hand, our patients were suffering from acute & chronic complications due to gastric sleeve surgery such as bleeding by 30.8% Vs 31.9% (which is more predominant) followed by anaemia & Iron deficiency, stomach twisting, reduction in gastric juice, and pulmonary embolism among Saudi Vs Egyptian patients respectively. Weight gain was observed 2 and 3 years after GSS.

Conclusion: The degree of satisfaction with GSS was higher in Saudis (67.0%) more than Egyptians (44.3%), and the benefits were more than complications, so, we advise to undergo GSS in obese patient who having more comorbidity due to obesity.

Keywords: Bariatric Surgery, Gastric sleeve surgery, Obesity, Comorbidity, Advantages, complications, Saudi Arabia, Egypt.

1. INTRODUCTION

A higher body mass index (BMI) was linked to 4.7 million deaths and 148 million disability-adjusted life years in 2017, according to the Global Burden of Disease Study. (GBD, 2017), and it is now

thought that 800 million people worldwide are obese (World Obesity Day, 2022). The prevalence of obesity has increased significantly, particularly in Western Europe (Janseen et al., 2020), and the Gulf region (Balhareth et al., 2019). The prevalence of overweight and obesity in Saudi Arabia was projected by the Ministry of Health to be 38% and 20%, respectively, in 2019 (MOH, 2022); more recently, the prevalence of obesity in Saudi Arabia has been assessed to be up to 36% (Salem et al., 2022). Overweight status and obesity are linked with more deaths. High body mass index (BMI) is a major risk factor for many diseases like diabetes mellitus (DM), cardiovascular diseases, osteoarthritis as musculoskeletal disorders, and some type of cancers (Althumiri et al., 2020). Bariatric surgery is more efficient than pharmacotherapy or lifestyle interventions to induce weight loss, and sleeve gastrectomy is one of this surgery (Arterburn & Courcoulas, 2014). Bariatric surgery effectively prevents and treats T2DM (Lee et al., 2018).

In Saudi Arabia the weighted national prevalence of obesity in Saudi Arabia in 2020 was estimated as 24.7% (Althumiri et al., 2020). Alfadda et al. reported data from the ACTION-IO study of obesity on the prevalence of obesity classes I (BMI 30.0–34.9 kg/m²), II (35.0–39.9 kg/m²) and III (≥ 40 kg/m²) (Alfadda et al., 2021).

The prevalence of obesity in KSA has increased in both genders by an average of 0.64% per year from 2012–2016 (Abarca-Gomez et al., 2017). All over the world, the prevalence of obesity has shown a marked increase over the past 40 years (WHO, 2018). Obesity should be managed step wisely on three lines, first lifestyle modification and behavioural therapies. Second-line adjuncts to lifestyle modification is pharmacological agents. The third line of management is bariatric surgery, which is considered the most effective long-term treatment for persons with severe obesity or moderate obesity complicated by comorbid conditions (Kushner, 2017).

In Egypt, according to “100 million health” survey, which was conducted in 2019 and screened 49.7 million adult Egyptians (≥ 18 years old), 39.8% of adult Egyptians suffered from obesity (BMI ≥ 30 kg/m²). Obesity was more prevalent in adult females than adult males (49.5% of Egyptian adult females suffered obesity compared to 29.5% for males) (Abouelghate et al., 2021).

The highest percentage of bariatric procedures performed were registered in Arabian Gulf countries although Arabian Gulf countries has the lowest number of research publications about bariatric surgery in comparison to Western countries (AlMarri et al., 2017). Although bariatric surgeries are the most common surgeries performed to manage obesity, there are specific guidelines that should be followed, which vary with the type of procedure performed (Alfadda et al., 2016). Other study showed the outcome of sleeve gastrectomy as a primary bariatric procedure (Van Rutte et al., 2014).

In Egypt 2020 a study about Laparoscopic sleeve gastrectomy surgery concluded that it is an easy, safe, and effective bariatric surgical procedure producing significant weight loss, improvement of comorbidities, and quality of life with low perioperative complications 19 (Elmahdy et al., 2020)

. Although studies have indicated that there are many complications of GSS, the prevalence of postoperative complications range between 4.4 and 12.8% (Seki et al., 2016). Bleeding is the early complication of GSS that need rapid management (Woźniewska et al., 2021). The incidence of leaks after GSS ranges from 1.3 to 2.8% (Seki et al., 2016). The objective of this study is to assess the benefits and complications of GSS among patients who underwent this surgery in Saudi Arabia and Egypt.

