EXPLORING THE PERCEPTIONS AND UNDERSTANDING OF DIFFERENT BARIATRIC PROCEDURES AMONG OBESE INDIVIDUALS IN THE NORTHERN BORDER REGION, SAUDI ARABIA

Yasir Mehmood[1], Pakeeza Shafiq[2], Abdullah Shafi Alanazi[3], Feras Hamad Alanazi[3], Khalid Majed Almutlaq[3], Omar Mosab Alenazi[3], Abdulaziz Mohammed Almalki[3], Hussam Mohammed Alanazi[3]

[1]Assistant Professor of General Surgery, Department of Surgery, Faculty of Medicine, Northern Border University, Arar, Saudi Arabia; [2]Assistant Professor of Radiology, Department of Surgery, Faculty of Medicine, Northern Border University, Arar, Saudi Arabia; [3]Medical students, Faculty of Medicine, Northern Border University, Arar, Saudi Arabia

Abstract

Background: Although bariatric surgery is a well-documented effective intervention for severe obesity and its comorbidities, awareness, and knowledge of the procedures are highly important among obese patients in bringing about acceptance and utilization of such surgical interventions.

Objective: The present study aimed to find out the awareness and knowledge regarding different bariatric procedures among obese patients in the Northern Border Region, Saudi Arabia.

Methods: This current study was designed to be a cross-sectional one that recruited obese individuals aged 18 years or older with BMI ≥ 30 in the Northern Border Region through convenience sampling. Data was gathered from an online questionnaire that included demographic information of the patients, awareness of bariatric surgery, and knowledge of specific bariatric procedures. Knowledge was assessed using 20 multiple-choice questions with a score ranging from 0 to 20 points.

Results: Of the 373 participants, 76.7% knew that bariatric surgery was a treatment option; they reported television/media and personal networks as sources of this information by 44.1% and 43.0%, respectively. Sleeve gastrectomy and adjustable gastric banding represented the two best-known procedures at 37% and 41.3%, respectively. On the other end of the spectrum, biliopancreatic diversion with a duodenal switch represented the least well-known procedure at 6.4%. About 14.5% of the respondents demonstrated a high level of knowledge, whereas 51.5% showed a moderate level.

Conclusion: It has been highlighted that bariatric surgery was highly acknowledged (76.7%) as one of the obese patients' treatment options in the Northern Border Region, Saudi Arabia. However, knowledge regarding the same remains a concern because only 14.5% possessed a high level of knowledge.

Keywords: awareness, perception, obesity, bariatric procedures, Saudi Arabia.

Manuscrito recibido: 27/09/2024
Manuscrito aceptado: 12/10/2024

*Corresponding Author: Abdullah Shai Alanazi, Faculty of Medicine, Northern Border University, Arar, Saudi Arabia
Tel: +966538320712

Correo-e: abdullh.shafi1@gmail.com

Introduction

Obesity is an alarming health concern on both national and global levels that has significant ramifications for individuals and healthcare systems. Obesity-Defined by WHO as having a body mass index (BMI) greater than or equal to 30, has been spreading like fire from around the world. As of 2016, more than 1.9 billion adults were overweight and obese globally with over 650 million fitting into those categories. [1]. The rise in obesity prevalence is not only a matter of surplus poundage but also associated with numerous non-communicable diseases such as type 2 diabetes, cardiovascular disease, musculoskeletal disorders, and various cancers. [2].

Saudi Arabia has a particularly high rate of obesity which is reaching epidemic dimensions. Recent studies found that almost 35% of the adult population is obese, and there are huge disparities between the region and the country. These differences depend on the environment, lifestyle, and population in this multiethnic County [3]. The situation in the Northern Border Region is characterized by uniqueness in demographics and lifestyle. It is also witnessing an important rise in obesity factors because of their dietary habits, low levels of physical activity, and predispositions to genetic factors [4].

Bariatric surgery forms part of the optimal solution to obesity and has proven to be the most successful means of treatment for severe obesity and its comorbidities. [5]. Bariatric surgery is a collective term for a group of operations that cause weight loss by specific anatomical changes to the digestive system. These types of surgery include gastric bypass, sleeve gastrectomy, adjustable gastric banding, and biliopancreatic diversion with a duodenal switch, which are the most performed.

