

PREVALENCE OF DEPRESSION AMONG PATIENTS UNDERGOING BARIATRIC SURGERY IN SAUDI ARABIA

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ABSTRACT

Following bariatric surgery, there is a crucial period, as depression can develop during this period. We aim in this study to assess the prevalence of depression and its contributing factors following bariatric surgery among adults in all regions of Saudi Arabia. This study aims to establish prevalence of depression among patients undergoing bariatric surgery in Saudi Arabia. A cross-sectional study included male and female adult patients that had bariatric surgery in Saudi Arabia. Using an online questionnaire regarding patients' sociodemographic data, medical information, and evaluation of depression after a bariatric procedure using PHQ-9. The study included 408 participants. The age group with the highest percentage is 19-30, accounting for 47.8% of the total. Females make up the majority of the respondents. Prior to the surgery, the majority of individuals fell into the higher BMI categories, with a higher number of individuals having a BMI above 40. In conclusion, the prevalence of depression among patients undergoing bariatric surgery is a crucial area of study. Age, marital status, gender, and educational level may be important factors to consider when assessing an individual's risk for depression. However, further research is needed to explore the underlying mechanisms behind these associations and to determine the potential implications for prevention and treatment strategies.

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Introduction

Obesity is a global pandemic affecting over 1.9 billion adults who were classified as overweight (39%), and over 650 million who were obese (13%) in 2016 [1]. According to statistics, 33% of individuals in Saudi Arabia are obese, and 10% are classified as morbidly obese body mass index (BMI) of 40 kg/m² or greater [2]. Individuals who are qualified for bariatric surgery should have a (BMI) of 40 kg/m² or 35 kg/m² with concomitant disease, such as diabetes [3]. Some of the bariatric surgical methods include a laparoscopic gastric sleeve, Roux-en-Y gastric bypass (RYG), gastric band, and biliopancreatic diversion with a duodenal switch [4].

The most common method, sleeve gastrectomy (SG), contributed to 47% of all obesity-related operations carried out globally in 2019 [5]. Its advantageous outcomes involve improving the management of diabetes or possibly remission, lowering the

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likelihood of cardiovascular disease, improving the general quality of life, and significantly lowering the total mortality rate [6].

As the major effect of a bariatric operation, surgeons tend to concentrate on reducing body mass even though surgery effectiveness not exclusively relies on losing weight but also on the state of one's psychological well-being [7]. However, A Saudi Arabian study revealed a prevalence of depression following bariatric surgery of 31.3% in 2019. This frequency is thought to be higher than that of the overall population in Saudi Arabia as the prevalence of depression among adults in the general population is substantially lower (5.4%) [8].

A cohort study in 2018, found that obese patients who had bariatric surgery had a 1.50-fold higher chance of developing MDD than obese controls. Additionally, it was discovered that, compared to controls, the incidence of MDD increased 4 years following surgery [9].

Studies have been published in the Endocrinology, Diabetes, and Metabolism Journal. According to Milad Kheirvari *et al.*, out of 307 SG patients, 30.4% had acquired depression [10].

In 2022, research conducted on the Prevalence of Depression in BS Patients showed that among 367 BS patients, 4.4% of them had severe depression. Followed by moderate depression in 11.2% and mild depression in 29.4% and 46.9% of them had minimal depression [11].

With advances in knowledge, there is a greater awareness of the psychological issues and alterations brought on by being obese and undergoing bariatric surgeries [12]. Anxiety, depression, eating disorders, body dissatisfaction, substance use disorders, and suicidal ideation are all instances of mental health illnesses that have arisen because of bariatric surgery. Consequently, there is now a distinct specialty called bariatric psychiatry [13]. In addition, depression contributes considerably to the economic burden of illness around the world. Severe depression is also linked to higher fatality as it can lead to stroke and cardiovascular disease [14].

Recent studies in Saudi Arabia focused on a particular area or a small group of individuals. In this study, we aim to determine the prevalence of depression after a bariatric procedure and to assess its impact on patients' lives, to offer adequate psychological follow-up after weight reduction operations and establish the standards of care across all of Saudi Arabia.

Materials and Methods

Study Design

A Cross-sectional study consisted of patients who had bariatric surgery between January 2017 and December 2022 in Saudi Arabia. Only those who received the questionnaire were recruited.