2. METHODS

2.1. Study Design

A retrospective study was carried out among patients in Saudi Arabia and Egypt who underwent bariatric surgery. Data was collected from patients through interview contain questions about their demographic characteristics (age, gender, education, marital status, BMI) and benefits and disadvantages of the GSS. Other data, including the clinical status; co-morbid diseases (hypertension,

Type II diabetes, dyslipidemia), biochemical parameters (glucose, HbA1c, cholesterol, triglyceride, lipids). The participants were well-informed about the nature of the study and inform them that the participation is voluntary. We illustrated at the beginning of the questionnaire or the interview some phrases about the participation is not mandatory and they can stop participation at any time without any harm. Also, data was secured for all participants, coded, and kept in a locked file with the access to the researchers only. The data was collected from October 2022 to February 2023. This study has been reviewed and approved by the research Ethical Committee (REC) at the University of Hail research number (H-2022-376) dated 14/11/2022.

2.2. Statistical analysis: was done with Statistical Package for Social Sciences (version 25 SPSS Inc, Chicago, IL, USA). Categorical variables were presented using frequencies (n) and percentages (%). P-value ≤ 0.05 was considered statistically significant according to Pearson Chi-Square test.

2.3. Inclusion criteria: The participants were males or females with age of 18 years-old and above who underwent GSS.

2. 4. Exclusion criteria: Patients with age less 18-years-old or suffering from mental disorders.

3. RESULTS

Some demographic characteristics about patients in Egypt and KSA who undergo gastric sleeve surgery. The total number of patients who underwent GSS was 482; only 426 who completed their data. About 182 (42.7%) from KSA and 244 (57.3%) from Egypt. Concerning the age of patients with GSS, the significant was different between the age of Saudis Vs Egyptians at $P = 0.020$ and the most affected age was 31-40 years-old (72.5% Vs 44.3%) respectively (Table 1, Figure 1). No significant difference was observed between gender at $P = 0.352$ (most of them from females) and level of education at $P = 0.268$ (most of them with university degree and above).

In this study, the marital and employment status of the patients was significantly different at $P < 0.050$, most of them married and employed. Positive lifestyle such as doing exercises, following healthy diets with nutritarian also affected the study significantly ($P < 0.05$) and most of patients were not smokers. About 47.3% Vs 41.8% (doing exercises), 30.8% Vs 50.8% (following healthy diet), 26.4% Vs 52.5% (follow up with nutritarian) among Saudis Vs Egyptians respectively (Figure 2).

All clinical characteristics were showed significant difference among patients ($P < 0.050$) either from Saudis or Egyptians such as percentage of patients with diabetes, duration of DM, hemoglobin A1C, cholesterol & lipid profile, receiving drugs for weight reduction (Table 2). The percentages of diabetic patients 24.2% Vs 42.6%, normal hemoglobin HbA1C (37.4% Vs 51.6%), high cholesterol & lipid profile level (46.2% Vs 34.4%), percentage of patients receiving drugs for weight reduction (17.6% Vs 73.8%) among Saudis Vs Egyptians patients who undergo GSS. The percentage of obese patients (with ≥ 30 BMI kg/m^2) showed no significant differences ($P = 0.217$) between the two nationality as 70.3% from Saudis Vs 72.1% from Egyptians. The main purpose of GSS for our patients was weight reduction in Saudis (70.3%) Vs Egyptians (83.6%).

Our patients were suffering from acute & chronic complications due to gastric sleeve surgery such as bleeding by 30.8% Vs 31.9% (which is more predominant) followed by anemia & Iron deficiency (31.9% Vs 16.3%), stomach twisting (17.6% Vs 31.9%), nerve pain (19.8% Vs 8.2%), reduction in gastric juice (15.4% Vs 8.2%) and pulmonary embolism (7.7% Vs 16.3%) among Saudi Vs Egyptian patients respectively (Table 3, Figure 3).

On the other hand, some benefits was shown in Table 3 after doing GSS, high significant differences was observed in weight reduction by 92.3% Vs 95.6% (Figure 4), control of diabetes (57.1% Vs 23.8%), control of lipid profile (62.6% Vs 49.2%), control of heart problem (45.1% Vs 18.9%), increased the fitness (79.1% Vs 43.4%), better social communication (57.1% Vs 73.8%), improve the ability to work (54.9% Vs 32.0%), control diabetes & lipids profile (27.5% Vs 6.6%) among Saudi and Egyptian patients respectively. Also, no increase in patients' weight after GSS in 68.1% Vs

56.6%, while 12.1% Vs 19.7% showed weight gain after 2 years and similar results were observed after 3 years from GSS (Figure 4). The degree of satisfaction with GSS was 67.0% Vs 44.3% and the disagree was 3.3% Vs 3.8% among Saudi and Egyptian patients respectively.