Gastric bypass surgery dramatically limits food intake and nutrient absorption by bypassing most of the stomach and duodenum. It accomplishes these goals by creating a tiny pouch at the top of the stomach and connecting it straight to the small intestine. Sleeve gastrectomy, the second common operation in the US, involves resection of 75-90 percent of the stomach, leaving a tubular remnant. Weight loss is encouraged by reducing the stomach's physical capacity and limiting the production of the hunger hormone ghrelin. Finally, with adjustable gastric banding, a small pouch that limits food intake is created via an inflatable band encircling the upper end of the stomach. Other variations, such as biliopancreatic diversion with duodenal switch, include major rearrangement of the intestines and removal of an upper part of the stomach, thereby maximizing nutrient malabsorption.

The acceptance and the use of bariatric surgery in the treatment of obesity patients, though this clinical solution is efficient, depends on the awareness and knowledge of obese patients of these procedures [11]. In this sense, awareness is the ability to identify and accept that bariatric surgery can be used to treat obesity. In knowledge, however, the applicant is expected to provide thorough information about the surgery including the techniques, benefits, and possible dangers. Evidence suggests, that awareness and knowledge of patients strongly influence their decision-making process on treatment options available and their readiness for such interventions [12].

In Saudi Arabia, the level of awareness and knowledge about bariatric surgery among obese individuals is not well-documented. For example, a study showed that the bariatric surgery awareness level was low, and even more, there were misunderstandings of the procedures and expected outcomes of the Saudi citizens [13]. Likewise, a study conducted by Alfadhel et al., also proved that most subjects did not know the risks and benefits of the different techniques of bariatric surgery [14]. Such findings highlight the urgency of developing strategies aimed at educating people on effectiveness as well as possible complications.

The impact of age, sex, income, and education, among other parameters of the population, is strong and influences the level of awareness and comprehension of individuals [15]. Furthermore, there are other factors, including previous healthcare experiences, healthcare provider information, media, and social networks that contribute to patients' knowledge in addition to the barriers identified [16]. The North Region of Saudi Arabia therefore forms an interesting basis on which to conduct an analysis of awareness and understanding regarding bariatric procedures among obese patients.

Its demographic and cultural background includes variations in the healthcare system across regions that might affect patients' attitudes and level of acceptance of bariatric surgery. The current level of awareness and knowledge about this population group is important for assessing gaps in knowledge and educational interventions aimed at overcoming these gaps, thereby improving the latency of acceptance and outcomes of bariatric surgery.

Study Aim

This study evaluated the awareness and knowledge of different bariatric procedures among obese patients in the Northern Border Region of Saudi Arabia.

Methodology

This study was cross-sectional to assess the relevant information and visual comprehension and understanding of different bariatric procedures by obese patients residing within the Northern Border Region of Saudi Arabia. A non-random sampling method was employed for the obese group of 18 years and above residing in the Northern Border Region of Saudi Arabia, BMI ≥ 30.

A questionnaire was given out to the participants, in the form of an online survey. This was developed after a systematic review and consultation of professionals from public health and bariatric surgery. The questionnaire was organized in three elements namely participant demographics, awareness of Bariatric Surgery, and knowledge of Bariatric Procedures. In the knowledge section, twenty items were in multiple-choice questions. One point was awarded for a correct response; all wrong and "don't know" responses were awarded zero. The score ranged from 0 to 20 where the higher the score the greater the degree of knowledge on bariatric surgery concepts. A small focus group of demographically similar obese persons tested the survey for comprehensibility, relevance, and validity. A draft version of the questionnaire was prepared and tested, and then the results were used to modify the questionnaire when actual data collection was to be done.

This also included the use of social networking sites that were able to reach a wide number of people in the Northern Border Region by using the online questionnaire. Further dissemination of the survey link was carried out with the help of collaborations with local healthcare institutions and community centers. At the start of the online questionnaire, an informed consent form was included.

Data Analysis

The statistical software called SPSS version 26.0 was employed to interpret the data. Demographic data on the individuals was summarized using frequencies, percentages, means, and standard deviations. Similar statistical measures were used to elaborate on the awareness and knowledge of bariatric surgery. To examine the association between personal characteristics (including age, gender, and education level) and awareness levels, a t-test and chi-square were applied.

Ethical Approval

The Local Committee of Bioethics (HAP-09-A-043) at Northern Border University approved the study on 02/06/2024 with decision number (77/24/H).

