

Gastric sleeve versus lifestyle modification for weight reduction in Western KSA: Cross-sectional study

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Abstract

Background: Obesity is a growing public health concern in Saudi Arabia, with increasing prevalence rates and associated risks such as diabetes, cardiovascular diseases, and reduced quality of life. Lifestyle modifications and bariatric surgery, particularly laparoscopic sleeve gastrectomy (LSG), are two commonly employed strategies for weight reduction. This cross-sectional study compares the effectiveness of LSG and lifestyle modifications in achieving weight loss and improving quality of life among individuals in the Western region of Saudi Arabia.

Objective: To evaluate and compare the outcomes of gastric sleeve surgery and lifestyle modification for weight reduction, focusing on weight loss outcomes, health improvements, and patient satisfaction.

Methods: A cross-sectional study was conducted in Saudi Arabia from November 2022 to January 2024, involving 200 participants aged 14 years and older with a Body Mass Index (BMI) of 25 or higher. The participants were either following a lifestyle modification regimen or had undergone gastric sleeve surgery. Data were collected through an online questionnaire, which included 15 open-ended and multiple-choice questions covering demographics, personal information, BMI, chronic disease status, weight loss, and the perceived advantages and disadvantages of the interventions. Statistical analyses, including both descriptive and inferential methods, were performed with a significance level set at $p < 0.05$.

Results: Among the participants, 82.5% were female, and the mean BMI was 28.9 ± 6.9 kg/m². The study found that gastric sleeve surgery resulted in greater weight loss, with 87% of participants losing more than 20 kg. In contrast, lifestyle modification led to more modest weight loss, with 35% of participants losing more than 10 kg. Both methods were associated with improvements in self-confidence, control of chronic diseases, and overall quality of life, though surgical patients reported a higher incidence of complications such as gastroesophageal reflux disease and skin redundancy.

Conclusion: Gastric sleeve surgery is more effective for achieving significant weight loss compared to lifestyle modification. However, both methods offer health benefits, with surgery leading to more rapid results. These findings underscore the importance of personalized weight management strategies in the Western region of Saudi Arabia, taking into account patient preferences, health status, and potential risks.

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INTRODUCTION

Obesity, defined by the World Health Organization (WHO) as an abnormal or excessive fat accumulation that negatively impacts health, and it is a critical global public health issue, linked to numerous chronic diseases such as diabetes, cardiovascular

diseases, and certain types of cancer [1]. In Saudi Arabia, obesity has reached alarming levels, with a prevalence of 24.7% classified as obese and 38.3% as overweight in 2021, making it a significant public health concern [2,3]. This growing epidemic underscores the need for effective weight-reduction

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strategies, including lifestyle interventions and surgical options such as gastric sleeve surgery, to inform evidence-based recommendations.

The detrimental effects of obesity go beyond chronic disease risks. It also has a profound impact on quality of life, increases healthcare costs, and leads to higher morbidity and mortality rates [4–6]. Obesity has been recognized as a major risk factor for coronary heart disease, ischemic and hemorrhagic strokes, various cancers, and other conditions exacerbated by associated factors such as smoking, dyslipidemia, and hypertension [7–9]. Given that by 2030, it is projected that nearly half of the world's adult population will be overweight or obese [10], addressing this issue is critical to curbing the global healthcare burden.

Lifestyle modification, consisting of dietary changes and increased physical activity, remains the cornerstone of obesity management. Creating a caloric deficit of 500–750 calories per day can yield significant weight loss, and regular cardiovascular and resistance exercises further enhance this deficit [11,12]. These interventions also provide additional health benefits, including lowered blood pressure and improved insulin sensitivity [13]. However, sustaining these lifestyle changes presents challenges, and failure to do so often results in weight regain (WR) and emotional distress [14].

For individuals unable to maintain weight loss through lifestyle changes alone, bariatric surgery, particularly laparoscopic sleeve gastrectomy (LSG), has emerged as an effective alternative. LSG involves the removal of a large portion of the stomach, reducing its capacity and suppressing hunger by eliminating ghrelin-producing cells.[15,16]. It has rapidly gained popularity due to its ability to induce substantial and sustained weight loss, alongside the improvement of obesity-related comorbidities.