Table 1. The Socio-demographic characteristics of Egyptian & Saudi patients who underwent GSS [Total n=426, n=182 (Saudis), n=244 (Egyptians)].

| Characteristics n(%) | Saudis 182 (42.7%) | Egyptians 244 (57.3%) | Total no. 426 | P-value |
|---|--------------------|-----------------------|---------------|---------|
| Gender | | | | |
| Male | 56(30.8) | 90(36.9) | 146 (34.3) | 0.352 |
| Female | 126(69.2) | 154(63.1) | 280 (65.7) | |
| Age (years) | | | | |
| 18-30 | 14(7.7) | 32(13.1) | 46(10.8) | 0.000* |
| 31-40 | 132(72.5) | 108(44.3) | 240(56.3) | |
| 41-50 | 32(17.6) | 80(32.8) | 112(26.3) | |
| >50 | 4(2.2) | 24(9.8) | 28(6.6) | |
| Level of Education | | | | |
| Secondary and below | 54(29.7) | 56(23.0) | 110(25.8) | 0.268 |
| University and above | 128(70.3) | 188(77.0) | 316(74.2) | |
| Marital Status | | | | |
| Married | 90(49.5) | 164(67.2) | 254(59.6) | 0.009* |
| Unmarried | 92(50.5) | 80(32.8) | 172(40.4) | |
| Employment Status | | | | |
| Student | 52(28.6) | 6(2.5) | 58(13.6) | 0.013* |
| Employee | 74(40.7) | 206(84.4) | 280(65.7) | |
| Un-employee | 56(30.8) | 32(13.1) | 88(20.7) | |
| Smoking | | | | |
| Non-smoker | 140(76.9) | 236(48.4) | 258(60.6) | 0.009* |
| Medium smoker | 32(17.6) | 86(35.2) | 118(27.7) | |
| Strong smoker | 10(5.5) | 40(16.4) | 50(11.7) | |
| Doing exercise | | | | |
| Yes | 86(47.3) | 102(41.8) | 188(44.1) | 0.001* |
| No | 20(11.0) | 78(32.0) | 98(23.0) | |
| Sometimes | 76(41.8) | 64(26.2) | 140(32.9) | |
| Following healthy diet | | | | |
| Yes | 56(30.8) | 124(50.8) | 180(42.3) | 0.011* |
| No | 82(45.1) | 38(15.6) | 120(28.2) | |
| Sometimes | 44(24.2) | 82(33.6) | 126(29.6) | |
| Are you follow up with nutritarian | | | | |
| Yes | 82(26.4) | 128(52.5) | 176(41.3) | 0.007* |
| No | 110(60.4) | 38(15.6) | 148(34.7) | |
| Sometimes | 24(13.2) | 78(32.0) | 102(24.0) | |

*Significant difference at P-Value ≤ 0.05 .

Table 2. Clinical characteristics of Egyptian & Saudi patients who underwent GSS [Total n=426, n=182 (Saudis), n=244 (Egyptians)].

| Characteristics n(%) | Saudis 182 (42.7%) | Egyptians 244 (57.3%) | Total no. 426 | P-value |
|---|--------------------|-----------------------|---------------|---------|
| Do you have Diabetes | | | | |
| Yes | 44 (24.2) | 104 (42.6) | 148(34.7) | 0.005* |
| No | 138(75.8) | 140(57.4) | 278(65.3) | |
| Duration of Diabetes | | | | |
| No Diabetes | 138(75.8) | 140(57.4) | 278(65.3) | 0.018* |
| <5 years | 12(6.6) | 50(20.5) | 62(14.6) | |
| 5-10 Years | 26(14.3) | 34(13.9) | 60(14.1) | |
| >10years | 6(3.3) | 20(8.2) | 26(6.1) | |
| Hemoglobin A1C (HbA1C) level | | | | |
| Normal (< 7%) | 78(37.4) | 126(51.6) | 194(45.5) | 0.009* |
| High (7-10%) | 42(23.1) | 58(23.8) | 100(23.5) | |
| Very High >10% | 2(1.1) | 0(0.0) | 2(0.5) | |
| Don't know | 70(38.5) | 60(24.6) | 130(30.5) | |
| Cholesterol & lipids level | | | | |
| Normal | 48(26.4) | 108(44.3) | 156(36.6) | 0.027* |
| High | 84(46.2) | 84(34.4) | 168(39.4) | |
| Don't know | 50(27.5) | 52(21.3) | 102(23.9) | |
| Receiving drugs for weight reduction? | | | | |
| Yes | 32(17.6) | 180(73.8) | 112(49.8) | 0.033* |
| No | 142(78.0) | 42(17.2) | 184(43.2) | |
| Sometimes | 8(4.4) | 22(8.2) | 30(7.0) | |
| Do you know when you are obese (BMI kg/m²)? | | | | |
| <30 | 54(29.7) | 68(27.9) | 122(28.6) | 0.217 |
| ≥30 | 128(70.3) | 176(72.1) | 304(71.4) | |
| The main purpose of Gastric Sleeve surgery | | | | |
| Weight Reduction | 128(70.3) | 204(83.6) | 332 (77.9) | 0.023* |
| Osteoarthritis | 12(6.6) | 4 (1.6) | 16 (3.8) | |
| Control DM | 8(4.4) | 24 (9.8) | 32 (7.5) | |
| Prevent CVD | 16(8.8) | 6(2.5) | 22(5.2) | |