Results

The demographics of the 373 participants are detailed in (Table 1). A considerable proportion of participants aged 36 to 50 years stood at 41.6%, younger cohorts at 37.3%, and elderly at 21.2%. Gender analysis indicated that more men at 51.7% participated in the survey than women who constituted 48.3%. The height data showed that 30.6% of the population categorized themselves as 167 cm or less, while 30.6% weighed between 86 to 95 kg. Less than two-fifths (53.9%) of respondents had attained the first degree higher than the few graduate holders and those without any formal education. Occupationally, the sample comprised of 42.4% employed and 36.2% non-employed individuals, indicative of varying socioeconomic dynamics.

Table 1. Sociodemographic characteristics of participants (n=373).

Parameter		No.	Percent (%)
Age	18 to 35	139	37.3
	36 to 50	155	41.6
	51 or more	79	21.2
Gender	Female	180	48.3
	Male	193	51.7
Height (Mean:172.7, STD:10.9)	167 cm or less	114	30.6
	168 cm to 175	102	27.3
	176 to 185 cm	97	26
Weight (Mean:101.5, STD:27.4)	more than 185 cm	60	16.1
	85 kg or less	82	22
	86 to 95 kg	114	30.6
	96 to 130 kg	98	26.3
	more than 130 kg	79	21.2
Education level	High school	119	31.9
	Bachelor's degree	201	53.9
	Master's degree	44	11.8
	PHD	1	0.3
	Uneducated	8	2.1
Occupational status	Student	68	18.2
	Employed	158	42.4
	Non employed	135	36.2
	Retired	12	3.2

Table 2. Parameters related to awareness and previous healthcare experiences related to obesity and bariatric surgery (n=373).

Parameter		No.	Percent (%)
Have you ever consulted a healthcare provider about obesity?	No	83	22.3
	Yes	290	77.7
Have you ever been recommended or considered for bariatric surgery?	No	158	42.4
	Yes	215	57.6
Have you heard of bariatric surgery as a treatment option for obesity?	No	87	23.3
	Yes	286	76.7
If yes, where did you hear about it? (Select all that apply): * (n=286)	Healthcare providers	26	9.1
	Internet	80	27.9
	Television/Media	126	44.1
	Friends/Family	123	43
	Other	26	9.1

*Results may overlap

(Table 2) shows that a significant majority, comprising 77.7%, have consulted a healthcare provider regarding their obesity, indicating a proactive attitude to addressing this health issue. Remarkably, awareness of bariatric surgery as a treatment option is substantially high, with 76.7% of participants reporting prior knowledge. The primary sources of this information reveal participants mostly rely on interpersonal networks like friends and family (43%), as well as media (44.1%).

(Table 3) depicts the level of knowledge and awareness regarding various bariatric procedures among 373 obese patients. Sleeve gastrectomy and adjustable gastric banding emerged as the most recognized procedures, with 37% and 41.3% awareness levels, respectively. In contrast, only 6.4% of participants reported awareness of the biliopancreatic diversion with duodenal switch, suggesting that it is a far less well-known procedure.

Also, while 90.6% of respondents acknowledged the need to adhere to a special post-operative diet, a large group of participants showed misconceptions about the reversibility of most bariatric surgeries and indication criteria, with 50.1% of those participants assuming that it was an issue of being overweight without health conditions.

Awareness and knowledge of different bariatric procedures amongst the obese patients varied markedly (Table. 4). A majority, 51.5%, were moderately aware, while a minority, 14.5%, were highly aware. In contrast, 34% of the patients had low knowledge of the procedures.

(Table 5) shows that knowledge and awareness level was related significantly to gender, weight, occupational status, whether participants consulted a healthcare provider about obesity, and whether participants considered bariatric surgery before. It shows an insignificant relation to age, height, and educational level.

Discussion

According to estimates from the World Health Organization (WHO), the rates of overweight and obesity in the population of Saudi Arabia are 68.2% and 33.7%, respectively. Similarly, studies undertaken in 2014 in the Arab region indicated that 25-40% of the children and 66-75% of the adults were overweight or obese [17]. The high percentage of obesity among Saudi individuals would indicate that whatever preventive measures have been adopted are either inadequate or ineffective [18]. Management of obesity typically involves pharmacologic therapies, which primarily serve to alleviate symptoms rather than provide a cure. Other options include surgery, where bariatric surgery is considered the most effective and durable therapy. The three most common bariatric surgeries are the Roux-en-Y gastric bypass, sleeve gastrectomy, and adjustable gastric banding. The findings of our study on knowledge and awareness of bariatric procedures among obese patients revealed that obese patients indeed had a high level of awareness; 76.7% knew bariatric surgery was among the lines of treatment.