Inclusion and Exclusion Criteria

Adult males and females who have undergone any type of bariatric surgery and are 18 years old or older, from all social classes, and who agreed to participate in our study in Saudi Arabia were included.

Patients younger than 18 and those with a history of depression or who were being treated with antidepressant medications before the surgery were excluded.

Sample Size

The Raosoft calculator was used to estimate the sample size, with a 95% level of confidence and a 5% margin of error, therefore the minimum sample size was 384.

The sample size was calculated with a 95% confidence level using the following formula: $n = P(1-P) * Z^2 / d^2$. Thus, the minimum sample size was determined to be: $n = (1.96)^2 * 0.50 * 0.50 / (0.05)^2 = 384$.

Method for Data Collection and Instrument (Data Collection Technique and Tools)

A self-administered online questionnaire was constructed and distributed to random patients in Saudi Arabia. The questionnaire included sections regarding the patient's sociodemographic data and medical information related to the patient such as their BMI before and after the surgery, when the surgery was done, type of the surgery, if they had any postoperative complications, and if the patient has a family history of mental illness. As well as questions about depression after a bariatric procedure using PHQ-9.

Scoring System

Add up all checked boxes on PHQ-9: For every ✓ Not at all = 0; Several days = 1; More than half the days = 2; Nearly every day = 3. **Table 1** illustrates the total score and depression Severity.

Table 1. Interpretation of Total Score

Total score	Depression Severity
1-4	Minimal depression
5-9	Mild depression
10-14	Moderate depression

15-19	Moderately severe depression
20-27	Severe depression

Analyzes and Entry Method

The data was entered and analyzed using the Statistical Package for the Social Sciences (SPSS) version 20. A simple frequency was done for all univariate variables. Across tabulation was done for bivariate variables. The association between variables was measured using Chi-square. A p-value of < 0.05 was considered significant.

Results and Discussion

The data provided in **Table 2** shows the distribution of respondents based on different parameters. The study included 408 participants. The age group with the highest percentage is 19-30, accounting for 47.8% of the total. Females make up the majority of the respondents, with 61.8% being female and 38.2% being male. In terms of marital status, the highest percentage is married individuals at 56.1%, followed by singles at 37.0%. The majority of respondents are from the Riyadh region, accounting for 30.9%, followed by the Eastern Province at 32.1%. In terms of educational level, the highest percentage is bachelor's degree holders at 51.5%. The majority of respondents have a monthly family income between 5000-10,000 Saudi riyals, accounting for 33.1%.

Table 2. Sociodemographic characteristics of participants (n=408)

	Parameter	No.	%
Age	19 - 30	195	47.8
	31 - 40	123	30.1
	41 - 50	69	16.9
	51 - 60	21	5.1
Gender	male	156	38.2
	female	252	61.8
Marital status	Single	151	37.0
	Married	229	56.1
	Divorced	18	4.4
	widow	10	2.5
Region	Makkah Region	60	14.7
	Riyadh region	126	30.9
	Eastern Province	131	32.1
	Asir region	19	4.7
	Jazan region	8	2.0
	Medina region	40	9.8
	Qassim region	6	1.5
	Tabuk region	3	.7
	Hail region	5	1.2
	Najran region	1	.2
	Al Bahah region	5	1.2
Educational level	Northern border region	4	1.0
	High school level or less	108	26.5
	Diploma degree	64	15.7
	Bachelor's degree	210	51.5
Monthly family income in Saudi riyals	Master's and doctoral degrees	26	6.4
	Less than 5000 riyals	94	23.0
	5000—10,000 Saudi riyals	135	33.1
	10,000-20,000 Saudi riyals	117	28.7
	Higher than 20,000 Saudi riyals	62	15.2

When it comes to diagnosed mental illnesses, **Figure 1** shows that 7.8% reported having an anxiety disorder, 2.0% had obsessive-compulsive disorder, 1.0% had schizophrenia, 4.4% experienced panic attacks and social phobia, 1.2% had personality disorders, and 2.7% had other mental illnesses. The majority (80.9%) had not been diagnosed with any mental illness.