Bariatric surgery trends in recent years show a growing preference for LSG, replacing older methods like adjustable gastric banding and Roux-en-Y gastric bypass. LSG now accounts for over 60% of bariatric procedures globally, largely due to its lower complication rates and effectiveness in managing comorbid conditions like diabetes and hypertension [17–19]. However, the procedure is not without risks, including gastroesophageal reflux disease (GERD), stomach dilation, and the possibility of WRs [9,20,21].

Pharmacological treatments also provide additional tools for weight management, particularly for patients who may not be candidates for surgery. Medications such as orlistat, liraglutide, semaglutide, and phentermine-topiramate have shown efficacy in appetite suppression and weight reduction. These drugs, approved for individuals with a BMI ≥ 30 or ≥ 27 with comorbid conditions, offer metabolic benefits, including improved insulin sensitivity and reduced liver fat. However, side effects such as gastrointestinal disturbances and potential surgical risks during future interventions must be considered when prescribing these medications [22,23].

In the Western region of Saudi Arabia, there is a unique cultural and social context influencing obesity treatment choices. Socioeconomic factors, dietary habits, and cultural perceptions of body weight all play a role in shaping patient preferences for surgery, lifestyle modification, or pharmacotherapy. Understanding these preferences is essential for tailoring effective interventions in this population.

This study aims to compare the effectiveness of gastric sleeve surgery and lifestyle modification in achieving weight reduction and improving quality of life among individuals in the Western region of Saudi Arabia. By examining patient outcomes and preferences, this research will contribute to more personalized recommendations for weight management in this population. Insights gained from this study will guide future clinical decisions and interventions aimed at addressing obesity in the region.

MATERIALS AND METHODS

Study Design

This research employed a cross-sectional observational design, which was highly suitable for investigating the prevalence and patterns of lifestyle modifications and surgical interventions (sleeve gastrectomy) within a defined population. The study was conducted from November 2022 to January 2024 in the Western Region of Saudi Arabia.

Participants

The study involved 200 participants, with inclusion criteria focusing on individuals aged 14 years and

above, who were overweight or obese (BMI ≥ 25). Both males and females were represented. Participants were either following a diet regimen or had undergone sleeve gastrectomy. Those with a BMI below 25 were excluded, as the study aimed to assess weight management strategies among overweight and obese populations. The decision to exclude children under 14 years old aligns with the ethical considerations of studying vulnerable populations.

Data Collection Methods

Data were collected using an online survey distributed via social media platforms, a widely accepted method in public health research due to its broad reach and accessibility. Before the main data collection, a pilot study involving 20 participants was conducted to confirm the clarity, relevance, and feasibility of the survey. After this validation, the survey was distributed to. The survey consisted of 15 questions, combining the following both closed-ended and open-ended formats:

- **Demographic Section:** age, sex, and region.
- **Personal Data:** height, weight, and BMI.
- **Health Status:** chronic diseases, kilograms lost through different weight management strategies (e.g., diet, surgery), and health outcomes following interventions.
- **Experiences with Weight Loss:** advantages and disadvantages of both lifestyle modifications and sleeve gastrectomy.

Ethical Considerations

Ethical approval was obtained from the Ethics Committee at Taif University (Approval No.: HAO-02-T-105). Participants were informed about the study’s objectives and provided written consent prior to enrollment, with the right to withdraw at any stage. The privacy and confidentiality of participants’ data were strictly maintained throughout the study.

Data Analysis

Data were analyzed using IBM SPSS Statistical software (version 22). Descriptive statistics, such as means and standard deviations, were used to summarize continuous variables like BMI and kilograms lost, while frequencies and percentages were calculated for categorical variables like gender and

type of intervention. Inferential statistical tests, including the *t*-test and chi-square test, were used to compare means and examine associations between categorical variables. The significance level was set at $p < 0.05$.

RESULTS

A total of 200 participants were included in this survey, with females representing 82.5% ($n = 165$) and males representing 17.5% ($n = 35$). The participants’ ages were distributed as follows: 13% ($n = 26$) were between 14 and 20 years, 47.5% ($n = 95$) were between 20 and 40 years, and 39.5% ($n = 79$) were above 40 years. The mean weight of participants was 74.9 ± 18.6 kg, with a range from 44 to 160 kg. The mean height was 161.0 ± 8.7 cm, with a range from 126 to 190 cm. The average BMI was 28.9 ± 6.9 kg/m², ranging from 17.9 to 63.0 (Table1).

