

Prevalence, Risk Factors, and Impact of Anal Disorders Following Sleeve Gastrectomy: A Single-Center Retrospective Study

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Abstract

Obesity is a significant global health concern, often leading to comorbidities such as cardiovascular diseases, diabetes, and hypertension. Bariatric surgery, including sleeve gastrectomy (SG), is a proven treatment for morbid obesity, offering substantial weight loss and resolution of comorbidities. However, post-surgical complications, particularly anorectal disorders such as hemorrhoids and anal fissures, remain underexplored, especially in Saudi Arabia. This retrospective cohort study aimed to assess the prevalence, risk factors, and impact of anal complications following SG at Almoosa Specialist Hospital in Alhassa, Saudi Arabia. A total of 205 patients who underwent SG between January 2020 and December 2021 were surveyed, with 148 eligible participants included in the final analysis. Results indicated that 8.8% of patients experienced anal complications, with anal fissures (53.8%) and hemorrhoids (38.5%) being the most common. These complications typically occurred 2 - 6 months post-surgery. Lifestyle factors such as physical activity and fluid intake were found to significantly reduce the likelihood of anal issues. Moreover, 69.2% of patients with anal problems reported a negative impact on their quality of life. The study highlights the importance of targeted post-operative care, including lifestyle modifications, to mitigate the impact of anal complications. The findings suggest that ongoing education and comprehensive support for bariatric surgery patients, particularly regarding physical activity and hydration, are critical for improving long-term health outcomes. Further research is needed

to explore the long-term progression of anal complications and effective interventions for enhancing patient satisfaction and quality of life.

Keywords

Bariatric Surgery, Sleeve Gastrectomy, Anorectal Complications, Bowel Habits, Quality of Life

1. Introduction

Obesity has become a rapidly growing global health concern, particularly in developed countries, where its prevalence has significantly increased among adults and children over the past three decades. This condition is associated with a heightened risk of chronic illnesses, including coronary artery disease, diabetes mellitus, hypertension, and hypercholesterolemia, contributing to considerable morbidity and mortality [1]. When conservative measures such as diet and exercise fail to achieve adequate weight loss, bariatric surgery emerges as the most effective and sustainable treatment option for morbid obesity. Procedures like sleeve gastrectomy (SG) and Roux-en-Y gastric bypass (RYGB) facilitate weight reduction through complex mechanisms, including alterations in gastrointestinal anatomy and motility, changes in gut hormone levels, and behavioral modifications. Despite the well-documented benefits of bariatric surgery in reducing weight and resolving comorbidities, it is not without complications [2]. Among these are anorectal disorders, such as hemorrhoids and anal fissures, which may significantly impact patients' quality of life. However, the relationship between bariatric surgery and the development of anorectal complications remains underexplored, particularly in Arab countries. While general complications associated with bariatric surgery have been documented [3] [4], specific studies focusing on anal complications post-surgery are scarce, and no such studies have been conducted in Saudi Arabia. This study aims to address this gap by analyzing the prevalence of anal diseases in patients who underwent sleeve gastrectomy at Almoosa Specialist Hospital, a tertiary-level private hospital in Alhassa, Saudi Arabia. Additionally, it seeks to identify associated risk factors, evaluate the impact of these complications on patients' quality of life, and propose preventive strategies.

2. Materials and Methods

2.1. Study Design

This retrospective cohort study aimed to evaluate the prevalence and impact of anal diseases among patients who underwent sleeve gastrectomy. The study focused on patients who had the procedure between January 2020 and December 2021. The design involved collecting and analyzing data through a structured questionnaire, with a focus on identifying associated risk factors and their effects on patients' quality of life.

2.2. Selection and Recruitment of Participants

Participants for this study were selected from a single surgical center's database of patients who underwent sleeve gastrectomy within the specified period. Eligible participants met the following inclusion criteria:

- Adults aged 18 years and above, who underwent sleeve gastrectomy between January 2020 and December 2021.
- Patients with no documented or self-reported anal diseases or complications prior to the surgery.

Exclusion criteria included:

- Patients with pre-existing anal diseases (e.g., hemorrhoids, fissures, abscesses) documented in their medical records or self-reported during the recruitment process.
- Individuals who declined to participate or could not be reached after three consecutive contact attempts.

Participants were recruited retrospectively through phone calls. The purpose and details of the study were explained during the calls, and verbal consent was obtained. The recruitment process ensured that the study focused on the onset of new anal complications post-surgery.