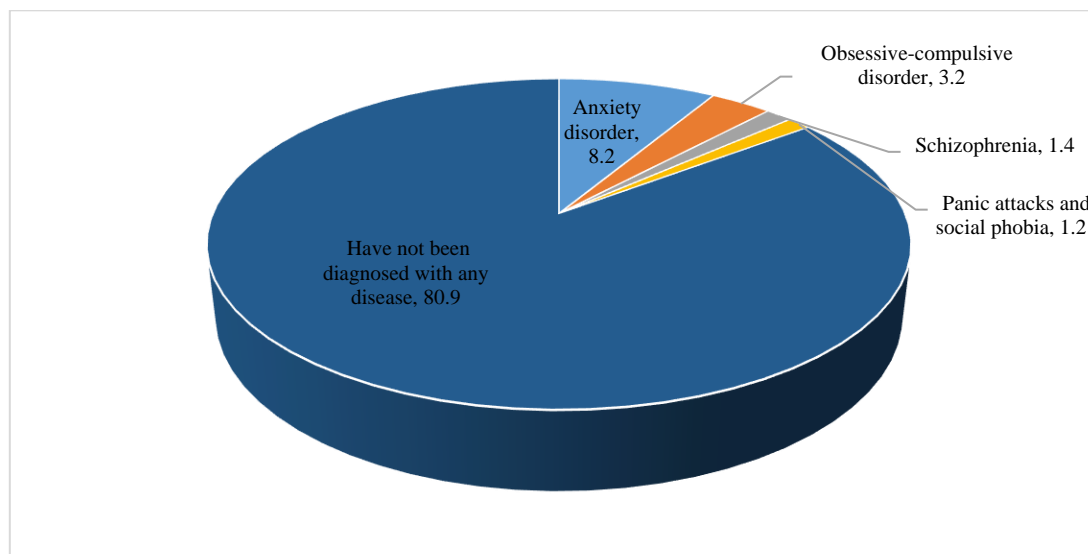


Figure 1. Prevalence of mental illness among study participants before bariatric surgery (n= 408)

The data provided in **Table 3** represents various parameters related to chronic diseases, BMI before and after bariatric surgery, type of bariatric surgery, time since surgery, obesity-related surgical problems/complications, diagnosed mental illnesses, close family members with mental illnesses, and satisfaction with current weight.

In terms of chronic diseases, cardiovascular diseases accounted for 4.90%, followed by diabetes (12.01%), hypothyroidism (8.09%), hypertension (11.52%), high cholesterol (10.54%), asthma and respiratory diseases (9.56%), and other diseases such as chronic kidney disease, joint disease, lupus, psoriasis, ruptured disc, urticaria, and vitamin deficiencies (9.31%). Rheumatoid disease was reported by 1.47% of respondents, while the majority (56.86%) did not have any chronic diseases.

Prior to the surgery, the majority of individuals fell into the higher BMI categories, with a higher number of individuals having a BMI above 40. However, after the surgery, there is a notable decrease in the number of individuals with a BMI above 40, indicating the effectiveness of the surgery in reducing weight. The data also reveals that individuals with a BMI between 30-35 and 35-40 had the highest number of participants before the surgery, with 60 and 100 individuals respectively. However, after the surgery, the number of individuals in these BMI ranges decreased to 80 and 50 respectively, further illustrating the positive impact of the surgery.

The majority of respondents (77.0%) underwent gastric sleeve surgery, followed by gastric banding (11.0%), gastric bypass (10.0%), and duodenal switch (2.0%). In terms of time since bariatric surgery, 20.3% had undergone surgery less than 6 months ago, 19.4% had surgery between 6 months and 1 year ago, 30.1% had surgery 2-3 years ago, 13.7% had surgery 3-4 years ago, and 16.4% had surgery more than 4 years ago. 21.8% of respondents reported experiencing obesity-related surgical problems or complications, while the majority (78.2%) did not.

10.8% of respondents reported having close family members with mental illnesses. Among those with family members diagnosed with mental illnesses, the most common diagnoses were anxiety disorder (7.11%), obsessive-compulsive disorder (2.94%), schizophrenia (2.70%), panic attacks and social phobia (1.96%), personality disorders (1.72%), and other mental illnesses (8.58%). In terms of satisfaction with current weight, 8.8% reported being very unsatisfied, 12.0% were unsatisfied, 31.6% were neutral, 21.8% were satisfied, and 25.7% were very satisfied.