This starkly contrasts with the findings of Alqahtani et al., in which only 22.7% of participants were informed about such solutions in eastern Saudi Arabia, indicating a major difference in awareness between populations. In this respect, a similar study by Shoog F. Alfadhel et al. reported that as many as 22.7% of

Table 3. participants' knowledge and awareness about different bariatric procedures among obese patients (n=373).

Parameter		No.	Percent (%)
Which of the following are types of bariatric surgery? (Select all that apply): *	Gastric bypass	43	11.5
	Sleeve gastrectomy	138	37
	Adjustable gastric banding	154	41.3
	Liposuction	115	30.8
	Biliopancreatic diversion with duodenal switch	24	6.4
Gastric bypass surgery involves:	Removing a part of the stomach	43	11.5
	Creating a small pouch at the top of the stomach and connecting it directly to the small intestine	176	47.2
	Placing an inflatable band around the upper part of the stomach	146	39.1
	Removing the entire stomach	8	2.1
The primary mechanism of sleeve gastrectomy is:	Reducing the stomach size by removing approximately 80% of it	92	24.7
	Placing a band around the stomach	141	37.8
	Rerouting the intestines	128	34.3
	Increasing the size of the stomach	12	3.2
Adjustable gastric banding works by:	Removing a portion of the stomach	33	8.8
	Placing an inflatable band around the upper part of the stomach to create a small pouch	176	47.2
	Connecting the stomach directly to the small intestine	150	40.2
	Removing the small intestine	14	3.8
Biliopancreatic diversion with duodenal switch is best described as:	Placing a band around the stomach	48	12.9
	Creating a small pouch and rerouting the intestines	202	54.2
	Removing a part of the stomach and rerouting the intestines	114	30.6
	Increasing the stomach size	9	2.4
The main benefit of bariatric surgery is:	Cosmetic improvement	29	7.8
	Significant weight loss and improvement in obesity-related conditions	186	49.9
	Temporary weight loss	134	35.9
	No improvement in health conditions	24	6.4
Which of the following is a potential risk of bariatric surgery? (Select all that apply): *	Infection	86	23
	Nutrient deficiencies	179	48
	Increased appetite	148	39.7
	Gallstones	41	11
Eligibility criteria for bariatric surgery typically include:	Being underweight	11	2.9
	Having a BMI of 30 or greater with obesity-related health conditions	160	42.9
	Being overweight without health issues	187	50.1
	Being pregnant	15	4
How long is the typical recovery period after bariatric surgery?	1-2 days	18	4.8
	1-2 weeks	142	38.1
	1-2 months	182	48.8
	1 year	31	8.3
After bariatric surgery, patients must follow a special diet.	FALSE	35	9.4
	TRUE	338	90.6
Bariatric surgery can cure obesity-related diseases such as diabetes.	FALSE	65	17.4
	TRUE	308	82.6
Most bariatric procedures are reversible.	FALSE	108	29
	TRUE	265	71
Regular follow-up with healthcare providers is necessary after bariatric surgery.	FALSE	37	9.9
	TRUE	336	90.1

*Results may overlap

participants were unaware of bariatric surgery and 50% did not understand the appropriate indications for these procedures. By contrast, ours would tend to indicate that most respondents are not only knowledgeable of the existence of bariatric surgeries but also deem postoperative dietary concerns relevant. What is more, whereas 14.5% of all subjects in our study had a high level of knowledge, Gowanlock et al. [22] established that 41% and 64.8% of subjects knew the indications and complications of bariatric surgery, respectively. That means comprehensive awareness exists, but the specific knowledge about indications and complications may be deficient in our cohort. Also, the study of Abdullah A. Alamri et al. confirms the variability of awareness as only 64% were aware of the acute complications of bariatric surgeries compared to the misconceptions given by our participants about the eligibility and reversibility of the surgeries being 50.1% and 14.5%, respectively. Thus, while our findings indicate that the level of general awareness is higher compared to previously related works, the difference in knowledge about the details of bariatric surgeries suggests a continued need for educational interventions among people and health professionals to close the gap in knowledge related to bariatric care. Knowledge level comparisons revealed that only 14.5%

Table 4. Shows knowledge and awareness about different bariatric procedures among obese patients score results.