2.3. Sample Size

The study included a total of 205 patients who had undergone sleeve gastrectomy during the specified period. Patients with pre-existing or documented anal complaints before surgery were excluded to ensure the study focused on new-onset complications post-surgery. The sample size was determined based on the availability of eligible participants and the feasibility of conducting the survey within the study timeline.

2.4. Data Collection

Data were gathered using a self-administered questionnaire distributed through a Google Form. Participants were contacted via phone calls to explain the study's purpose and procedure. The survey included detailed questions on demographics, the incidence and nature of anal complications, associated risk factors, and the impact of these complications on daily life. All responses were securely stored to maintain confidentiality.

2.5. Variables and Questionnaire Design

The questionnaire was carefully designed to address key variables and divided into three main sections (see **Appendix** for the complete questionnaire):

a) Demographics

- Gender.
- Age, categorized into five groups: <18 years, 18 - 25 years, 25 - 35 years, 35 - 45 years, and >45 years.

b) Clinical Outcomes

- Post-operative weight loss.
- Changes in bowel habits (e.g., frequency, consistency, or urgency).
- Onset and type of anal complications (e.g., hemorrhoids, anal fissures, abscesses).
- The timing of complications relative to the surgery.
- Management of anal complications (e.g., medical treatment, dietary adjustments, surgical interventions).

c) Lifestyle and Dietary Habits

- Dietary patterns, including fiber intake and hydration status.
- Exercise frequency and type.
- Use of dietary supplements, such as multivitamins or laxatives

2.6. Questionnaire Design

The questionnaire was developed by a multidisciplinary team comprising General surgeons, Bariatric surgeons, and epidemiologists from Almoosa Specialist Hospital to ensure it comprehensively addressed the study objectives. To validate the questionnaire, a pilot test was conducted with 20 patients who met the study's inclusion criteria but were not part of the final analysis. Feedback from the pilot test was used to refine the clarity and relevance of the questions.

3. Data Analysis

The data were entered into Microsoft excel and data was analyzed by using the statistical package of social science (IBM. SPSS) version 26.0 Categorical variables (sex, age groups, surgery outcomes, lifestyle and dietary habits,) were expressed as frequencies with percentages. The Chi-square test was used to check the association between the variables. The statistical significance will be set at $p < 0.05$.

4. Results**4.1. Participant Characteristics**

Out of the 205 surveys distributed, 173 patients participated in the study, representing an 84.4% response rate. Only participants who completed all sections of the questionnaire were included in the final analysis, totaling 148 eligible cases. Patients with pre-existing anal problems prior to surgery were excluded.

Table 1. Gender and age distribution of participants.

		Frequency	Percentage
Sex	Male	60	40.5
	Female	88	59.5
Age	<18	1	0.7
	18 - 25	26	17.6
	25 - 35	32	21.6
	35 - 45	42	28.4
	>45	47	31.8

Among the 148 participants, 88 (59.5%) were female, and 60 (40.5%) were male. The age distribution showed that the majority were aged between 35 - 45 years (42 participants, 28.4%) and over 45 years (47 participants, 31.8%). The gender and age breakdown are presented in **Table 1**.

4.2. Surgery-Related Outcomes

Table 2. Surgery related outcomes.

Outcome	Frequency	Percentage
Weight Reduction Post-Surgery		
<50%	120	81.1%
>50%	28	18.9%
Change in Bowel Habits Post-Surgery		
Constipation	36	24.3%
Diarrhea	14	9.5%
Fluctuation	3	2.0%
No Change	95	64.2%
Reported Anal Problems		
Yes	13	8.8%
No	135	91.2%
Type of Anal Problems		
Anal Fissures	7	53.8%
Hemorrhoids	5	38.5%
Abscess	1	7.7%
Timing of Anal Problems Post-Surgery		
<2 Months	3	23.1%
2 - 6 Months	8	61.5%
>12 Months	1	7.7%
>24 Months	1	7.7%
Management of Anal Problems		
Conservative	11	84.6%
Surgery	2	15.4%

Post-operative outcomes are summarized in **Table 2**. Among the participants, 120 (81.1%) achieved less than 50% weight loss, while 28 (18.9%) exceeded this threshold. Regarding changes in bowel habits, the majority of participants (95, 64.2%) reported no changes, while others experienced constipation (36, 24.3%), diarrhea (14, 9.5%), or fluctuating bowel habits (3, 2%). Anal complications were reported by 13 participants (8.8%), including anal fissures (7, 53.8%), hemorrhoids (5, 38.5%), and one case of anal abscess (7.7%). Most complications (8 cases, 61.5%) occurred within 2 - 6 months post-surgery and were predominantly

managed conservatively (11 cases, 84.6%).