Table 3. Prevalence of chronic diseases, BMI changes after bariatric surgery, types of surgeries performed, post-surgery complications, mental health diagnoses, and satisfaction with weight among the respondents. (n=408)

	Parameter	No.	%
Chronic diseases	Cardiovascular diseases	20	4.90
	diabetic	49	12.01
	Hypothyroidism	33	8.09
	Hypertension	47	11.52
	High cholesterol	43	10.54
	Asthma and respiratory diseases	39	9.56

	Others (chronic kidney disease, joint disease, lupus, psoriasis, ruptured disc, urticaria, and vitamin deficiencies)	38	9.31
	Rheumatoid disease	6	1.47
	I don't have any	232	56.86
BMI before bariatric surgery	less than 20	26	6.4
	20- 25	28	6.9
	25- 30	32	7.8
	30- 35	60	14.7
	35- 40	100	24.5
	above 40	162	39.7
BMI after bariatric surgery	less than 20	61	15.0
	20- 25	120	29.4
	25- 30	80	19.6
	30- 35	80	19.6
	35- 40	50	12.3
	above 40	17	4.2
Type of bariatric surgery	Gastric banding	45	11.0
	Gastric bypass	41	10.0
	Gastric sleeve	314	77.0
	Duodenal switch	8	2.0
Time since bariatric surgery	Less than 6 months	83	20.3
	6 months - 1 year	79	19.4
	2-3 years	123	30.1
	3-4 years	56	13.7
	Above 4 years	67	16.4
Experienced any obesity-related surgical problems/complications	Yes	89	21.8
	no	319	78.2
Diagnosed with any of these mental illnesses	Anxiety disorder	32	7.8
	Obsessive-compulsive disorder	8	2.0
	Schizophrenia	4	1.0
	Panic attacks and social phobia	18	4.4
	Personality disorders	5	1.2
	Other mental illnesses	11	2.7
	Have not been diagnosed with any disease	330	80.9
Close family members/members who have been diagnosed with a mental illness	Yes	44	10.8
	no	364	89.2
If yes, What are their psychiatric diagnoses?	Anxiety disorder	29	7.11
	Obsessive-compulsive disorder	12	2.94
	Schizophrenia	11	2.70
	Panic attacks and social phobia	8	1.96
	Personality disorders	7	1.72
	Other mental illnesses	35	8.58
Satisfaction with current weight	Very unsatisfied	36	8.8
	Unsatisfied	49	12.0
	Neutral	129	31.6
	Satisfied	89	21.8
	Very satisfied	105	25.7

According to **Table 4**, the symptom of feeling frustrated, depressed, or hopeless was reported by 211 individuals. This accounted for 51.7% of the respondents who experienced this symptom almost every day, 30.9% who experienced it more than half the days, and 9.3% who experienced it several days.

Another symptom highlighted in the data was difficulty falling asleep, staying asleep, or sleeping too much. This symptom was reported by 180 individuals, with 44.1% experiencing it almost every day, 33.6% experiencing it more than half the day, and 12.5% experiencing it several days. Feeling tired or lacking energy was reported by 110 individuals, representing 27.0% of those who experienced this symptom almost every day, 40.9% who experienced it more than half the days, and 19.4% who experienced it several days. The symptom of poor appetite or overeating was reported by 127 individuals, with 31.1% experiencing it almost every day, 36.0% experiencing it more than half the days, and 21.3% experiencing it several days.

Feeling bad about oneself, like a failure, or letting oneself or one's family down, was reported by 266 individuals. This accounted for 65.2% of those who experienced this symptom almost every day, 17.4% who experienced it more than half the days, and 10.3% who experienced it several days. Difficulty concentrating on things, such as reading newspapers or watching television, was reported by 236 individuals, with 57.8% experiencing it almost every day, 24.5% experiencing it more than half the days, and 11.8% experiencing it several days.

Changes in movement or speech were reported by 282 individuals. This accounted for 69.1% of those who experienced this symptom almost every day, 20.8% who experienced it more than half the days, and 6.4% who experienced it several days. Thoughts of self-harm or suicide were reported by 302 individuals, representing 74.0% of those who experienced these thoughts almost every day, 15.4% who experienced them more than half the days, and 6.9% who experienced them several days.