| | | | | |
|---|--|---------|--------|----------|
| Psychological | | 18(9.9) | 6(2.5) | 24 (5.6) |
| *Significant difference at P-Value ≤0.05. | | | | |

Table 3. Clinical characteristics of Egyptian & Saudi patients after performing GSS [Total n=426, n=182 (Saudis), n=244 (Egyptians)].

| Characteristics n(%) | Saudis 182 (42.7%) | Egyptians 244 (57.3%) | Total no. 426 | P-value |
|--|--------------------|-----------------------|---------------|---------|
| Acute & chronic complications of Gastric Sleeve surgery | | | | |
| Bleeding | 56(30.8) | 78(31.9) | 134(31.5) | 0.021* |
| Weight gain after time | 40(22.0) | 90(36.9) | 90 (21.1) | |
| Anemia & Iron Deficiency | 58(31.9) | 40(16.3) | 98(23.0) | |
| Stomach twisting | 32(17.6) | 78(31.9) | 90 (21.1) | |
| Nerve pain | 36(19.8) | 20(8.2) | 56 (13.1) | |
| Reduction in gastric Juice | 28(15.4) | 20(8.2) | 48(11.3) | |
| Pulmonary embolism | 14(7.7) | 40(16.3) | 54 (12.7) | |
| Weight reduction after Gastric Sleeve surgery | | | | |
| Yes | 168(92.3) | 192(78.6) | 360 (84.5) | 0.011* |
| No | 0(0.0) | 28(5.7) | 14(3.3) | |
| Somewhat | 14(7.7) | 38(15.6) | 56(12.2) | |
| Control of diabetes after Gastric Sleeve surgery | | | | |
| Yes | 104(57.1) | 58 (23.8) | 162(38.0) | 0.031* |
| No | 36 (19.8) | 46 (18.9) | 82(19.2) | |
| Somewhat | 42(23.1) | 140(57.4) | 182(42.7) | |
| Control of Lipid Profile after Gastric Sleeve surgery | | | | |
| Yes | 114(62.6) | 120(49.2) | 234 (54.9) | 0.012* |
| No | 34(18.7) | 18(7.4) | 56 (12.2) | |
| Somewhat | 34 (18.7) | 106(43.4) | 140 (32.9) | |
| Control of heart problem after Gastric Sleeve surgery | | | | |
| Yes | 82 (45.1) | 46(18.9) | 128 (30.0) | 0.030* |
| No | 50(27.5) | 58(23.8) | 108 (25.4) | |
| Somewhat | 50(27.5) | 140(57.4) | 190 (44.6) | |
| Feelings after Gastric Sleeve Surgery | | | | |
| Increased fitness | 144 (79.1) | 106(43.4) | 125 (58.7) | 0.008* |
| Better social communication | 104(57.1) | 180(73.8) | 142(66.7) | |
| Improve the work ability | 100(54.9) | 78(32.0) | 89 (41.8) | |
| Control DM & Lipids | 50 (27.5) | 16(6.6) | 33(15.5) | |
| Weight gain after Gastric Sleeve surgery | | | | |
| No increase | 124(68.1) | 138(56.6) | 262(61.5) | 0.015* |
| Increase after 2 Years | 22 (12.1) | 48 (19.7) | 70(16.4) | |
| Increase after 3 Years | 13(14.3) | 42(19.3) | 78(16.0) | |
| Increase after 4 Years | 2 (1.1) | 18(6.6) | 18 (4.2) | |
| Increase after 5 Years | 8(4.4) | 0 (5.3) | 8 (1.9) | |
| Degree of satisfaction with Gastric Sleeve surgery | | | | |
| Agree | 122(67.0) | 108(44.3) | 230 (54.0) | 0.020* |
| Neutral | 52(28.6) | 128 (52.4) | 180 (42.2) | |
| Not Agree | 8(4.4) | 8 (3.3) | 16 (3.8) | |
| *Significant difference at P-Value ≤0.05. | | | | |

