Public perception of bariatric surgery

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ABSTRACT

الأهداف: لبحث مدى الإدراك و الفهم لدى العامة في مدينة جدة لموضوع السمنة المفرطة و جراحة السمنة المفرطة أيضاً.

الطريقة: لقد قمنا بتنفيذ دراسة عرضية في جدة، المملكة العربية السعودية بين نوفمبر 2016م و نوفمبر 2017م و قد ضمت سعوديين من الفئة العمرية لمن هم في 18 أو أكثر من العمر واستثنينا طلاب الطب، الأطباء والأشخاص الذين خضعوا لعمليات جراحة السمنة المفرطة من قبل. ومن ثم تم عمل مقابلات للتحقق من صحة كل استبانة قام بتعبئتها كلٌ من المشاركين في الدراسة.

النتائج: تم عمل المقابلات مع عدد 1129 فرد (744، 65.9% من النساء) و معظمهم من حملة الشهادات الجامعية. معظم المشاركين (97.7%) اعترفوا بالارتباط الوثيق بين السمنة المفرطة و العديد من الأمراض. حوالي 22.68% من المشاركين في الدراسة لم يعرفوا كيفية إجراء جراحة السمنة المفرطة وحوالي 18.9% اعتبروا أن هذه الجراحة تعد جراحة تجميلية فقط. حوالي 50% من المشاركين لم يكونوا على علم بالدلالات الصحيحة لجراحة السمنة المفرطة. تقريباً 41.2% كانوا غير مستعدين للّجوء لمساعدة جراح السمنة المفرطة في حين تم تشخيصهم بالسمنة المفرطة. ارتبطت هذه النتائج بالمستوى العلمي لدى المشاركين و ذلك بحسب ارتباط سبيرمان.

الخاتمة: أظهرت الدراسة أن فهم وإدراك العامة للسمنة المفرطة و جراحة السمنة المفرطة هو فهم محدود. التنسيق الفعال للتعاون فيما بين الجراحين ومثقفي الصحة وغيرهم ممن يقدمون الرعاية الصحية هو شيء أساسي ومطلوب لتحسين الوعي العام في هذا الشأن.

Objective: To investigate the public perception of morbid obesity and bariatric surgery in Saudi Arabia.

Methods: A cross-sectional study was conducted between November 2016 and November 2017 in Jeddah, Saudi Arabia, including Saudis aged ≥18 years. Medical students, physicians, and individuals who underwent bariatric surgery were excluded. Participants were interviewed using a new, validated questionnaire.

Results: We interviewed 1,129 individuals of whom 744 (65.9%) were women. The educational level of most was a bachelor's degree. Most participants (97.7%) acknowledged the association between obesity and comorbidities. Approximately 22.7% of the participants were unaware of the bariatric surgery procedure. Approximately 18.9% considered it to be a cosmetic procedure. Approximately 50% were unaware of the correct indications for bariatric surgery, and 41.2% were unwilling to seek a bariatric surgeon's help if diagnosed with morbid obesity. These results were correlated with the participants' education level.

Conclusion: Our study shows that the public perception of obesity and bariatric surgery in Saudi Arabia is limited. Effective interagency coordination between surgeons, health educators, and other health care providers is required to improve public awareness.

Saudi Med J 2019; Vol. 40 (4): 379-384
doi: 10.15537/smj.2019.4.24050

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Received 26th October 2018. Accepted 28th February 2019.

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Obesity is one of the leading causes of preventable death.[1] The World Health Organization (WHO) uses body mass index (BMI) to classify the severity of obesity.[2] Morbid obesity is defined as a BMI of 40 kg/m^2 or higher.[2] Obesity has a major impact on health and health care systems. According to the WHO's 2016 data, 1.9 billion individuals in the world were overweight, and 650 million were obese. In Saudi Arabia, a nationwide survey of 4,589 individuals in 2005 showed that 28.3% of males and 43.8% of females were obese.[3] In 2005, Saudi Arabia ranked 15th among countries with the most obese individuals.[4] According to a study published in 2016, the predicted overall obesity among individuals in Saudi Arabia was 52.9%: 67.5% in females and 38.2% in males.[5] Morbid obesity