	Frequency	Percent
High level of knowledge and awareness	54	14.5
Moderate knowledge and awareness level	192	51.5
low knowledge and awareness level	127	34
Total	373	100

Table 5. Relationship between knowledge and awareness level, and sociodemographic characteristics.

Parameters		Knowledge and awareness level	low level	Total (N=373)	P value*
		High or moderate			
Gender	Female	106	74	180	0.005
		43.10%	58.30%	48.30%	
	Male	140	53	193	
		56.90%	41.70%	51.70%	
Age	18 to 35	95	44	139	0.258
		38.60%	34.60%	37.30%	
	36 to 50	95	60	155	
		38.60%	47.20%	41.60%	
	51 or more	56	23	79	
		22.80%	18.10%	21.20%	
Height	167 cm or less	74	40	114	0.174
		30.10%	31.50%	30.60%	
	168 cm to 175	60	42	102	
		24.40%	33.10%	27.30%	
	176 to 185 cm	67	30	97	
		27.20%	23.60%	26.00%	
	more than 185 cm	45	15	60	
		18.30%	11.80%	16.10%	
Weight	85 kg or less	51	31	82	0.0001
		20.70%	24.40%	22.00%	
	86 to 95 kg	59	55	114	
		24.00%	43.30%	30.60%	
	96 to 130 kg	77	21	98	
		31.30%	16.50%	26.30%	
	more than 130 kg	59	20	79	
		24.00%	15.70%	21.20%	
Education level	High school	69	50	119	0.057
		28.00%	39.40%	31.90%	
	Bachelor's degree	145	56	201	
		58.90%	44.10%	53.90%	
	Master's degree	27	17	44	
		11.00%	13.40%	11.80%	
	PHD	0	1	1	
		0.00%	0.80%	0.30%	
	Uneducated	5	3	8	
		2.00%	2.40%	2.10%	
Occupational status	Student	47	21	68	0.034
		19.10%	16.50%	18.20%	
	Employed	115	43	158	
		46.70%	33.90%	42.40%	
	Unemployed	77	58	135	
		31.30%	45.70%	36.20%	
	Retired	7	5	12	
		2.80%	3.90%	3.20%	
Have you ever consulted a healthcare provider about obesity?	No	47	36	83	0.042
		19.10%	28.30%	22.30%	
	Yes	199	91	290	
		80.90%	71.70%	77.70%	
Have you ever been recommended or considered for bariatric surgery?	No	82	76	158	0.0001
		33.30%	59.80%	42.40%	
	Yes	164	51	215	
		66.70%	40.20%	57.60%	

*P value was considered significant if ≤ 0.05.

possessed a high level of knowledge about the procedures behind bariatric surgery, while 34% had low knowledge.

On the other hand, research conducted by Bilal S Al-Mushaigah et.al, [24] highlights that out of the intention to undergo surgery, 43% were worried about societal attitudes and community treatment. Thus, the role of stigma in considerably impeding not only awareness but also decision-making in the candidate group considering surgery is important to note. Both studies also report that sources of information about bariatric procedures are mainly acquired from media and personal networks, which once more could present opportunities for public health campaigns to enhance educational efforts.

Regarding the relation between knowledge and the awareness level with sociodemographic characteristics, we have found that there is a statistically significant relation in gender, weight, occupational status, whether participants consulted with a healthcare provider regarding obesity, and whether participants considered bariatric surgery before. It also insignificantly shows statistical relations to age, height, and educational level. On the contrary, Aly et al., in their previous study on demographic and quality of life factors affecting patients' intent to consider bariatric surgery, reported that 40% more women considered weight loss surgery than men (22%) [25]. In addition, another study [26] demonstrated that the participants who held bachelor's degrees and were between the ages of 18 to 25 and had residences in either the Northern or Southern regions of Saudi Arabia had a high level of knowledge on indications of sleeve gastrectomy with $P < 0.05$, in contrast to the research by Alolayan on gender and educational attainment [27].