Finally, when asked about the impact of these symptoms on daily functioning, 267 individuals reported difficulty in performing their jobs, taking care of things at home, or getting along with other people. This accounted for 65.4% of those who found these symptoms to be very difficult, 21.8% who found them to be somewhat difficult, and 7.4% who found them to be a little difficult.

Table 4. Prevalence and impact of depression symptoms on participants' lives (n=408)

	Not at all	Several days	More than half the days	almost everyday
Lack of interest or pleasure in doing things	174 42.6%	141 34.6%	57 14.0%	36 8.8%
Feeling frustrated, depressed, or hopeless	211 51.7%	126 30.9%	38 9.3%	33 8.1%
Difficulty falling asleep, staying asleep, or sleeping too much	180 44.1%	137 33.6%	51 12.5%	40 9.8%
Feeling tired or lacking energy	110 27.0%	167 40.9%	79 19.4%	52 12.7%
Poor appetite or overeating	127 31.1%	147 36.0%	87 21.3%	47 11.5%
Feeling bad about yourself, like a failure, or letting yourself or your family down	266 65.2%	71 17.4%	42 10.3%	29 7.1%
Difficulty concentrating on things, such as reading newspapers or watching television	236 57.8%	100 24.5%	48 11.8%	24 5.9%
Moving or speaking so slowly that others notice. Or the opposite - being so moody or agitated that was moving more than usual	282 69.1%	85 20.8%	26 6.4%	15 3.7%
Thoughts that you would be better off dead, or hurt yourself	302 74.0%	63 15.4%	28 6.9%	15 3.7%
If you examine any of the problems, how difficult are they for you to do your job, take care of things at home, or get along with other people	267 65.4%	89 21.8%	30 7.4%	22 5.4%

According to **Figure 2**, out of the total number of individuals assessed, 42.2% scored in the minimal depression range, indicating that they are experiencing very few or no depressive symptoms. The second largest group, at 26.5%, fall under the category of mild depression. The data further reveals that 15.2% of the individuals assessed scored in the moderate depression range.

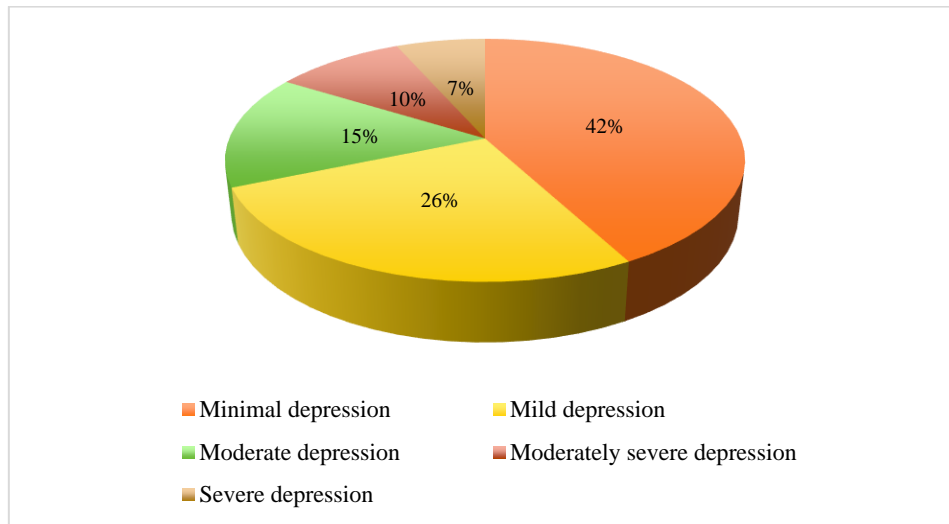


Figure 2. Depression score among participants according to PHQ-9 (n= 408)