is associated with a number of serious comorbidities including diseases of the cardiovascular system, diabetes, and cancers, along with a financial burden on patients and the health care system.[6] The results of numerous studies published in the last few decades indicated that bariatric surgery is one of the best treatment options for morbid obesity.[7-9] The Swedish Obese Subjects (SOS) trial, with a 20-year follow-up, proved that the most effective long-term treatment method for morbid obesity is bariatric surgery.[10] Previous studies reported bariatric surgery to be a safe option for the treatment of morbid obesity with a relatively low complication rate.[8,11-14] In a multicenter study conducted in 2017, complication rates were as low as 0.6%.[11] The long-term sustainability of weight loss demonstrated in these studies indicated that bariatric surgery is a better alternative to other methods of weight reduction that lack long-term effectiveness.[9,15-19] Studies in communities outside Saudi Arabia have shown that the public's perception of bariatric surgery is not accurate.[20] One study showed that patients who underwent bariatric surgery are more willing to adhere to a better lifestyle.[20] According to a study conducted in Germany, the public seemed to be rather cautious regarding bariatric surgery.[20] However, half of the studied population considered bariatric surgery as a highly effective method for weight reduction.[20] Furthermore, individuals with a higher level of education were more likely to consider bariatric surgery as an option in that study.[20] There is a paucity of studies that assess public perception of bariatric surgery in Saudi Arabia. This present study aimed to assess public perception and basic knowledge of morbid obesity and obesity surgery in Saudi Arabia.

Methods. This cross-sectional study was conducted between November 2016 and November 2017, involving Saudi residents aged 18 and above, in Jeddah, Saudi Arabia. Each participant was interviewed to assess their knowledge of obesity and bariatric surgery using a new questionnaire that was developed based on previous studies.[20,21] Data collectors personally interviewed adults in the waiting areas of King Abdulaziz University Hospital, Jeddah, Saudi Arabia. The period of data collection started on November 2016 until October 2017. Participation was voluntary. The sample size was determined based on prior studies.[20,21] The questionnaire's face and content validity were checked and critiqued by a group of experts. The questionnaire was piloted on 20 subjects before it was used in this study. The questionnaire was translated to patients. The questionnaire had 3 parts: demographic questions, knowledge about obesity, and knowledge about obesity surgery. Questionnaire items included questions on the definition of morbid obesity, health effects of obesity, knowledge of bariatric surgery, the most effective method to manage morbid obesity, knowledge of the indications of morbid obesity, and the perceived complication rate of bariatric surgery. Medical students, physicians, and individuals who underwent bariatric surgery were excluded from the study as their prior medical knowledge regarding obesity and obesity surgery might affect the results and cause bias.

We used PubMed database to identify related articles. Ethical approval was obtained. The study was conducted according to the principles of the Declaration of Helsinki. The results were correlated with the participants' level of education.

The Statistical Package for Social Sciences (SPSS) version 21 (SPSS Inc, Chicago, Illinois, USA) was used to analyze the data. For categorical variables data were represented as numbers and percentages. For continuous variables data were presented as mean and standard deviation. Chi-square test was performed to determine the significant differences between variables; the correlation between educational level and other variables was established using the Spearman correlation. A *p*-value of <0.05 was considered statistically significant.

Results. A total of 1,129 individuals were interviewed based on the criteria of inclusion and exclusion. The mean age of the participants was 35.19±13.16 years (range: 18-68 years). Of the 1,129 participants, 385 (34.1%) were males (**Table 1**). All the interviewees were residents of Saudi Arabia. The highest educational level was elementary school in 39 (3.5%) participants, middle school in 3 (0.3%) participants, high school in 301 (26.7%) participants, a diploma in 42 (3.7%) participants, a bachelor's degree in 539 (47.7%) participants, a master's degree in 145 (12.8%) participants, and doctorate in 60 (5.3%) of the participants (**Table 1**). All study demographics are shown in **Table 1**.

