



# General Public Awareness about the Indications and Complications of Sleeve Gastrectomy in Qassim Region, Saudi Arabia

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## Abstract

**BACKGROUND:** Sleeve gastrectomy has become prevalent worldwide regardless of the patient's awareness about the indications and complications. That would affect their judgment and decision.

**AIM:** This study aimed to assess the level of awareness about indications and complications of sleeve gastrectomy in the general public at Al-Qassim, Saudi Arabia in 2021.

**MATERIALS AND METHODS:** This is a quantitative cross-sectional study conducted among the general public living in the Qassim region, Saudi Arabia. Using a convenience sampling technique to select the participants as a representative sample for the general population. The target population will include all Saudis, who live in Al-Qassim and aged above 18 years, and will exclude who does not live in al-Qassim, age under 18 years, non-Saudi, who does not complete the questionnaire and who refuse to participate. The data were collected using a validated self-administered questionnaire. Questionnaires include; demographic characteristics, general awareness about sleeve gastrectomy, and awareness toward the indication and complication of sleeve gastrectomy. All statistical analyses were performed using Statistical Packages for Software Sciences version 26.

**RESULTS:** A total of 1091 respondents took part. The mean age of the respondents was 37.5 (SD 12.9) years old with females dominating the males (87.8% vs. 12.2%). Awareness about the indications and complications of sleeve gastrectomy constitutes 49% and 82.4%, respectively. In univariate analyses, those who have heard about body mass index (BMI) had greater knowledge of the indications and complications of sleeve gastrectomy. In a multivariate regression model, gender female was the independent significant predictor of sleeve gastrectomy complications whereas those who heard of BMI was the independent significant predictor of the knowledge toward the indications and complications of sleeve gastrectomy.

**CONCLUSION:** The general public demonstrated a lack of knowledge regarding the indications of sleeve gastrectomy but their knowledge about complications was better. Better knowledge about BMI comes with a better awareness of the indications and complications of sleeve gastrectomy.

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## Introduction

Obesity is one of the most serious health issues that affect daily life activities, it is now considered a prevalent disease affecting both adults and children [1]. In 2008, the WHO reported that worldwide obesity has doubled since 1980 [2]. It is described as a body mass index (BMI) of 30 kg/m<sup>2</sup> [3], and morbid obesity as 40 kg/m<sup>2</sup> or higher [4].

WHO's 2016 data shows 650 million individuals in the world were obese [2]. Studies show that gulf countries are on the top of list in terms of obesity, Kuwait for example has the greatest rate with 42.8% among the population [5]. Saudi Arabia also has one of the highest obesity rates in the world, with over 35% of the population obese [6], [7] and women represent higher percentage than men [8].

Obesity and overweight can be caused by a number of factors, including genetic, behavioral, and

environmental [9]. Obesity would have a huge effect on the global prevalence of cardiovascular disease, Type 2 diabetes, stroke, osteoarthritis, decrease work performance, and sleep apnea as obesity increases. Obesity has a greater effect on morbidity than it does on mortality [2], [10].

The management of obesity is a stepwise process. Obese patients have to be counseled for lifestyle modification first, that includes diet, increase physical activity, and behavior therapies. Treatment with pharmacological agents considered as the second step. Bariatric surgery such as sleeve gastrectomy or gastric bypass is the third step for patients with certain criteria [11].

The surgical management is considered as the most effective treatment for individuals with severe obesity, moderate obesity with other comorbidities or patients that are not responsive to the first two steps [11]. In Saudi Arabia, the indications to perform sleeve gastrectomy involve individuals with a BMI

of 40 kg/m<sup>2</sup> or higher, BMI of 35 kg/m<sup>2</sup> or higher with serious comorbidities, and individuals with a BMI of 30 kg/m<sup>2</sup> or higher with poorly controlled Type 2 diabetes and cardiovascular risk [1].