BMI Distribution

More than one-third of participants (36.5%, $n = 73$) had a BMI over 30, indicating obesity. In contrast, 33% ($n = 66$) had a BMI within the normal range (18.5–25) (Figure 1).

Prevalence of Chronic Diseases

Approximately one-third of the participants (32.5%, $n = 65$) reported having chronic diseases.

Table 1. Socio-demographic characteristics of the studied population.

Studied variables		Frequency	Percent
Gender	Female	165	82.5%
	Male	35	17.5%
Age (years)	14–20 years	26	13.0%
	20–40 years	95	47.5%
	Above 40 years	79	39.5%
Weight (kg)	Mean + SD	74.9±18.6	
	Min–max	44–160	
Height(cm)	Mean + SD	161.0 ± 8.7	
	Min–max	126–190	
BMI (kg/m2)	Mean + SD	28.9±6.9	
	Min–max	17.9–63.0	

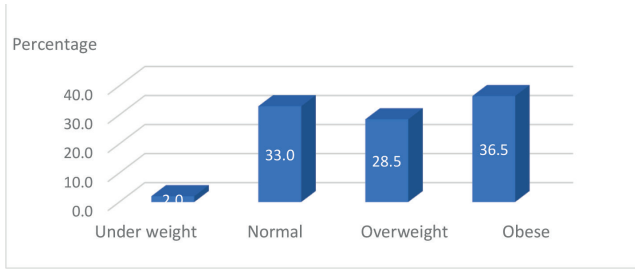


Figure 1. Distribution of the study participants based on their BMI.

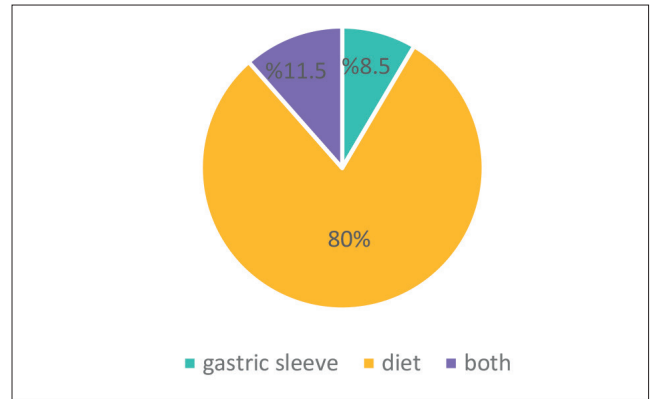


Figure 2. Studied participants in each method for weight reduction.

Table 2. Prevalence of chronic diseases among the study participants.

Complaining of chronic diseases		No	%
Having chronic diseases	No	135	67.5%
	Yes	65	32.5%
Bronchial asthma		3	1.5%
Thyroid diseases		5	2.5%
Rheumatologic diseases		7	3.5%
Hypertension		25	12.5%
Diabetes mellitus		23	11.5%
Other		10	5.0%