Approximately 566 (50.1%) of the participants did not know the correct definition of morbid obesity. Of the interviewees, 1,069 (94.7%) knew that there is a difference between obesity and morbid obesity. Among the survey participants, 1,103 (97.7%) individuals acknowledged that obesity is a significant cause of numerous medical diseases (**Table 2**).

Disclosure. Authors have no conflict of interests, and the work was not supported or funded by any drug company.

Most (1,103 individuals or 97.7%) of the participants knew that there are surgical methods for weight reduction. A total of 937 (83%) participants knew someone who had undergone bariatric surgery. About 304 (26.8%) of the subjects did not know how bariatric surgery is performed. Moreover, 669 (59.3%) considered bariatric surgery a medical procedure, 213 (18.9%) considered it a cosmetic procedure, and the rest were not sure. Of the participants, 778 (69%) thought that either diet or exercise is the single most effective method in the management of morbid obesity, while only 18.2% considered surgery as the most effective method. Of those who were interviewed, 163 (14.4%) individuals thought that bariatric surgery is never needed and 603 (53.1%) did not know the correct indications for bariatric surgery. About 729 (64.6%) of those who participated thought that the complication rate of bariatric surgery is more than 40%, and 400 (35.4%) thought that it is less than 5%. Of the participants, 465

Table 1 - Study demographics of 1,129 individuals included in the study.

Demographics	n (%)
Mean age (years)	35.19 ± 13.16
Range (years)	18-68
Mean height (cm)	164.66 ± 9.85
Range (cm)	120-190
Mean weight (kg)	77.11 ± 22.76
Range (kg)	42-186
Had previous bariatric surgery	
Yes	0
No	1,129 (100)
Gender	
Male	385 (34.1)
Female	744 (65.9)
Nationality	
Saudi	1,129 (100)
Highest educational level	
Elementary school	39 (3.5)
Middle school	3 (0.3)
High school	301 (26.7)
Diploma	42 (3.7)
Bachelor's degree	539 (47.7)
Master's degree	145 (12.8)
Doctorate	60 (5.3)

Table 2 - Knowledge about obesity.

Knowledge about obesity	n	(%)
Do you think being overweight or obese can cause significant medical problems?		
Yes	1,103	(97.7)
No	26	(2.3)
What is morbid obesity?		
People who have a BMI of >24.9 kg/m^2	58	(5.1)
People who have a BMI of ≥30 kg/m^2	148	(13.1)
People who have a BMI of 40 or of 34–40 with significant medical problems	563	(49.9)
I don't know	360	(31.9)
Is there a difference between obesity and morbid obesity?		
Yes	1,069	(94.7)
No	60	(5.3)

Table 3 - Knowledge about bariatric surgery.

Knowledge about bariatric surgery	n	(%)
Do you know that there are surgical methods to reduce weight?		
Yes	1,103	(97.7)
No	26	(2.3)
What is bariatric surgery?		
Weight loss is achieved by reducing the size of the stomach or by resecting and re-routing the small intestine	825	(73.1)
Removing excess fat from under the skin by suction	110	(9.7)
The insertion of a balloon that fills the stomach and gives the feeling of satiety quickly	49	(4.3)
I don't know	145	(12.8)
Have anyone you know underwent bariatric surgery?		
Yes	937	(83.0)
No	192	(17.0)
Do you think that surgery for morbid obesity is a medical procedure or a cosmetic procedure		
Medical	669	(59.3)
Cosmetic	213	(18.9)
Not sure	247	(21.9)
What is the single most effective method for long-term management of morbid obesity?		
Diet	345	(30.6)
Exercise	433	(38.4)
Slimming centers	78	(6.9)
Medications	3	(0.3)
Surgery	206	(18.2)
I don't know	64	(5.7)
When do you think bariatric surgery is needed?		
Incorrect	599	(53.1)
Correct	360	(31.9)
Never	163	(14.4)
I don't know	4	(0.6)
What are the complications' percentage of bariatric surgery?		
Less than 5%	400	(35.4)
More than 40%	729	(64.6)
If you know a morbidly obese person, would you recommend that he/she seeks a bariatric surgeon's help?		
Yes	664	(58.8)
No	465	(41.2)
If you were a morbidly obese person, would you seek a bariatric surgeon's help?		
Yes	598	(53.0)
No	531	(47.0)

(41.2%) stated that they would not to seek a bariatric surgeon's help if they were morbidly obese, and 531 (47%) would not advise a morbidly obese person to seek bariatric surgery (**Table 3**).