Table 5 indicates that there is a significant association between certain demographic factors and depression scores. Age, marital status, gender, educational level, and family income were all found to have a statistically significant relationship with depression scores. Regarding age, the data shows that individuals between the ages of 19-30 had the highest prevalence of depression, with 47.8% of this age group falling into the category of severe depression. On the other hand, individuals between the ages of 51-60 had the lowest prevalence of depression, with only 5.1% falling into the severe depression category. However, the p-value of 0.135 suggests that the relationship between age and depression scores is not statistically significant. Marital status also showed a significant association with depression scores. Individuals who were married had the highest prevalence of depression, with 56.1% falling into the severe depression category. On the other hand, widowed individuals had the lowest prevalence of depression, with only 2.5% falling into the severe depression category. The p-value of 0.003 indicates that the relationship between marital status and depression scores is statistically significant. Gender was another factor that showed a significant association with depression scores. Females had a higher prevalence of depression compared to males, with 61.8% falling into the severe depression category. In contrast, only 38.2% of males fell into the severe depression category. The p-value of 0.008 suggests that the relationship between gender and depression scores is statistically significant. Educational level did not show a significant association with depression scores, as indicated by the p-value of 0.986. However, it is worth noting that individuals with a bachelor's degree had the highest prevalence of depression, with 51.5% falling into the severe depression category. Lastly, family income did not show a significant association with depression scores, as indicated by the p-value of 0.528. However, individuals with a family income of less than 5000 SAR had the highest prevalence of depression, with 23% falling into the severe depression category.

Table 5. Association between sociodemographic characteristics of participants with their depression scores (n=408)

	Depression scores					Total (N=408)	P value	
	Mild depression	Minimal depression	Moderate depression	Moderately severe depression	Severe depression			
Age	19 - 30	53	70	38	21	13	0.135	
		13.0%	17.2%	9.3%	5.1%	3.2%		47.8%
	31- 40	28	56	17	12	10		123
		6.9%	13.7%	4.2%	2.9%	2.5%		30.1%
	41- 50	24	34	5	3	3		69
	5.9%	8.3%	1.2%	0.7%	0.7%	16.9%		
	51- 60	3	12	2	3	1	21	
		0.7%	2.9%	0.5%	0.7%	0.2%	5.1%	
Marital status	Single	35	56	33	16	11	151	0.003
		8.6%	13.7%	8.1%	3.9%	2.7%	37.0%	
	Married	60	110	29	18	12	229	
		14.7%	27.0%	7.1%	4.4%	2.9%	56.1%	
	Divorced	7	5	0	4	2	18	
	1.7%	1.2%	0.0%	1.0%	0.5%	4.4%		
	widow	6	1	0	1	2	10	

		1.5%	0.2%	0.0%	0.2%	0.5%	2.5%		
Gender	Male	37	83	18	10	8	156	0.008	
		9.1%	20.3%	4.4%	2.5%	2.0%	38.2%		
	Female	71	89	44	29	19	252		
		17.4%	21.8%	10.8%	7.1%	4.7%	61.8%		
Educational level	Secondary	29	44	16	12	7	108	0.986	
		7.1%	10.8%	3.9%	2.9%	1.7%	26.5%		
	Diploma	18	26	12	6	2	64		
		4.4%	6.4%	2.9%	1.5%	0.5%	15.7%		
	Bachelor	56	90	29	19	16	210		
		13.7%	22.1%	7.1%	4.7%	3.9%	51.5%		
Master or more	5	12	5	2	2	26			
Family income	Less than 5000 SAR	23	31	21	12	7	94	0.528	
		5.6%	7.6%	5.1%	2.9%	1.7%	23.0%		
	5000—10,000 SAR	37	55	21	12	10	135		
		9.1%	13.5%	5.1%	2.9%	2.5%	33.1%		
	10,000—20,000 SAR	30	58	13	10	6	117		
		7.4%	14.2%	3.2%	2.5%	1.5%	28.7%		
	More than 20,000 SAR	18	28	7	5	4	62		
		4.4%	6.9%	1.7%	1.2%	1.0%	15.2%		

Bariatric surgery is a commonly performed procedure for individuals with obesity, aiming to promote weight loss and improve associated health conditions. While this surgical intervention has proven to be effective in achieving weight loss goals and reducing obesity-related comorbidities, it is important to acknowledge that it can also have psychological implications [15]. Depression is a mental health disorder that affects millions of individuals worldwide, and its prevalence among patients undergoing bariatric surgery is a significant concern. The link between obesity and depression is complex and multifaceted, with obesity often being associated with an increased risk of developing depression. Therefore, it is crucial to explore the prevalence of depression specifically in the context of bariatric surgery [1, 7].