4.3. Lifestyle and Dietary Habits

Lifestyle factors and dietary habits are outlined in **Table 3**. Physical activity was reported by 96 participants (64.9%), while 52 (35.1%) were inactive. Changes in diet were noted in 59 participants (39.9%), with high-protein diets (21, 14.2%) and low-fat diets (20, 13.5%) being the most common changes. Multivitamins were the most commonly used supplements 78 (52.7%), and adequate fluid intake was reported by 114 participants (77%).

Participants who engaged in physical activity ($p = 0.001$) or consumed adequate fluids ($p = 0.006$) were significantly less likely to report post-surgery anal problems. No significant associations were observed between anal problems and dietary changes ($p = 0.196$) or supplement use ($p = 0.175$).

Table 3. Lifestyle and dietary Habits of Participants.

Habit	Yes (Frequency, %)	No (Frequency, %)
Physical Activity	96 (64.9%)	52 (35.1%)
Dietary Changes	59 (39.9%)	89 (60.1%)
Adequate Fluid Intake	114 (77.0%)	34 (23.0%)

4.4. Impact of Anal Problems

Among the 13 participants with post-operative anal problems, 9 (69.2%) reported that these issues negatively affected their lifestyle. While not statistically significant, males reported a higher impact on lifestyle (66.7%) compared to females (33.3%) ($p = 0.19$). Younger age groups (<45 years) showed a higher likelihood of reporting lifestyle effects, though these differences were not statistically significant ($p = 0.38$).

5. Discussion

Bariatric surgery is considered as one of the possible treatment strategies for reducing body weight, especially with the failure of other treatment strategies [5]. Some epidemiological investigations demonstrated that weight reduction through bariatric surgeries could reduce the incidence of comorbidities [6]. Anal Complications are long-term complications of bariatric surgery. Despite routine treatment by bariatric and colorectal surgeons in daily practice, little has been published on management. Only few articles have been published on the incidence of anal complications after BS [7] [8].

The analysis of data collected from participants who underwent bariatric surgery at our center offers valuable insights into their demographics, surgical outcomes, and lifestyle changes following the procedure. The gender distribution in our study revealed a higher percentage of females (59.5%) compared to males (40.5%), aligning with trends commonly observed in bariatric surgery demographics.

This finding is consistent with research by Young *et al.*, which reported that approximately 80% of bariatric surgery patients are women [9]. This trend may suggest that women are more likely to pursue surgical interventions for weight loss or are more frequently represented in clinical studies.

The age distribution of our participants highlights a diverse group, with the largest cohort aged 35 - 45 years (28.4%) and a significant proportion over 45 years (31.8%). This suggests that bariatric surgery is often sought by middle-aged individuals, likely due to the increasing health risks associated with obesity in this age group, as well as the desire to improve overall quality of life and reduce obesity-related comorbidities.

In terms of surgical outcomes, the majority of participants (81.1%) reported a weight reduction of less than 50%. These findings are consistent with the study conducted by Alhuzaim WM *et al.* [10], as well as with results from Sjöström *et al.* [11], which indicated that approximately 60% of patients achieved significant weight loss post-surgery, though outcomes varied depending on adherence to post-operative guidelines.

Regarding bowel habits post-surgery, most participants reported no change, while a notable minority experienced constipation (24.3%) or diarrhea (9.5%). These results align with findings by Afshar *et al.* [12], who observed similar post-operative bowel changes in their cohort study and highlighted the importance of dietary modifications to manage these symptoms. Similar trends were also noted by Alhuzaim WM *et al.* [10], who reported constipation in 22.2% and diarrhea in 14.5% of patients post-surgery. These findings underscore the need for ongoing monitoring and support to address gastrointestinal issues that may arise after bariatric surgery.

In this study, anal problems were relatively infrequent, affecting 8.8% of participants, with anal fissures (53.8%), hemorrhoids (38.5%), and abscesses (7.7%) being the most commonly reported complications. Comparatively, a study from Spain reported a significantly higher prevalence of anal complications after bariatric surgery at 37.2%, with hemorrhoids accounting for 43.1% and fissures-in-ano for 27.5% of cases [13].

In a separate study published in 2008 on patients who underwent Modified Biliopancreatic Diversion (MBPD), the incidence of anal complications was 18%, with fissures-in-ano being the most common disorder, occurring in 8% of patients [14]. Similarly, Parés *et al.* [15]. noted that while gastrointestinal complications are commonly documented after bariatric surgery, specific anal problems, such as fissures and hemorrhoids, are often underreported. Their study emphasized the need for greater focus on these issues in post-operative care.