There was a significant positive correlation between the level of education attained and the knowledge of the definition of morbid obesity (-0.090, p=0.002). Moreover, there was a significant positive correlation between the level of education and both the knowledge of the definition of bariatric surgery (-0.185, p<0.001) and the presence of surgical methods for weight reduction (-0.126, p<0.001). There was also a positive correlation between the level of education and knowing someone who had undergone bariatric surgery (-0.185, p<0.001). Considering bariatric surgery as a medical procedure was significantly correlated with the level of education (-0124, p<0.001). There was a significant positive correlation between the educational level and falsely thinking that diet or exercise is the most effective method in managing morbid obesity (0.091, p=0.002). However, there was no significant correlation between the level of education and the knowledge of bariatric surgery indications or the perceived complication rate of the surgery. Additionally, there was no significant correlation between the educational level and either seeking a bariatric surgeon's help or recommending bariatric surgery to a morbidly obese individual (**Table 4**).

Discussion. The WHO has declared obesity to be a growing threat and a global epidemic.[22] In Saudi Arabia, the prevalence of obesity is growing, as proven by numerous studies nationwide.[3,5,6] Among the Saudi population, obesity is more prevalent among women than among men.[5] The national prevalence of obesity in Saudi Arabia by the year 2022 is projected to be 59.5% in men and 77.6% in women.[5]

The proper treatment of morbid obesity may lead to dramatic favorable effects on the patients' health as well as on the health care system. Bariatric surgery is an effective management option for morbid obesity. An appropriate perception of a specific medical treatment among the public is key in ensuring that affected individuals seek that solution. Multiple factors may affect the public's opinion about bariatric surgery, such as educational level, social and print media, peers' or contacts' experiences, and many others. Print media are an important factor in influencing the public's view of bariatric surgery as negative reportage distorts the public's overall awareness of bariatric surgery.[23] Choosing bariatric surgery to manage one's morbid obesity is affected by the perception of bariatric surgery, accessibility, finances, and cost.[21] The complication rates of bariatric surgery in centers of excellence are relatively low.[8,10-14] Bariatric surgery is usually the ultimate option for people suffering from morbid obesity. In this study,

Table 4 - Correlation with educational level.

Correlation with Educational level	Elementary (n=39)	Middle (n=3)	High S (n=301)	Diploma (n=42)	Bachelor (n=539)	Masters (n=145)	Doctorate (n=60)	Chi-square p-value	Spearman rank correlation (p-value)
Do you think being overweight or obese can cause significant medical problems?									
Yes	39 (100)	3 (100)	283 (94.0)	40 (95.2)	521 (96.7)	140 (96.6)	60 (100)	0.211	-0.043 (0.153)
No	0	0	18 (6.0)	2 (4.8)	18 (3.3)	5 (3.4)	0		
Do you know that there are surgical methods to reduce weight?									
Yes	31 (79.5)	3 (100)	285 (94.7)	42 (100)	539 (100)	143 (98.6)	60 (100)	<0.001	-0.185 (<0.001)*
No	8 (20.5)	0	16 (5.3)	0	0	2 (1.4)	0		
What is morbid obesity?									
BMI >24.9	0	0	12 (4.0)	2 (4.8)	26 (4.8)	16 (11.0)	2 (3.3)		
BMI ≥30	3 (7.7)	0	33 (10.9)	17 (40.5)	65 (12.1)	28 (19.3)	2 (3.3)		
BMI 34 to 40 with significant medical problems caused by or made worse by their weight	25 (64.1)	3 (100)	144 (47.8)	3 (7.1)	282 (52.3)	69 (47.6)	37 (61.7)	<0.001	-0.090 (0.002)*
I don't know	11 (28.2)	0	112 (37.2)	20 (47.6)	166 (30.8)	32 (22.1)	19 (31.7)		
Is there a difference between obesity and morbid obesity?									
Yes	28 (71.8)	3 (100)	285 (94.7)	39 (92.9)	514 (95.4)	140 (96.6)	60 (100)	<0.001	-0.093 (<0.001)*
No	11 (28.2)	0	16 (5.3)	3 (7.1)	25 (4.6)	5 (3.4)	0		
What is bariatric surgery?									
Weight loss is achieved by reducing the size of the stomach or by resecting an re-routing the small intestine	21 (53.9)	3 (100)	199 (66.1)	33 (78.6)	407 (75.5)	104 (71.7)	58 (96.7)		
Removing excess fat from under the skin by suction	8 (20.5)	0	28 (9.3)	3 (7.1)	58 (10.8)	11 (7.6)	2 (3.3)		
The insertion of a balloon that fills the stomach and gives the feeling of satiety quickly	4 (10.3)	0	21 (7.0)	0	19 (3.5)	5 (3.4)	0	<0.001	-0.126 (<0.001)*
I don't know	6 (15.4)	0	53 (17.6)	6 (14.3)	55 (10.2)	25 (17.2)	0		