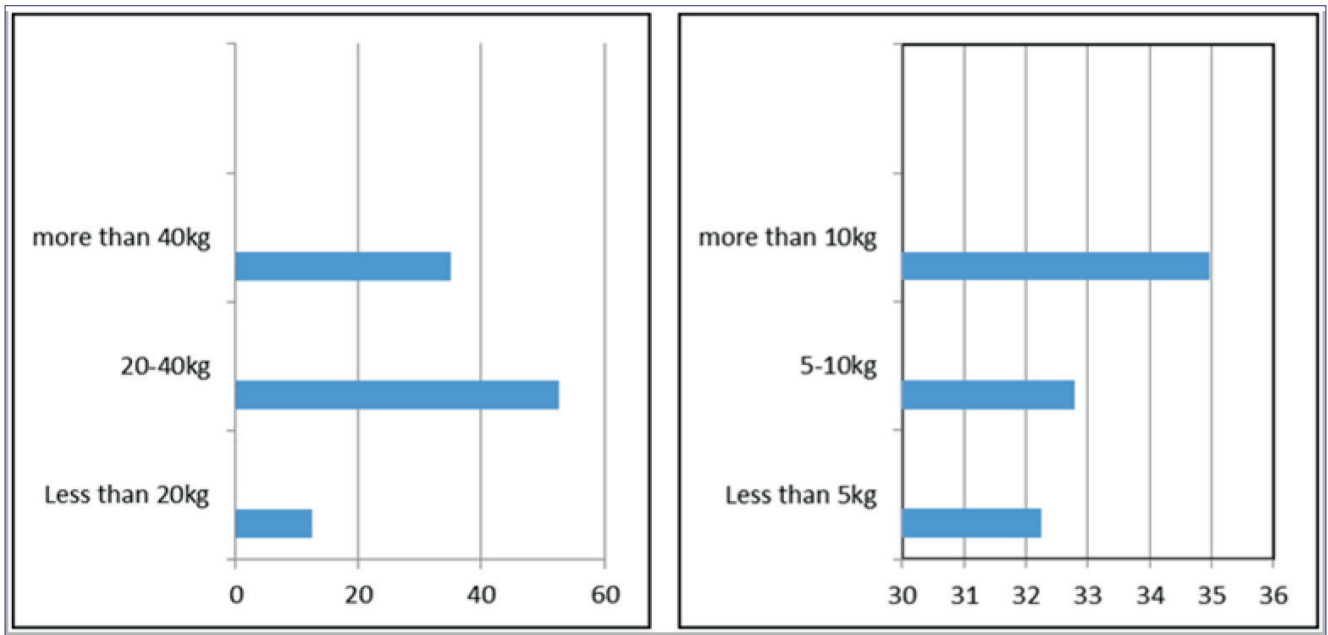


Figure 3. Weight reduction after gastric sleeve (a) and following diet (b).

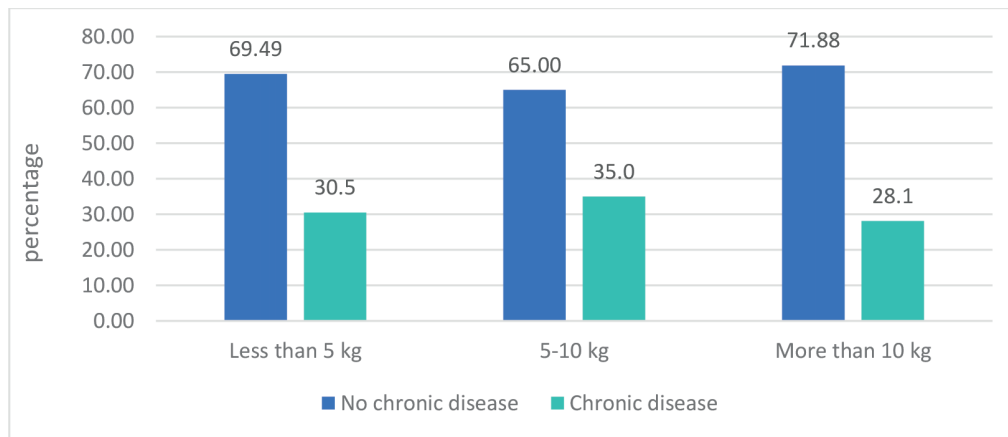


Figure 4. Weight loss across participants with and without chronic diseases.

Hypertension was the most prevalent chronic condition (12.5%, $n = 25$), followed by diabetes mellitus (11.5%, $n = 23$) (Table 2).

Methods of Weight Reduction

Most participants (80%, $n = 160$) reported using diet alone for weight reduction, while 8.5% ($n = 17$) underwent gastric sleeve surgery. A combination of both methods was used by 11.5% ($n = 23$) (Figure 2).

Weight Reduction Outcomes

Among those who underwent gastric sleeve surgery, 12.5% ($n = 5$) lost less than 20 kg, 52.5% ($n = 21$) lost between 20 and 40 kg, and 35% ($n = 14$) lost more than 40 kg. For participants following a diet, weight loss was distributed as follows: 32.2% ($n = 59$) lost

less than 5 kg, 32.8% ($n = 60$) lost between 5 and 10 kg, and 35% ($n = 64$) lost more than 10 kg (Figure 3).