Conclusion

The current study depicts the critical yet uneven landscape of awareness and knowledge about bariatric surgery among obese patients in the Northern Border Region of Saudi Arabia. This means that while most participants identified the correct treatment method, there were still several incorrect assumptions about eligibility and the reversibility of the procedure. Although awareness is on the increase, the findings indicate a dire need for targeted educational interventions that could bridge knowledge gaps, especially concerning the type of bariatric procedures and the respective risks and benefits associated with them. Increasing knowledge through comprehensive campaigns in public health may eventually enable patients to make informed decisions on the choice of treatment, thus realizing better health outcomes in this obese epidemic-prone region.

Acknowledgements

The authors extends thefir apprecfiatfion to the Deanshfip of Scfientfific Research at Northern Border University, Arar, Saudi Arabia for funding this research work through the project number “NBU-FFR-2024-1510-01”.

Conflict of interest

Nil

References

1. World Health Organization. Obesity and overweight. 2021. Available from: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight
2. Guh DP, Zhang W, Bansback N, Amarsi Z, Birmingham CL, Anis AH. The incidence of co-morbidities related to obesity and overweight: a systematic review and meta-analysis. BMC Public Health. 2009; 9:88. https://doi.org/10.1186/1471-2458-9-88
3. Al-Nozha MM, Al-Mazrou YY, Al-Maatouq MA, Arafah MR, Khalil MZ, Khan NB, et al. Obesity in Saudi Arabia. Saudi Med J. 2005;26(5):824-9. PMID: 15951877.
4. Alqarni SSM. A review of prevalence of obesity in Saudi Arabia. J Obes Eat Disord. 2016 ;2(2):1-6. DOI10.21767/2471-8203.100025
5. Chang SH, Stoll CR, Song J, Varela JE, Eagon CJ, Colditz GA. The effectiveness and risks of bariatric surgery: an updated systematic review and meta-analysis, 2003-2012. JAMA surgery. 2014 Mar 1;149(3):275-87. doi: 10.1001/jamasurg.2013.3654.
6. Buchwald H, Estok R, Fahrbach K, Banel D, Jensen MD, Pories WJ, Bantle JP, Sledge I. Weight and type 2 diabetes after bariatric surgery: systematic review and meta-analysis. The American journal of medicine. 2009 Mar 1;122(3):248-56. https://doi.org/10.1016/j.amjmed.2008.09.041
7. Nguyen NT, Varela JE. Bariatric surgery for obesity and metabolic disorders: state of the art. Nature reviews Gastroenterology & hepatology. 2017 Mar;14(3):160-9. doi: 10.1038/nrgastro.2016.170.
8. Brethauer SA. Sleeve gastrectomy. Surgical Clinics. 2011 Dec 1;91(6):1265-79. https://doi.org/10.1016/j.suc.2011.08.012
9. O'brien PE, McPhail T, Chaston TB, Dixon JB. Systematic review of medium-term weight loss after bariatric operations. Obesity surgery. 2006 Aug;16(8):1032-40. https://doi.org/10.1381/096089206778026316
10. Hess DS, Hess DW. Biliopancreatic diversion with a duodenal switch. Obesity surgery. 1998 Jun;8(3):267-82.
11. Stolberg CR, Hepp N, Juhl AJ, Deepti BC, Juhl CB. Primary care physician decision making regarding referral for bariatric surgery: a national survey. Surgery for Obesity and Related Diseases. 2017 May 1;13(5):807-13. doi: 10.1016/j.soard.2017.02.002
12. Wee CC, Mukamal KJ, Huskey KW, Davis RB, Colten ME, Bolcic-Jankovic D, Apovian CM, Jones DB, Blackburn GL. High-risk alcohol use after weight loss surgery. Surgery for obesity and related diseases. 2014 May 1;10(3):508-13. https://doi.org/10.1016%2Fj.soard.2013.12.014