Table 4 - Correlation with educational level. (continued)

Have anyone you know underwent bariatric surgery?									
Yes	23 (58.9)	3 (100)	231 (76.7)	42 (100)	450 (83.5)	128 (88.3)	60 (100)	<0.001	-0.185 (<0.001)*
No	16 (41.1)	0	70 (23.3)	0	89 (16.5)	17 (11.7)	0		
Do you think that surgery for morbid obesity is a medical procedure or a cosmetic procedure									
Medical	16 (41.0)	0	148 (49.2)	14 (33.3)	343 (63.6)	104 (71.7)	44 (73.3)	<0.001	-0.124 (<0.001)*
Cosmetic	17 (43.6)	3 (100)	62 (20.6)	15 (35.7)	95 (17.6)	17 (11.7)	4 (6.7)		
Not sure	6 (15.4)	0	91 (30.2)	13 (30.9)	101 (18.7)	24 (16.6)	12 (20.0)		
A 25 years old morbid obese, what is the least way for him/her to get complications during 10 years?									
Diet	7 (17.9)	0	92 (30.6)	11 (26.2)	170 (31.5)	58 (40.0)	5 (8.3)	<0.001	0.043 (0.146)
Exercise	15 (38.5)	3 (100)	133 (44.2)	14 (33.3)	220 (40.8)	36 (24.8)	30 (50.0)		
Traditional medicine	0	0	4 (1.3)	0	7 (1.3)	0	0		
Slimming centers	12 (30.8)	0	24 (8.0)	11 (26.2)	48 (8.9)	13 (9.0)	9 (15.0)		
Medications	0	0	0	0	14 (2.6)	0	0		
Surgery	5 (12.8)	0	48 (15.9)	6 (42.3)	80 (14.8)	34 (23.4)	16 (26.7)		
I don't know	0	0	0	0	0	4 (2.8)	0		
What is the single most effective method for long term management of morbid obesity?									
Diet	9 (23.1)	0	99 (32.9)	7 (16.7)	175 (32.5)	36 (24.8)	19 (31.7)	<0.001	0.091 (0.002)*
Exercise	11 (28.2)	3 (100)	134 (44.5)	18 (42.9)	197 (36.5)	50 (34.5)	20 (33.3)		
Slimming centers	9 (23.1)	0	15 (5.0)	8 (19.0)	40 (7.4)	3 (2.1)	3 (5.0)		
Medications	0	0	0	0	3 (0.6)	0	0		
Surgery	10 (25.6)	0	44 (14.6)	4 (9.5)	94 (17.4)	36 (24.8)	18 (30.0)		
I don't know	0	0	9 (3.0)	5 (11.9)	30 (5.6)	20 (13.8)	0		
When do you think bariatric surgery is needed?									
Incorrect	20 (51.3)	3 (100)	160 (53.2)	17 (40.5)	300 (55.7)	76 (52.4)	23 (38.3)	0.037	0.025 (0.403)
Correct	13 (33.3)	0	91 (30.2)	19 (45.2)	157 (29.1)	48 (33.1)	32 (53.3)		
Never	6 (15.4)	0	50 (16.6)	6 (14.3)	75 (13.9)	21 (14.5)	5 (8.3)		
I don't know	0	0	0	0	7 (1.3)	0	0		
What are the complication percentages of bariatric surgery?									
Less than 5%	9 (23.1)	3 (100)	100 (33.2)	9 (21.4)	200 (37.1)	45 (31.0)	34 (56.7)	<0.001	-0.031 (0.296)
More than 40%	30 (76.9)	0	201 (66.8)	33 (78.6)	339 (62.9)	100 (69.0)	26 (43.3)		
If you know morbidly obese person, would you recommend that he/she seeks a bariatric surgeon's help?									
Yes	25 (64.1)	3 (100)	166 (55.1)	28 (66.7)	324 (60.1)	85 (58.6)	33 (55.0)	0.420	-0.019 (0.522)
No	14 (35.9)	0	135 (44.9)	14 (33.3)	215 (39.9)	60 (41.4)	27 (45.0)		
If you were a morbidly obese person, would you seek a bariatric surgeon's help?									
Yes	26 (66.7)	3 (100)	144 (47.8)	28 (66.7)	283 (52.5)	78 (53.8)	36 (60.0)	0.040	-0.045 (0.134)
No	13 (33.3)	0	157 (52.2)	14 (33.3)	256 (47.5)	67 (46.2)	24 (40.0)		
Did our questions make you more aware regarding the need for obesity surgery?								0.001	0.000 (0.992)
Yes	34 (87.2)	3 (100)	170 (56.5)	23 (54.8)	327 (60.7)	83 (57.2)	45 (75.0)		
No	5 (12.8)	0	131 (43.5)	17 (45.2)	212 (39.3)	62 (42.8)	15 (25.0)		