Potoczna *et al.* [16] reported comparable findings, with a 10% incidence of anal complications following bariatric procedures, highlighting the prevalence of hemorrhoids and anal fissures. Globally, these conditions are among the most commonly reported anorectal disorders [3] [17] [18].

Our findings suggest that normal bowel habits are crucial in preventing and

managing anal complications following bariatric procedures. This emphasizes the importance of patient education, dietary adjustments, and adequate hydration to minimize the risk and impact of these conditions.

The lifestyle and dietary habits of participants in this study indicate a positive trend toward physical activity, with 64.9% engaging in some form of exercise. However, a considerable portion (35.1%) of participants did not engage in physical activity, highlighting a potential area for improvement in post-surgical care plans. These findings align with the research of Bastos *et al.* [19], who demonstrated that increased physical activity is associated with better weight maintenance after bariatric surgery. Their study emphasized the importance of incorporating structured exercise programs into post-operative care to enhance long-term outcomes.

Additionally, while many participants reported dietary changes, particularly an increase in protein intake, a significant proportion (60.1%) did not modify their eating habits. This suggests that despite the known benefits of dietary adjustments post-surgery, there is room for improvement in dietary counseling and patient adherence to recommended nutritional guidelines. Providing comprehensive nutritional education and support may help address this gap and further optimize surgical outcomes.

The significant percentage (69.2%) of participants indicating that anal problems affected their lifestyle aligns with findings from Cano-Valderrama *et al.* [20], who observed that such complications can lead to substantial reductions in quality of life. This highlights the necessity for comprehensive post-operative care to mitigate these impacts.

The analysis of the association between anal problems and lifestyle factors post-bariatric surgery provides important insights into patient experiences and the role of lifestyle choices in health outcomes. Physical activity emerged as a significant protective factor, with participants engaging in physical activity reporting significantly fewer anal problems (23.1%), as evidenced by a *p*-value of 0.001. This finding is consistent with research by Adil *et al.* [21], who demonstrated that regular physical activity post-bariatric surgery improves gastrointestinal function and reduces complications, including anal issues. Their study also emphasized that patients who maintain an active lifestyle experience fewer bowel-related problems, underlining the importance of encouraging exercise as part of post-operative care to enhance health outcomes.

Conversely, the study found no significant association between dietary changes and the occurrence of anal problems. Among participants with anal issues, 23.1% reported dietary changes compared to 41.5% of those without problems, with a *p*-value of 0.196. This is consistent with findings from Lupoli *et al.* [22], who suggested that while dietary modifications are common after surgery, they do not consistently correlate with gastrointestinal complications. Their research highlighted the variability in individual responses to dietary changes, indicating that dietary adjustments alone may not suffice to prevent anal complications.

Similarly, the use of dietary supplements showed no significant relationship with the occurrence of anal problems. In this study, 53.8% of participants with anal problems reported using supplements compared to 54.8% of those without, with a p -value of 0.175. This finding aligns with Gasmi *et al.* [23], who reported that although supplement use is widespread post-surgery and essential for nutrient absorption, it does not directly influence the development of anal complications.

Adequate fluid intake, however, emerged as a significant factor, with participants who consumed sufficient fluids reporting significantly fewer anal problems (46.2%), supported by a p -value of 0.006. This corroborates findings by Dagan *et al.* [24], who emphasized the role of hydration in preventing constipation and other gastrointestinal issues post-surgery. Their study concluded that higher fluid intake improves bowel regularity and reduces complications, reinforcing the need to prioritize hydration in post-operative care.

The data also revealed gender-based differences in the impact of anal problems on lifestyle. A higher percentage of males reported lifestyle disruptions due to anal issues compared to females, though this was not statistically significant (p -value = 0.19). Similarly, age did not show a strong association with the lifestyle impact of anal problems, as indicated by non-significant p -values across age groups.

The association between satisfaction and demographics observed in this study aligns with research by Hult *et al.* [25], who noted that younger patients and women often report differing levels of satisfaction based on surgical outcomes. These findings emphasize the importance of personalized care to address the unique needs and expectations of various demographic groups.

In summary, this study underscores the critical role of physical activity and fluid intake in reducing the risk of anal complications post-bariatric surgery. While dietary changes and supplement use did not show significant associations, these findings highlight the need for targeted post-operative strategies to optimize patient outcomes and quality of life.