13. Aldawqi TA, Aseri AY, Albariqi AA. Assessment of knowledge, attitude and practice of safety, effectiveness and consequences of bariatric surgery among community in Riyadh city. The Egyptian Journal of Hospital Medicine. 2018 Jan 1;70(9):1484-93.
14. Alfadhel SF, Almutairi HS, Al Darwish TH, Almanea LT, Aldosary RA, Shook AH. Knowledge, attitude, and practice of bariatric surgery among adult Saudi community, Saudi Arabia, 2019. J Family Med Prim Care. 2020 Jun 1;9(6):3048-52. doi: 10.4103/jfmpc.jfmpc_953_19.
15. Santry HP, Lauderdale DS, Cagney KA, Rathouz PJ, Alverdy JC, Chin MH. Predictors of patient selection in bariatric surgery. Annals of surgery. 2007 Jan 1;245(1):59-67. https://doi.org/10.1097%2F01.sla.0000232551.55712.b3
16. Thomas H, Agrawal S. Systematic review of obesity surgery mortality risk score—preoperative risk stratification in bariatric surgery. Obesity surgery. 2012 Jul;22:1135-40. doi: 10.1007/s11695-012-0663-7.
17. Salem V, AlHusseini N, Abdul Razack HI, Naoum A, Sims OT, Alqahtani SA. Prevalence, risk factors, and interventions for obesity in Saudi Arabia: a systematic review. Obes Rev. 2022; 23(7): e13448. doi: 10.1111/obr.13448.
18. Al-Ghamdi S, Shubair MM, Aldiab A, Zahrani JM, Aldossari KK, Househ M, et al. Prevalence of overweight and obesity based on the body mass index; a cross-sectional study in Alkharj, Saudi Arabia. Lipids Health Dis. 2018; 17:134. doi: 10.1186/s12944-018-0778-5.
19. Rahim HF, Sibai A, Khader Y, Hawalla N, Fadhi I, Alsiyabi H, etal. Non-communicable diseases in the Arab world. Lancet. 2014; 383:356–67. doi: 10.1016/S0140-6736(13)62383-1.
20. Alqahtani N, Alkhudairi SS, Aljahli MS, Alshammari IB, Almansour BT, Alshayeb SN. J Family Med Prim Care. 2019; 8:3678–3682. https://doi.org/10.4103%2Fjfmpc.jfmpc_700_19.
21. Alfadhel, SF, Almutairi HSS, Darwish TH, Almanea LT, Aldosary RA, Shook AH. “Knowledge, attitude, and practice of bariatric surgery among adult Saudi community, Saudi Arabia, 2019.” Journal of family medicine and primary care vol. 9,6 3048-3052. 30 Jun. 2020, doi: 10.4103/jfmpc.jfmpc_953_19
22. Gowanlock Z, Lezhanska A, Conroy M, Crowther M, Tiboni M, Mbuagbaw L, Siegal DM. Iron deficiency following bariatric surgery: a retrospective cohort study. Blood Adv. 2020; 4:3639-3647. doi: 10.1182/bloodadvances.2020001880.
23. Alamri AA, Alsadiqi AI, Dahlawi A, Alghamdi A, Alnefaie M, Alhazmi M, Tewfik O, Almaymuni A, Al-Abbadi H, ¿Mosli M. Are patients aware of potential risks of weight reduction surgery? An internet based survey. Saudi J Gastroenterol. 2019 Mar-Apr;25(2):97-100. doi: 10.4103/sjg.SJG_232_18.
24. Al-Mushaigah BS, Almesned RA, Alsolai OA, Alfahhad NM, Almesned AA. Knowledge and Attitude of the Public Toward Bariatric Weight Loss Surgery and Its Impact on Candidates and Patients in the Al-Qassim Region, Saudi Arabia. Cureus. 2023 Dec 13;15(12):e50477. doi: 10.7759/cureus.50477.
25. Aly S, Hachey K, Pernar LIM. Gender disparities in weight loss surgery. Mini-invasive Surg. 2020;4:21. http://dx.doi.org/10.20517/2574-1225.2019.57
26. Taha M, Alharbi AM, Al-Zahrani SS, Alzamzami HH, Alotaibi BA, Alhariry AA, Bahakeem RF. Awareness of Bariatric Sleeve Gastrectomy Complications Among the General Population of Saudi Arabian Regions. Cureus. 2024 Jan 12;16(1):e52187. doi: 10.7759/cureus.52187.
27. Alolayan H, Aldubayyan A, Aldhohayan A, et al. General public awareness about the indications and complications of sleeve gastrectomy in Qassim Region, Saudi Arabia. International Journal of Advances in Medicine. 2021; 9:1517–21. https://doi.org/10.18203/2349-3933.ijam20213671