Impact of Chronic Diseases on Weight Loss

Participants without chronic diseases achieved greater weight loss compared to those with chronic diseases, but this difference was not statistically significant ($p = 0.72$) (Figure 4).

Time to Achieve Target Weight

Nearly half of the participants following a diet (47.5%) achieved their target weight within months, while 40% of those who underwent gastric sleeve surgery took a year to reach their desired weight (Figure 5).

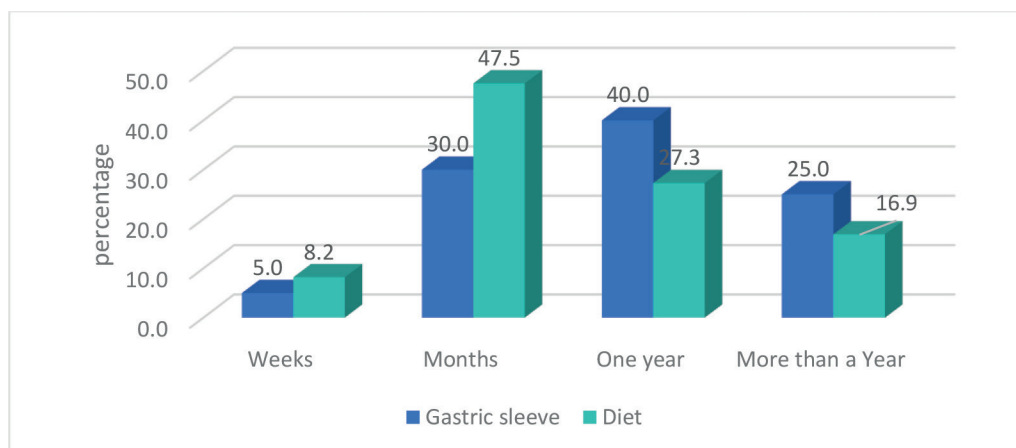


Figure 5. Time required to achieve the required body weight (diet or gastric sleeve).

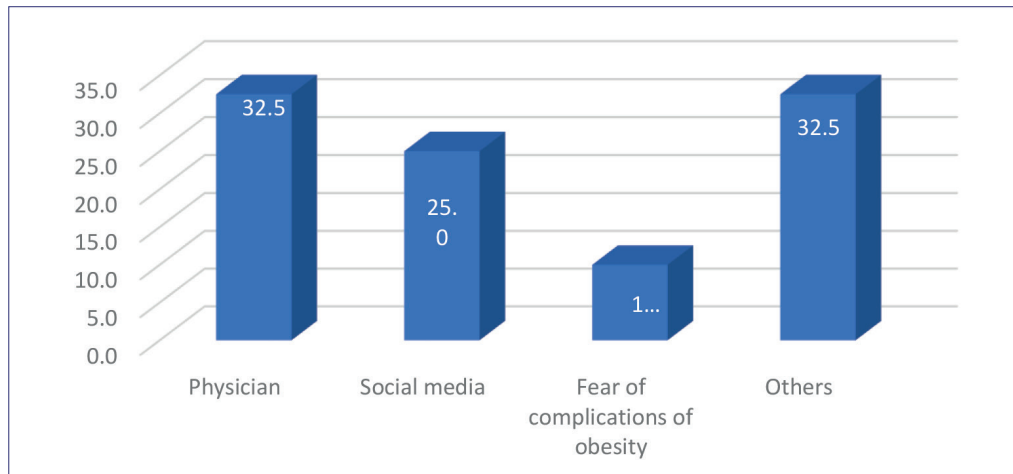


Figure 6. Who convinced you to do the gastric sleeve procedure.

Table 3. Participants perception regarding the advantages and complication of gastric sleeve (n = 40).