*significant correlation.

more females than males were interviewed, accounting for the difference in the prevalence of obesity between the 2 genders in Saudi Arabia. Our results show an obvious deficiency in the knowledge about bariatric surgery among the population studied. This large knowledge gap may cause a reluctance in accepting bariatric surgery as an option. The false perception about the complications of bariatric procedures likely has a major impact on the decision to undergo bariatric surgery in individuals who require such treatment. Although a majority of the participants acknowledged the impact of morbid obesity on health, in that it causes a variety of medical problems, they lacked knowledge of the fact that the most effective method for morbid obesity management is bariatric surgery. There is little awareness about the proper definition of bariatric surgery, indications, and the correct complication rate. Contrary to what one might expect, the educational level did not have a significant impact on the subject's view on bariatric surgery and the willingness to seek bariatric surgery, or to recommend it as an option for treatment for morbid obesity. Different methods might be useful in overcoming the public's false perception of bariatric

surgery. As social media has become a major source of easily accessible information, bariatric surgeons may use this platform to spread accurate knowledge about bariatric surgery. Additionally, use of print media is of paramount importance as we have learned that they influence public perception. Organizing nationwide public awareness campaigns may also help educate people about obesity, its complications, its prevention, and the management options available, and importantly, to deliver accurate information about the benefits, indications, and complication risks of bariatric surgery.

Study limitation. The study was conducted in one region of the country. We would hence recommend conducting similar studies in different regions and local communities, or a nationwide study, to further clarify this issue and have a more comprehensive view, as the first step in solving a problem is detecting its existence.

In conclusion, the study shows deficiency in the public's basic knowledge of obesity and bariatric surgery. Educational level does not affect an individual's knowledge or opinion regarding bariatric surgery. Surgeons and health educators, among others, should act accordingly to improve public awareness in this regard.

Acknowledgment. *We would like to thank www.editage.com for English language editing.*

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