Compared with other types of bariatric surgery, sleeve gastrectomy is observed to have less complication and more effective outcome [12]. However, many studies have reported numerous complications which vary in severity and incidence. In general, postoperative complications can occur, such as anastomotic leaks, hemorrhage, strictures, abscesses, nutritional deficiencies, vein thrombosis, and wound infections [13]. According to a study done in Japan, 12.8% of obese patients were experienced early and late complication of Sleeve Gastrectomy [14]. Bleeding as a serious complication was reported in 1.8% [15].

Furthermore, anastomosis leakages considered as a major complication were revealed mainly in women (1.5%) [16]. Another study shows a higher incidence of leaking due to the re-operation up to 20% [17]. The main causes for re-operative surgery are severe gastroesophageal reflux disease (GERD) and failure to lose weight [14].

Some of the participants were unaware about the indications and complications of sleeve gastrectomy based on the previous study [1]. In addition to the lack of such studies in the Al-Qassim region, this research would help in determining the awareness about indications and complications of sleeve gastrectomy among the general population. Furthermore, to identify the gaps in knowledge in order to fill them.

## Methods

A quantitative observational analytical cross-sectional study will be used as study design. The study will be conducted in the Al-Qassim region. We will use a convenience sampling technique to select the participants as a representative sample for the general population. The target population will include all Saudis, who live in Al-Qassim and aged above 18 years and will exclude who does not live in al-Qassim, age under 18 years, non-Saudi, who does not complete the questionnaire and who refuse to participate. Descriptive statistics were presented using counts, proportions (%), mean and standard deviation. The awareness toward the indications and complications of sleeve gastrectomy were compared with the demographic data of participants using the Chi-square test. Significant results produced in crosstabulation were then arranged in a multivariate regression table to capture the independent significant predictor of the awareness about the indications and complications of sleeve gastrectomy where the odds ratio and 95% confidence interval were also

being reported.  $p < 0.05$  was considered statistically significant. The data analyses were carried out using Statistical Packages for Software Sciences version 26 Armonk, New York, IBM Corporation.

## Results

There were 1091 participants involved in this study. Table 1 presented the demographic data of the general public. Respondents' mean age was 37.5 (12.9) years with 18–25 years was the most common age group (29.5%). Females were dominant (87.8%) than males (12.2%). With regards to their education, nearly three quarters had bachelor's degrees (74.1%) followed by high school (19.6%).

**Table 1: Demographic characteristics of the general public living in Qassim region, Saudi Arabia**

Study variables	n (%)
Age in years (mean±SD) (years)	37.5±12.9
18 – 25	322 (29.5%)
26 – 35	169 (15.5%)
36 – 45	261 (23.9%)
46 – 55	252 (23.1%)
> 55	87 (8.0%)
Gender	
Male	133 (12.2%)
Female	958 (87.8%)
Educational level	
Elementary school	12 (1.1%)
Intermediate school	20 (1.8%)
High school	214 (19.6%)
Bachelor	808 (74.1%)
Master degree	28 (02.6%)
PhD	9 (0.80%)

The awareness of respondents regarding gastric sleeves has been described in Table 2. Following the results, it was shown that while all respondents have heard about sleeve gastrectomy, however, only 49.5% of respondents have heard about BMI and 35.5% of them knew about the correct BMI range of obese person. In addition, more than a quarter of the respondents (26.4%) knew that a person with a BMI of 30 or more (kg/m<sup>2</sup>) was an indication of obesity. The prevalence of respondents who were aware of the indication and complication of sleeve gastrectomy were 49.5% and 82.4%, respectively.