Studied variables	Frequency	Percent
Gastric sleeve advantages	Improve self confidence	28 14.0%
	Control chronic diseases	17 8.5%
	Loss appetite	23 11.5%
	Avoid diseases associated obesity	30 15.0%
Complication of gastric sleeve	Effective weight loss	38 19.0%
	Malabsorption	14 7.0%
	Wound side leakage bleeding	13 6.5%
	Weight regains	19 9.5%
	Skin redundancy	48 24.0%
GERD	23 11.5%	

Reasons for Choosing Gastric Sleeve Surgery

Among the 40 participants who chose gastric sleeve surgery, 32.5% (n = 13) were influenced by a physician’s recommendation. Other factors included social media (10%, n = 4) and fear of obesity-related complications (10%, n = 4) (Figure 6).

Perceived Advantages and Complications of Gastric Sleeve

Participants cited improved self-confidence (14%, n = 28), chronic disease control (8.5%, n = 17),

Table 4. Participants perception regarding diet (n = 183).

Studied variables	Frequency	Percent
Advantage of diet	Having higher energy	72 36%
	Better concentration	68 34%
	Reduction of blood pressure and improve insulin sensitivity	57 28.5%
	Better sleep quality	83 41.5%
Complications of following diet	Having the required weight	132 66%
	Diarrhea	7 3.5%
	Cannot bear (no patience)	88 44.0%
	Weakness and fatigue	74 37.0%
	Dizziness	43 21.5%
Anxiety	53 26.5%	
Regain weight	68 34.0%	

decreased appetite (11.5%, n = 23), prevention of obesity-related diseases (15%, n = 30), and effective weight loss (19%, n = 38) as the main advantages of the gastric sleeve procedure. However, complications included skin redundancy (24%, n = 48), WR (9.5%, n = 19), and GERD (11.5%, n = 23) (Table 3).

Perceptions of Diet

The most commonly reported advantages of diet were achieving the desired weight (66%, n = 132), improved sleep quality (41.5%, n = 83), and

increased energy (36%, $n = 72$). However, participants also reported challenges such as a lack of patience (44%, $n = 88$), weakness and fatigue (37%, $n = 74$), and WR (34%, $n = 68$) (Table 4).

DISCUSSION

The results of our cross-sectional study offer important insights into the comparative effectiveness of gastric sleeve surgery and lifestyle modification for weight reduction in the Western Saudi Arabian population. Our findings reveal that while both interventions lead to significant weight loss, the rate and extent of weight loss differ notably between the two approaches.

The results of this study show that gastric sleeve surgery tends to result in greater weight loss compared to dietary modifications alone. Among participants who underwent gastric sleeve surgery, over 87% experienced significant weight loss, with 35% losing more than 40 kg. In contrast, weight loss among diet participants was more modest, with 35% losing more than 10 kg.

These outcomes align with existing literature, which highlights the superior efficacy of bariatric surgery for achieving substantial and sustained weight loss [24,25]. Although lifestyle interventions remain essential in obesity management, evidence indicates that both pharmacotherapy and bariatric surgery yield more pronounced and lasting results than lifestyle modifications alone [26]. These findings underscore the efficacy of bariatric surgery for individuals seeking rapid and substantial weight loss.

Whereas lifestyle interventions are recommended, they face challenges in practical implementation, particularly in primary care settings, where long-term adherence is often poor [27,28].

Gastric sleeve surgery, which reduces stomach size and alters gut hormone production, results in greater satiety and long-term weight loss. On the other hand, the efficacy of diet modifications is frequently limited by factors such as patient adherence [29].

An important aspect of the study was the comparison of weight loss outcomes between patients with and without chronic diseases. Although participants without chronic diseases generally tended to lose more weight, this difference was not statistically significant. This suggests that chronic conditions may not necessarily hinder weight loss, although it is well-established that conditions such as hyper-

tension and diabetes can complicate weight reduction efforts due to factors like medication-related weight gain and decreased metabolic rates [30].

The relatively high prevalence of hypertension (12.5%) and diabetes (11.5%) in our cohort underscores the need for personalized weight loss interventions tailored to the unique challenges of patients with chronic diseases. These patients may benefit from a combination of medical management and lifestyle changes, with bariatric surgery offering an additional option when lifestyle modifications alone prove insufficient.