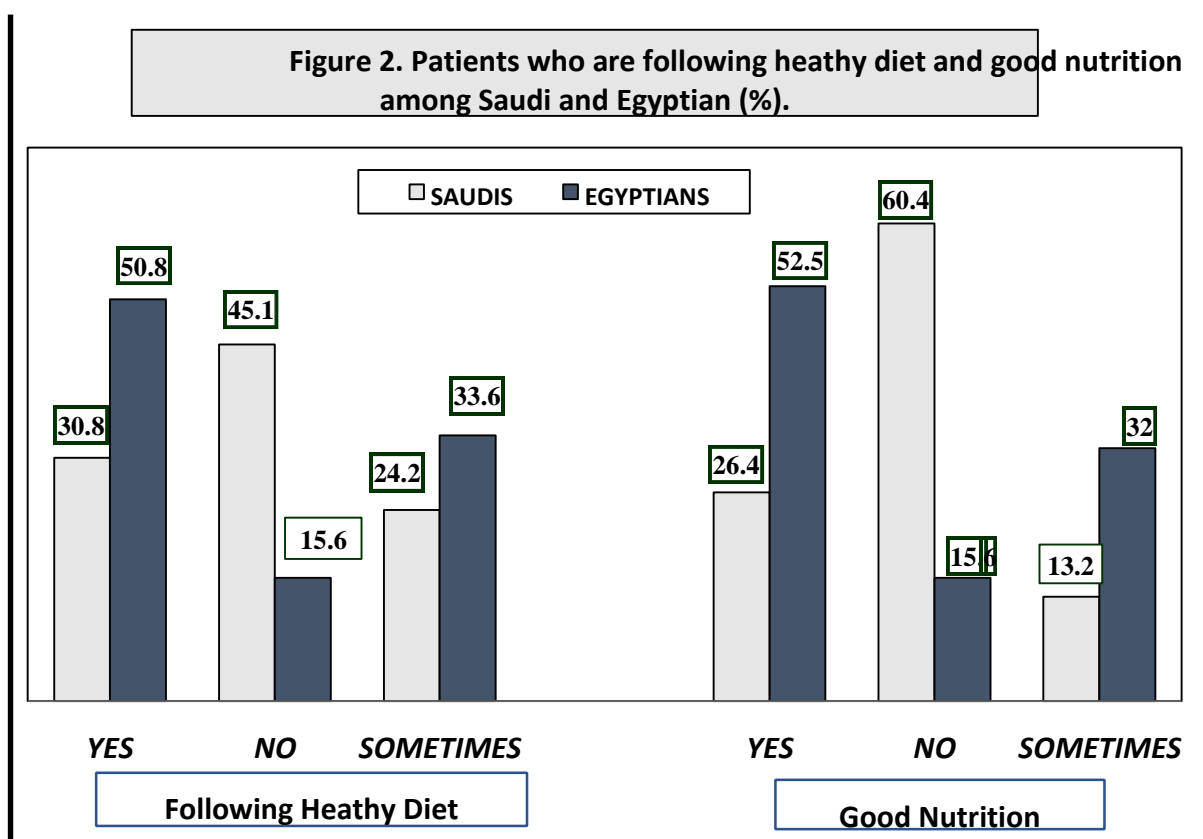
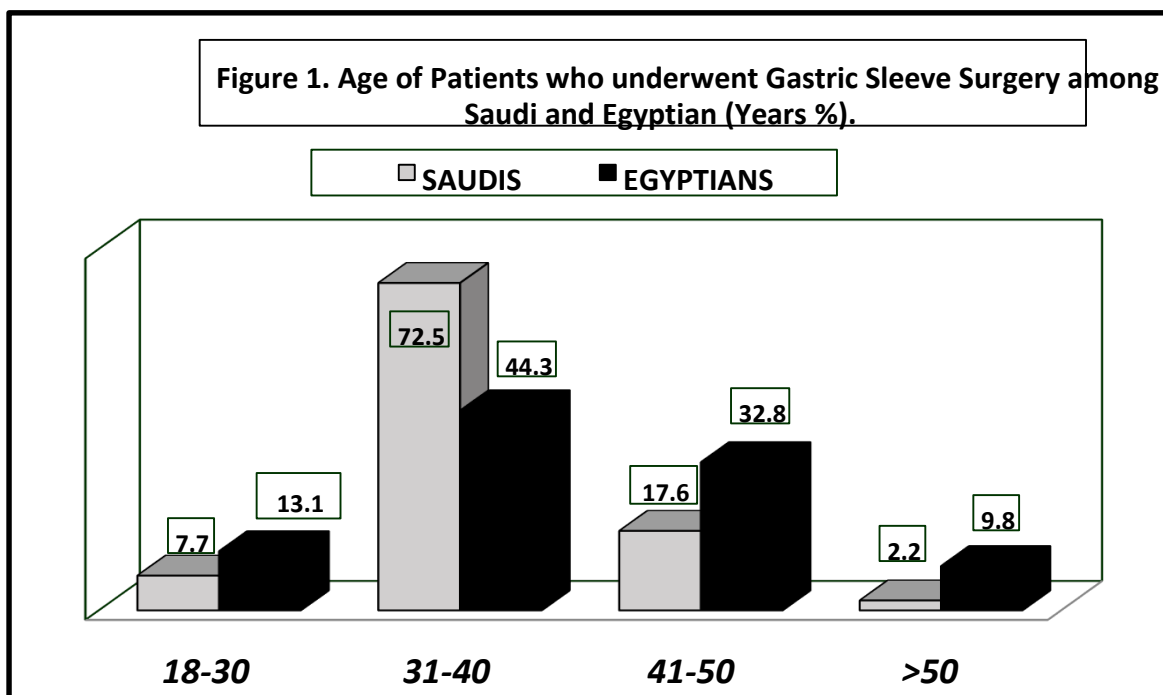