**Table 2: Knowledge of participants about indication and compilation of sleeve gastrectomy**

Variables	n (%)
Did you hear about sleeve gastrectomy?	
Yes	1091 (100)
No	0
Have you heard about the body mass index?	
Yes	557 (51.1)
No	534 (48.9)
What is the BMI range that we can say this person is obese?	
<18.5	09 (0.80)
18.5 – 24.9	66 (6.0)
25 – 29.9	169 (15.5)
≥30	387 (35.5)
I don't know	460 (42.2)
Do you know about the indication of sleeve gastrectomy?	
Yes	535 (49.0)
No	556 (51.0)
Do you know about the complications of sleeve gastrectomy?	
Yes	899 (82.4)
No	192 (17.6)

Table 3, it showed the knowledge of 535 respondents regarding the indication for sleeve gastrectomy. Accordingly, respondents knew that the most common indication for sleeve gastrectomy was an adult with BMI more than 40 kg/m<sup>2</sup> (59.8%) and adult with BMI more than 30 kg/m<sup>2</sup> with poorly controlled type 2 diabetes and increased cardiovascular risk (59.8%), followed by an adult with BMI more 35 kg/m<sup>2</sup> and severe comorbidities (55%) while few of them believe that an adult with BMI less than 18.5 is an indication of sleeve gastrectomy (3.7%).

**Table 3: Knowledge of participants regarding indication for sleeve gastrectomy**

Indication	n (%)
Adult with BMI>40kg/m <sup>2</sup>	320 (59.8)
Adult with BMI>35 kg/m <sup>2</sup> and severe comorbidities	294 (55.0)
Adult with BMI>30 kg/m <sup>2</sup> , poorly controlled type 2 diabetes, increased cardiovascular risk	320 (59.8)
Adult with BMI from 18.5-24.9	93 (17.4)
Adult with BMI of 18.5	42 (07.9)
Adult with BMI less than 18.5	20 (03.7)
For cosmetics	102 (19.1)

Pertaining to the knowledge of participants toward the complications of sleeve gastrectomy, it can be observed that the participants were knowledgeable that the most common acute complication of sleeve gastrectomy was hemorrhage (58.5%), followed by anemia (55.5%) and leak gastric content (54.5%) while the most common chronic complication was anemia (59.5%), followed by iron deficiency (54.9%) and other nutritional and mineral deficiency (46.4%) (Table 4).

Univariate analysis has been performed in Table 5, to find the significant factor associated with the knowledge toward the indications and complications of sleeve gastrectomy. It was revealed that the knowledge toward the indications of sleeve gastrectomy was less common among those in the oldest age group (> 55 years) (X<sup>2</sup> = 10.783; p = 0.029). It was further observed that gender females had better knowledge regarding the complications of sleeve gastrectomy than males (X<sup>2</sup> = 18.278; p < 0.001). Furthermore, having

heard about BMI was more common among those who knew the indications (X<sup>2</sup> = 118.519; p < 0.001) and complications (X<sup>2</sup> = 7.330; p = 0.007) of sleeve gastrectomy.

**Table 4: Knowledge of participants regarding complication of sleeve gastrectomy**

Characteristics	Acute complication n (%)	Chronic complication n (%)
Hemorrhage	526 (58.5)	326 (36.3)
Anemia	499 (55.5)	535 (59.5)
Leak of gastric content	490 (54.5)	320 (35.6)
Other nutritional and mineral deficiency	419 (46.6)	417 (46.4)
Iron deficiency	404 (44.9)	494 (54.9)
Abscess	394 (43.8)	235 (26.1)
Neuropathies	212 (23.6)	285 (31.7)
Pulmonary emboli	194 (21.6)	162 (18.0)
Twist of stomach	171 (19.0)	155 (17.2)
Weight regain	104 (11.6)	154 (17.1)

In multivariate regression, those who have heard about BMI were 4 times higher of knowing about the indications of sleeve gastrectomy (AOR = 4.388; 95% CI = 3.366–5.721; p < 0.001) while females were twice as higher than males to be more associated with the knowledge toward complications of sleeve gastrectomy (AOR = 2.531; 95% CI = 1.676–3.822; p < 0.001). In addition, those who have heard about BMI were significantly more likely to be more associated with the knowledge toward the complication of sleeve gastrectomy (AOR = 1.636; 95% CI = 1.188–2.253; p = 0.003) (Table 6).