One challenge highlighted by our study is WR. Among the gastric sleeve group, 9.5% experienced WR, compared to 34% of the diet group. A systematic review by Lauti et al. [31] reported a wide range of WR rates after sleeve gastrectomy, with 5.7–20% of patients experiencing significant WR within 2 years post-surgery, and 26.3–76% within 6 years. Factors contributing to WR include non-adherence to dietary guidelines, physical inactivity, and psychological, anatomical, and hormonal factors [32,33]. Without continued intervention, individuals relying on lifestyle modification alone often regain approximately one-third of the lost weight within the first year, with additional weight gain over time. This highlights the importance of continued support to maintain weight loss [34].

Post-surgical weight regain is often attributed to behavioral factors, metabolic adaptations, and complications like GERD, which affected 11.5% of the surgery group. In contrast, weight regain in the diet group reflects the difficulty of sustaining lifestyle changes over the long term, often due to social, psychological, or environmental stressors [35].

Participants' perceptions of the advantages and disadvantages of each approach provide valuable insights into their decision-making processes. The most commonly cited advantages of gastric sleeve surgery included improved self-confidence, better control of chronic diseases, decreased appetite, prevention of obesity-related diseases, and effective weight loss. However, participants also reported several potential complications, such as skin redundancy, GERD, and weight regain were. These findings align with existing literature highlighting the complex risk-benefit profile of bariatric surgery [36]. And emphasize the importance of careful patient selection and postoperative care to minimize the risk of complications [37].

While lifestyle modification may not be as effective as gastric sleeve surgery in achieving rapid weight loss, it offers several advantages, including a lower risk of complications and the potential for long-term sustainability. Our study found that participants who followed a diet reported improved sleep quality, increased energy, and reduced blood pressure. However, they also faced challenges such as a lack of patience, weakness and fatigue, and weight regain. These findings highlight the importance of providing individuals with adequate support and guidance to overcome these challenges and maintain long-term weight loss.

In contrast, participants pursuing dietary modification reported advantages such as achieving the desired weight, improved sleep quality, and increased energy. However, challenges such as lack of patience, weakness and fatigue, and weight regain were also prevalent.

This is considered a reflection to the complexity of behavioral, biological, cultural, economic, environmental, ethnic, psychological, and social factors that influence an individual's lifestyle behavior and body weight and which lifestyle modification is expected to address [38].

While gastric sleeve surgery produces more immediate and substantial results, lifestyle modification offers certain advantages, including a lower risk of complications and the potential for long-term sustainability. Participants who followed diet modifications reported improved sleep quality, increased energy, and reduced blood pressure. However, they also faced challenges such as lack of patience, fatigue, and difficulty maintaining weight loss. This underscores the importance of providing ongoing support to help individuals sustain lifestyle changes.

Given the increasing prevalence of obesity in Saudi Arabia and the growing burden of obesity-related chronic diseases, this study reinforces the need for comprehensive, multifaceted weight loss strategies that include both medical and surgical options. In particular, the role of healthcare providers in influencing patients' decisions was evident, as 32.5% of those opting for gastric sleeve surgery were motivated by a physician's recommendation. This finding suggests that physicians play a critical role in educating patients about the risks and benefits of different weight loss methods.

Health providers play a crucial role in managing obesity and related diseases, with patients expecting respectful, personalized weight management discussions. Patients who receive counseling on weight loss are two to three times more likely to attempt or achieve weight loss. Simply being diagnosed as overweight (BMI ≥ 25 – 29.9 kg/m²) or obese (BMI ≥ 30 kg/m²) by a provider increases the likelihood that patients will recognize their condition and pursue weight control efforts [39].

This study has several limitations. First, the cross-sectional design prevents us from establishing causality between weight loss interventions and long-term outcomes. Longitudinal studies are needed to assess sustained weight loss and the long-term effects of gastric sleeve surgery compared to lifestyle modification. Additionally, the reliance on self-reported data introduces potential recall bias, particularly regarding weight loss and complications. Future studies with a larger sample size and a longitudinal design could provide more robust evidence on the effectiveness of these interventions in the Western Saudi population.

CONCLUSION

In conclusion, our study reinforces the significant role of gastric sleeve surgery in achieving superior weight loss outcomes compared to lifestyle modification in the context of Western Saudi Arabia. However, both interventions have a role in managing obesity, and future research should aim to refine and optimize these approaches to meet the diverse needs of the population.

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CONFLICT OF INTEREST

None

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