Figure 3. Acute & chronic complications after Gastric Sleeve surgery among Saudi and Egyptian (%).

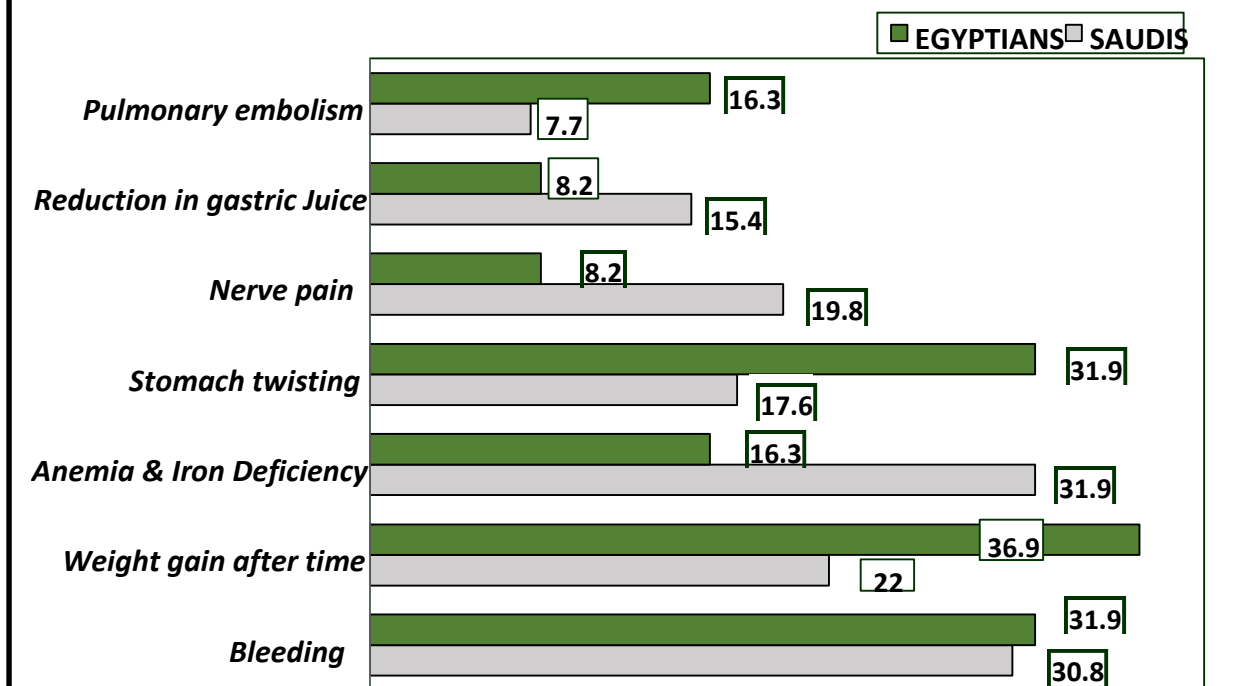


Figure 4. Percentage of Patients with weight loss and weight gain after Gastric Sleeve surgery among Saudi and Egyptian (%).



4. DISCUSSION

The total number of patients who underwent GSS was 482; only 426 completed their data. About 182 (42.7%) from KSA and 244 (57.3%) from Egypt. There was a significant difference between the age of patients who underwent GSS, among Saudis Vs Egyptians (31-40 yearsold), also the marital and employment status of the patients was significantly affected, but no significant difference was observed between gender, and level of education.