6. Limitations of the Study

While this study provides valuable insights into anal complications following sleeve gastrectomy, several limitations must be acknowledged. The relatively small sample size ($n = 148$) may limit the generalizability of the findings, as a larger, more diverse sample could yield more robust and widely applicable results. Additionally, the reliance on self-reported data introduces the potential for recall bias or inaccuracies, particularly regarding sensitive issues like anal health, as patients might underreport or misinterpret symptoms. Incorporating clinical assessments or validated tools in future studies could address this limitation. As the study was conducted at a single institution, the findings may not reflect the experiences of patients from other regions or healthcare settings, highlighting the need for multi-center studies to account for variations in surgical techniques, post-operative care, and patient demographics.

Moreover, the retrospective design constrained the ability to observe long-term outcomes, underscoring the value of prospective longitudinal studies to better understand the progression and sustained impact of anal complications.

In addition, while this study relied on patient-reported symptoms, incorporating standardized objective measures, such as physical examinations or anoscopy, could strengthen the validity of findings. These measures would enable accurate grading of complication severity and provide a more comprehensive understanding of their clinical impact.

Finally, our study provides a valuable understanding of anal complications post-sleeve gastrectomy. However, it is important to acknowledge that confounding variables, such as pre-existing conditions and variations in surgical technique, could influence the outcomes. While we documented these factors during data collection, statistical adjustments were not performed due to the study's retrospective design. This limitation highlights an area for improvement in future research, where the use of multivariable analysis could help isolate the effects of primary risk factors and strengthen the causal inferences drawn. Incorporating objective clinical assessments alongside robust statistical models would provide a more comprehensive understanding of the determinants of anal complications post SG surgery.

7. Conclusions

This study highlights a low incidence of anal problems following bariatric surgery, with specific conditions such as anal fissures and hemorrhoids requiring attention in post-operative care plans. The findings underscore the need for enhanced patient support, particularly in addressing weight loss challenges and post-surgical gastrointestinal issues. The higher prevalence of female and middle-aged participants suggests a demand for targeted educational programs and support tailored to these demographics. The data also emphasizes the positive impact of physical activity and adequate hydration on recovery and quality of life, underscoring their importance in post-operative counseling.

Comprehensive pre-and post-operative guidance is crucial to improving surgical outcomes and patient satisfaction.

Future research should prioritize long-term follow-up to better understand the progression of complications and the effectiveness of interventions aimed at improving lifestyle habits among bariatric surgery patients. By addressing the complexities of weight management and post-operative care, ongoing research can contribute to enhancing the overall health outcomes and quality of life for this population.

Ethical Considerations

All participants were fully informed about the study's purpose, objectives, and procedures before data collection began. Participants were assured that their responses would remain confidential and that their personal information would be

securely stored and used solely for research purposes. Additionally, participants were made aware of their right to withdraw from the study at any time without providing a reason and without any consequences to their medical care. The study received ethical approval from the Institutional Review Board (IRB) of Almoosa Specialist Hospital, under reference number IRB ARC-24.1.02.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix

Our study aims to assess the prevalence of anal complication post sleeve surgery, risk factors and their impacts in patient's life. Answering the following questionnaire, it will help with completion of this study. All the information given will be anonymous and used just for this research. The questionnaire consists of the following sections:

First: Consent.

Second: demographic Data.

Third: questions to assess the anal complications post bariatric, risk factors, impacts in patient's life.

- Do you agree to participate in the research? Yes/No
- Gender: Male/Female
- Age: <18, 18 - 25, 25 - 35, 35 - 45, >45.
- Did you experience any anal problem before surgery? (will be excluded)

Post surgery outcome:

- Weight reduction post-surgery (<50%, >50%)

Post surgery change in bowel motion and presence of anal complications:

- Was there any change in bowel habits post bariatric surgery? Diarrhea, constipation, fluctuate or no change.
- Did you experience any anal problem post-surgery?
- When did you experience the anal problem post-surgery? Time from surgery. (<2 months, 2 - 6 months, after one year, after two years.
- What was the type of anal problem did you experience? Hemorrhoid, fistula, fecal incontinence, abscess or others.
- Did you seek any medical advice? (yes, no)
- Was it Managed conservatively or need surgery?

Lifestyle

- Did you practice any physical activity? (yes, no)
- Was there any change in diet habits? Short answer question
- Did you use any dietary supplement? Specify, Short answer question
- Were you drinking plenty of fluid? (yes, no)

Impact on patient's life

- Did the anal problem affect your life and lifestyle? (yes, no)
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