## Discussion

The present study highlights the knowledge of the general public regarding the indications and complications of sleeve gastrectomy. The findings of this study showed that the knowledge of the respondents regarding the indication of sleeve gastrectomy was insufficient (49%), however, their knowledge about the complications showed better, with

**Table 5: Univariate analysis to determine the factor associated with having the knowledge toward indication and complication of sleeve gastrectomy**

Factor	Knowledge toward indication		X <sup>2</sup>	p-value	Knowledge toward complication		X <sup>2</sup>	p-value
	Yes n (%)	No n (%)			Yes n (%)	No n (%)		
Age group (years)								
18 – 25	139 (26.0)	183 (32.9)	10.783	0.029**	252 (28.0)	70 (36.5)	7.306	0.121
26 – 35	95 (17.8)	74 (13.3)			143 (15.9)	26 (13.5)		
36 – 45	139 (26.0)	122 (21.9)			213 (23.7)	48 (25.0)		
46 – 55	124 (23.2)	128 (23.0)			217 (24.1)	35 (18.2)		
>55	38 (7.1)	49 (8.8)			74 (8.2)	13 (6.8)		
Gender			1.326	0.25			18.28	<0.001**
Male	59 (11.0)	74 (13.3)			92 (10.2)	41 (21.4)		
Female	476 (89.0)	482 (86.7)			807 (89.8)	151 (78.6)		
Educational level			0.238	0.626			2.15	0.143
High school or below	124 (23.2)	122 (21.9)			195 (21.7)	51 (26.6)		
Bachelor or higher	411 (76.8)	434 (78.1)			704 (78.3)	141 (73.4)		
Heard about BMI			118.52	<0.001**			7.33	0.007**
Yes	363 (67.9)	194 (34.9)			476 (52.9)	81 (42.2)		
No	172 (32.1)	362 (65.1)			423 (47.1)	111 (57.8)		
BMI range of obese person <sup>†</sup>			5.634	0.06			5.82	0.054
<25 kg/m <sup>2</sup>	41 (10.4)	34 (14.4)			62 (11.6)	13 (13.7)		
25–29.9 kg/m <sup>2</sup>	98 (24.8)	71 (30.1)			135 (25.2)	34 (35.8)		
≥30 kg/m <sup>2</sup>	256 (64.8)	131 (55.5)			339 (63.2)	48 (50.5)		

<sup>†</sup>Participants who did not know the BMI range of obese persons were excluded from the analysis. P value has been calculated using Chi-square test. \*\*Significant at P<0.05 level

82.4% were knowledgeable about it. These findings are in agreement with the paper of Al Watban *et al.* [1] Their study reported a lack of awareness regarding sleeve gastrectomy. They accounted, 41% and 64.8% of the patients who have heard about the indications and complications of sleeve gastrectomy. Another study conducted in Jeddah, Saudi Arabia [18], indicated that among 298 medical students, 73% and 78.9% of them were able to distinguish the correct indications and complications of bariatric surgery which were slightly higher than our report. Although, it is expected that the knowledge of medical students is better than the general population. Moreover, we noted that nearly 60% of the subjects were sure about the correct indication of sleeve gastrectomy which was an adult with a BMI of more than 40 kg/m<sup>2</sup> or an adult with BMI more than 30 kg/m<sup>2</sup> with poorly controlled Type 2 diabetes and increased cardiovascular risk. Incidentally, the knowledge of the study population in our report regarding the correct indication of the gastric sleeve was higher than the study of Al Watban *et al.* [1] as well as Bshait and associates [19].