Positive lifestyle such as doing exercises, following healthy diets with nutritarian also affected the study significantly. Other study in KSA reported that quality of life was found to be influenced by age, gender, nationality, educational attainment, marital status, and a history of chronic illness or comorbidities (Alotaibi et al., 2022). Other studies said that losing weight can result from a variety of dietary patterns, both macronutrient and food based. Reducing energy density is a major weight-management technique that is useful for weight reduction and maintenance, according to clinical investigations, by lowering energy density, implementing portion control, and enhancing food quality. All vegetables were tinned, frozen, or fresh. Pick a variety of vegetables, that include those that are starchy, dark green, red, and orange, and legumes (Smethers & Rolls, 2018). Portion size can be specifically used to boost young children's daily intake of fruits and vegetables (Roe et al., 2022). Even when people are aware of the energy density of their meals, it can still have a big influence on the quantity of energy they take (Kral et al., 2022). Jogging, strength training, swimming and other forms of exercise were more frequently practiced by people with normal BMI than obese one who were eating much fast food, chocolates, fizzy drinks (Alsulami et al., 2023).

In this study some disadvantages of GSS were observed, they suffered from acute & chronic complications such as bleeding in one third of patients. Bleeding, leakage, and gastric fistulas are the most frequent intraoperative complications and post-operative complications after sleeve gastrectomy (Sharma et al., 2019). Besides intra-operative leaks and bleeds, postoperative effects are the main focus of many studies. The methods used to detect intra-operative staple line bleeds are not standardized, which makes them present a unique challenge because bleeds are frequently left unexplained or regarded as an inconvenience and are frequently treated with cauterization, sutures, sealants, and clips or may self-resolve with the application of pressure along the staple line. Only a small number of studies have looked at how intraoperative leaks and bleeding affect other complications or parameters including operating duration, cost, and length of stay (Ghosh et al., 2016). While bleeding during a sleeve gastrectomy did not extend the procedure's duration, it did slow down the process, according to a research team (Al Hajj & Haddad, 2013).

In our study, some patients had pulmonary embolism & stomach twisting (more in Egyptians), reduction in gastric juice (more in Saudis). Other studies found similar studies; they said variety of complications can happen in the post-operative period. Pulmonary emboli, bleeding, chest infections, abscesses, incisional hernias, re-laparoscopy for retained drains, anatomic leaks, wound infections, gastroesophageal reflux disease (GERD), and rhabdomyolysis in male patients are the most frequent problems during this time. Furthermore, dumping frequently manifests as bloating, flushing, diarrhea, and lightheadedness an hour after eating (Sarker et al., 2016).

Regarding anemia & Iron deficiency was observed it more in Saudis more than Egyptians. This result was like other study that revealed the deficiency in iron, calcium, vitamin D, and vitamin B12 as the most typical micronutrient. Thiamine, folate, and fat-soluble vitamins are further micronutrient deficits that can cause serious difficulties (Sarker et al., 2016). According to other studies, benefits in health were largely seen three years after the gastric sleeve surgery, and after five years, nutritional levels had returned to their pre-surgery levels (Saif et al., 2012). These findings highlight the importance of the initial five years of clinical surveillance.

Also, an increase in patients' weight after GSS, about 12.1% Vs 19.7% showed weight gain after 2 years and 3 years from GSS. Other finding which was similar to us was found by Catheline et al. (2012). They said that in contrast, 23% of patients had insufficient weight reduction (defined as between 35 and 40 kg/m²), progressive weight rebound, or persistence of co-morbidities. Catheline et al. discovered that 77% of patients who had a follow-up longer than 18 months exhibited considerable weight loss (Catheline et al., 2012; Abd Ellatif et al., 2014). Re-laparoscopic sleeve gastrectomy or gastric bypass can be suggested as a secondstage procedure in cases where weight loss is insufficient. Around 2.5% of patients with insufficient weight loss, according to several studies, needed a second operation (Catheline et al., 2012).

On the other hand, some benefits was observed after doing GSS was observed in weight reduction, this results was in agreement with other researches which revealed that after a sleeve gastrectomy, a morbidly obese patient will undergo a number of physical changes, including a large long-term weight loss (up to 80%), reduced hunger, satiety, altered food preferences, and increased energy expenditure (Sinclair et al., 2018). Changes in plasma high sensitivity Creactive protein are significantly correlated with a decrease in BMI % (Young et al., 2015).

Control of diabetes was more observed in Saudis more than Egyptians in patients who underwent GSS Similar to earlier studies. According to recently published guidelines, bariatric surgery should be suggested in diabetic patients with class III obesity, regardless of their level of glycemic control, and patients with class II obesity who have poorly controlled T2DM despite lifestyle changes and appropriate medication treatment. In individuals with class I obesity and poorly controlled hyperglycemia while receiving the best medical care, surgery should also be taken into account (Koliaki et al. 2017). Another study found that most T2DM patients who had Roux-en-Y gastric bypass or sleeve gastrectomy underwent T2DM remission at some time during the 5-year follow-up period (McTigue et al., 2020).