Understanding the prevalence of depression among patients undergoing bariatric surgery is essential for several reasons. Firstly, it allows healthcare professionals to identify and address mental health needs before, during, and after surgical intervention. By recognizing the presence of depression, healthcare providers can implement appropriate interventions and support systems to ensure the overall well-being of patients [3].

Secondly, recognizing the prevalence of depression in this population can help inform the decision-making process for both patients and healthcare providers. It allows individuals considering bariatric surgery to have a comprehensive understanding of the potential psychological implications, enabling them to make informed decisions about their healthcare journey [3]. Moreover, understanding the prevalence of depression among patients undergoing bariatric surgery can also contribute to the development of tailored interventions and support programs. By recognizing the unique challenges faced by this population, healthcare providers can design strategies to address mental health concerns effectively.

It is worth noting that the prevalence of depression among patients undergoing bariatric surgery can vary depending on several factors. These factors may include pre-existing mental health conditions, personal history, social support systems, and the specific surgical procedure performed. Therefore, it is essential to conduct comprehensive research that considers these variables to obtain a more accurate understanding of the prevalence of depression in this population [8].

According to our study results, 42.2% of participants scored in the minimal depression range, indicating that they are experiencing very few or no depressive symptoms, 26.5% falls under the category of mild depression, and 15.2% of the individuals assessed scored in the moderate depression range. In a prior Saudi study, the majority of BS patients reported having minimal or little anxiety; 20.7% of the patients were rated as having mild anxiety, 11.2% as having severe anxiety, and 8.7% as having significant anxiety [11]. The survey also discovered that in terms of depression, the majority of patients—46.9%—were judged to have extremely low levels of the illness, with light depression—29.4%—and moderate depression—11.2%—following. Yet another 8.2% of bariatric surgery patients were deemed to have relatively high levels of depression, and 4.4% experienced severe depression during the trial. In a study done in the USA, it was discovered that the rate of depression following bariatric surgery was 32% [16]. Similar percentages of depression and depressive symptoms were found in post-bariatric surgery patients and the general Saudi population (26.3% mild, 15.8% moderate, 7.2% moderately severe, and 0.7% severe) [4], supporting the findings of the Alqadhi study in the nonobese Saudi population at King Abdulaziz National Guard primary care centers using the PHQ-9 (31% mild, 13.4% moderate, 4.4% moderate-to-severe, and 1.0% severe

cases) [17]. Similar patient characteristics, surgical procedures, and instrumentation tools were employed in another study conducted in Germany, and its findings corroborate this one. We determined our sample size based on that investigation. The reduction in depression from 37.2% to 21.3% after 4 years following surgery was deemed to be impressive [18].

According to several studies, depression rates among patients with a favorable history first decline, then rise over the course of the next three years, and possibly surpass pre-surgery levels [19-21]. In one study that revealed a comparable "fall-rebound" pattern, self-esteem and extra questionnaires to gauge mental and physical well-being were used to try and describe patients' changes in depression [22]. Within the first six months following bariatric surgery, participants' depression levels did not change much, and the subsequent rise in depression scores was strongly and unfavorably associated with self-esteem. In contrast, participants who reported lower depression ratings showed a strong positive correlation between self-esteem levels. These authors concluded that, rather than a relapse of pre-surgical reasons of sadness, greater depression post-surgery is connected to novel elements harmful to self-images, such as loose skin, social scrutiny, and relationship dissolution [23].

Our study findings suggest that age, marital status, gender, and educational level may be important factors to consider when assessing an individual's risk for depression. Another study found a strong correlation between marital status and the likelihood of developing depression ($P = 0.019$). In comparison to other categories, singles were shown to have greater rates of moderate to severe depression. Depression was not substantially correlated with gender, income, or education [4].

Conclusion

In conclusion, the prevalence of depression among patients undergoing bariatric surgery is a crucial area of study. Age, marital status, gender, and educational level may be important factors to consider when assessing an individual's risk for depression. However, further research is needed to explore the underlying mechanisms behind these associations and to determine the potential implications for prevention and treatment strategies.

By understanding the impact of surgical interventions on mental health, healthcare providers can better support patients throughout their weight loss journey. Furthermore, this knowledge can contribute to the development of tailored interventions and support programs to address the unique challenges faced by individuals undergoing bariatric surgery. Continued research in this field is necessary to improve patient outcomes and ensure holistic care for those seeking bariatric surgery.

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