**Table 6: Multivariate regression analyses to determine the independent significant predictor associated with the knowledge toward indication and complication of sleeve gastrectomy**

Knowledge toward indication	AOR	95% CI	p-value
Age group (years)			
18 – 25	Ref		
26 – 35	1.486	0.888 – 2.485	0.131
36 – 45	0.883	0.505 – 1.544	0.662
46 – 55	0.735	0.437 – 1.237	0.246
> 55	0.779	0.462 – 1.314	0.349
Heard about BMI			
Yes	4.388	3.366 – 5.721	<0.001**
No	Ref		
Knowledge toward complication			
Gender			
Male	Ref		
Female	2.531	1.676 – 3.822	<0.001**
Heard about BMI			
Yes	1.636	1.188 – 2.253	0.003**
No	Ref		

AOR: Adjusted odds ratio, CI: Confidence interval

Similarly, regarding the knowledge of participants toward the complications of sleeve gastrectomy, which we measured among 899 subjects. The response of 899 individuals in the multiple response questions showed that the most common acute complication of sleeve gastrectomy was hemorrhage (58.5%) followed by anemia (55.5%) and leak of gastric content (54.5%). Likewise, pertaining to chronic complications, anemia (59.5%), iron deficiency (54.9%), and other nutritional and mineral deficiency (46.4%) were the top three most common chronic complications of sleeve gastrectomy. These findings are consistent with the study of Al Watban *et al.* [1]. They similarly reported hemorrhage (51%) as the major acute complication of sleeve gastrectomy followed by iron deficiency (40.8%). On the other hand, in the chronic complication, hemorrhage was also identified as the main chronic complication (51%) of the gastric sleeve, which disagreed with our findings. In another study conducted in Al Ahsa, Saudi Arabia [19], they indicated that the most common complication of bariatric surgery

was GERD, iron, vitamin B12, and protein deficiencies which were also in line with our results.

Moreover, we have seen that even though all subjects have heard about sleeve gastrectomy, on the other hand, their knowledge about BMI and the accurate BMI range of obese people was lacking. Based on our results, nearly half of the respondents (48.9%) were not aware of the term “BMI” while only 35.5% knew that an obese person had a BMI range of 30 kg/m<sup>2</sup> or more with many of the subjects (42.2%) does not know or had no knowledge about it. In Turkey [20], research indicated that the awareness about BMI was insufficient and only 39.4% knew that 30 kg/m<sup>2</sup> was the cutoff point to detect obesity which was consistent with our reports.

Conversely, we determined that the increasing age was associated with the decrease of the knowledge toward the indication of sleeve gastrectomy while the awareness about BMI was associated with the increase in knowledge in both indications and complications of sleeve gastrectomy. Further, we have learned that female subjects had better knowledge of the complications of gastric sleeves. Correspondingly, in our multivariate regression estimates, having heard of the term “BMI” was the independent significant predictor of the knowledge regarding indications and complications of sleeve gastrectomy. Consistently, in a study done by Al Watban *et al.* [1], they reported that educational level was not an influential factor with having heard of indications and complications of sleeve gastrectomy. Similarly, in a study conducted by Alamri *et al.* [21], they pointed out that the awareness of females regarding bariatric surgery complications was higher than males but their awareness was similar across educational levels which were consistent with our results.

Our study based on a sufficient representative sample of the population; besides it is the only study conducted in the Qassim region that determined the awareness of the general public about the indications & complications of sleeve gastrectomy. We would hence recommend conducting similar studies in different regions of the country to clarify this issue and have more comprehensive view.

This research has some limitations which should be taken into account. The most important of these criticisms is that participants from the sample were collected through convenient online survey sampling. In addition, the study collects the data as a cross-sectional method, which may have a selection bias.

## Conclusion

The general public demonstrated a lack of knowledge regarding the indications of sleeve gastrectomy but their knowledge about complications

was better. Better knowledge about BMI comes with a better awareness of the indications and complications. It is important to improve general populations' awareness regarding the indications of sleeve gastrectomy, specifically in terms of the accurate indication of gastric sleeve. A continuous awareness campaign is one of the most important methods to increase the awareness of the general public regarding the subject. Community healthcare workers had the vital role to provide proper education in the community about the importance of having adequate knowledge toward the indications and complications of sleeve gastrectomy.

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