Control of lipid profile was found in patients who underwent GSS, these results in accordance with other studies. They reported that following a sleeve gastrectomy, lipid indicators had shown regulatory effects (75% remission in lipid abnormalities). A significant decrease was observed in triglyceride (Amin & Hassan, 2019), total cholesterol, VLDL cholesterol, and LDL cholesterol levels have all significantly decreased (Vuono et al., 2019). Other studies reported no significant increase in serum HDL cholesterol following sleeve gastrectomy (Navaneethan et al., 2010), despite significant growth being seen in HDL-cholesterol serum levels (Vuono et al., 2019).

Obesity is associated with a higher rate of stroke incidence. The data showed that there was a 50 percent lower death rate among participants with bariatric surgery, which considerably reduced the risk of stroke and heart attack among them as well (Young et al., 2015). Control of heart problem was more observed in Saudis more than Egyptians in patients who underwent GSS. The close relationship between morbid obesity and alterations in the coagulation system was confirmed in several investigations (Saif et al., 2012; Vilahur et al., 2017). Reduction in cardiovascular risk leads to a significant decrease in the thrombin generation; the critical process in hemostasis (Ay et al., 2010). It was reported that after one-year post-surgery, patients were experiencing a normal serum levels of hemoglobin and calcium (Duran et al., 2019), as well as a significant decrease in serum levels of HbA1c and platelet (Navaneethan et al., 2010); however, in another study hemoglobin and hematocrit were less than normal for 28.6% and 25% of patients respectively, but ferritin, iron, and total iron-binding capacity remained the same a year after (Saif et al., 2012).

In this study, better social communication, improve the ability to work, increased the fitness was found. The resolution of mental health was similar to other studies who said that patients having GSS, higher levels of preoperative depression, phobic anxiety, interpersonal sensitivity, and binge eating are linked to lower postoperative weight reduction (Rieber et al., 2013; Brunault et al., 2012). Sleeve gastrectomy has been linked to fewer mental health issues in morbidly obese patients, according to several studies (Rieber et al., 2013), but more research is needed to determine how common preoperative syndromic or subsyndromal atypical depression is in bariatric surgery candidates and how it relates to postoperative weight loss (Brunault et al., 2012). Because of the strong link between depression and obesity, bariatric surgery candidates frequently have depression as one of their diseases. Several studies indicate that the first few years following bariatric surgery may see a slight decline in clinical depression (Booth et al., 2015). After bariatric surgery, which resulted in a significant weight loss, researchers discovered a significant increase in physical and psychosocial, although higher preoperative depression has been linked to a more mediocre

improvement (Bout-Tabaku et al., 2019). Further research showed that having a sleeve gastrectomy significantly improved psychological aspects and eating habits. In clinical settings, patients with low cognitive restraint would require individualized support to adjust to their new anatomic conditions after bariatric surgery (Rieber et al., 2013). Also, our study showed no increase in patients' weight after GSS in about 2/3 Vs 1/2 of patients with high degree of satisfaction with this surgery and the disagree was less than 4% among Saudi and Egyptian patients respectively.

CONCLUSION

We can conclude that, in both Saudi Arabia and Egypt, obesity is currently linked to a wide range of health disorders that may adversely affect people's quality of life, impose burden on the healthcare system, and affect the nation's economy. Significant weight loss, comorbidity improvement, and quality of life improvement after bariatric surgery with some postoperative problems. High degree of satisfaction with GSS. Health education programs about obesity were desired for all ages and genders in both countries.

Acknowledgement: We thank the patients who contributed samples to the study.

Author Contributions: MRM, conceptualization, supervision, work design, reviewing relevant literature, analysis, and writing and editing the scientific paper; RSEA & TAMS, conceptualization, data collection from Saudi Arabia, work design, reviewing relevant literature, and writing and editing the manuscript; OGA, SGA & AGA conceptualization, data collection from Egypt, work design, work design, reviewing relevant literature, and writing and editing the manuscript. All authors read and approved the final manuscript.

Funding: This study has not received any external funding.

Conflict of Interest: The authors declare that there are no conflicts of interests.

Ethical Approval: This study has been reviewed and approved by the research Ethical Committee (REC) at the University of Hail research number (H-2022-376) dated 14/11/2022. (Attached file)

Informed consent: Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript. **Data materials availability:** Data that support the findings of this study are embedded within the manuscript.

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