

Primary Care Physicians' Knowledge, Attitude and Practice towards Bariatric Operations in the Kingdom of Bahrain

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ABSTRACT

Background: Obesity is an epidemic treatable disease. In Bahrain, the prevalence of obesity was 36.2%. Bariatric surgery should be considered for patients with BMI ≥ 40 , or ≥ 30 with obesity-related comorbidities. Family physicians have a key role in identifying and counseling patients who may qualify for bariatric surgery. The most common reason for physicians' refusal of referral for bariatric surgeries is fear of complications followed by concern of ineffective weight loss following the surgery. Doctors are not comfortable providing post bariatric operation care.

Aim: To study the PCPs' knowledge, attitude and practice towards bariatric surgeries in the kingdom of Bahrain.

Methods: this is a cross-sectional study of a convenient sample of physicians working in the Kingdom of Bahrain health centers, using an electronic and manual questionnaire to test the knowledge, attitude and practice towards bariatric surgery.

Results: The sample included a total of 222 participants. 56.1% agreed that the BMI ≥ 40 without weight related comorbidities is an indication for bariatric surgery and 92.3% of them referred patients for bariatric surgery, with BMI (88.6%) as the most influential factor followed by presence of comorbidities (87.8%). On the other hand, lack of resources was the main cause for not referring patient for bariatric surgery (29.4%) followed by concerns with follow up (23.5%). 80.6% are comfortable to initiate conversations with their patients about bariatric surgery, while 36.1% feel comfortable explaining the procedural options to a patient. 83.8% agreed that additional medical education in bariatric surgical care would be useful.

Conclusion: Primary care physicians showed well knowledge about the referral criteria to bariatric surgeries and that's reflected by the high referral rate (92.3%). But there is a gap in the knowledge mean score across different age groups and experience. Less than half of the physicians are not comfortable dealing with patients. Continuous medical education is essential to address the gap and to establish comprehensive obesity management guidelines for primary care physicians.

Keywords: Family physician, Bariatric surgeries, Obesity, Bahrain, Primary care

INTRODUCTION

Obesity is an epidemic treatable disease defined as abnormal or excessive fat accumulation that presents a risk to health¹. A body mass index (BMI) over 30 is obese¹.

According to the World Health Organization (2016), 39% of adults worldwide were overweight, and 13% obese¹. In Bahrain, overall prevalence of overweight was 33.4%, while prevalence of obesity was 36.2%².

"The National Evidence-based clinical Guidelines for Assessing and Managing Overweight and Obesity in the Kingdom of Bahrain" were

developed based on an extensive review of published literature while considering the local situation and the available resources³.

The management and treatment of obesity have wider objectives than weight loss alone and include risk reduction and health improvement⁴. Significant clinical benefits may be achieved even by modest weight loss (i.e., 5-10% of initial body weight), and lifestyle modification (improved nutritional content of the diet and modest increases in physical activity and fitness)⁴.

In patients who do not sufficiently respond to lifestyle intervention alone, pharmacotherapy, medical devices, and/or bariatric surgery

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should be considered⁵. Patients with a BMI of 40 or greater, or 30 or greater who have obesity-related comorbidities should be offered referral for consideration of bariatric surgery⁵.

In Bahrain, around 500 bariatric surgeries are performed annually in governmental and private hospitals⁶. General Surgery Department in Salmaniya Medical Complex receives about 5-6 cases per week referred from various departments of the Ministry of Health⁶.

Family physicians have a key role in identifying and counseling patients who may qualify for bariatric surgery⁵. Primary care physicians (PCPs) are not keen to refer obese patients for bariatric surgery⁷.

Physicians with no history of referral are less likely to feel comfortable explaining procedure options and providing postoperative care⁷.

The most common reason for PCP's refusal of referral for bariatric surgeries is fear of complications followed by concern of ineffective weight loss following the surgery⁸⁻¹¹. Doctors are not comfortable providing post bariatric operation care^{11,12}.

Several studies showed that PCPs would like to participate in educational activities related to management of obese patients and that would help improve the quality of care provided to them^{7,12,13}.

Regionally, limited research was done on perception of primary care physicians toward bariatric surgeries. Studies done in Kuwait showed a huge gap in knowledge that may affect the referral rate^{14,15}. Those with better knowledge and recently graduated were more likely to refer for bariatric surgeries¹⁵.

This is the first study aim to address the primary care physicians' knowledge, attitude and practice towards bariatric operations in the Kingdom of Bahrain

METHODOLOGY

Study Population

The data were collected using a convenient sampling to get the largest desired sample size possible, at minimum of (194) according to Slovin's formula:

$$n = \frac{N}{1 + Ne^2}$$

Were

n = desired sample size, N = population size (378), e = desired margin of sampling error (0.05).

The sample included primary care physicians working in 26 health centers and COVID-19 facilities under the Ministry of Health in the kingdom of Bahrain, as some PCPs were working in COVID-19 facilities during research period.

Study Design and Tool

This cross-sectional study was conducted using a questionnaire in English generated initially by Canadian researchers for a study done in Ontario in 2016 that studied the same topic. With removal of one question related to the health care system in Canada⁷.

Data Collection and Analysis

An electronic form of the questionnaire was developed using Google forms, and the questionnaire link was distributed, during the period of

July 2021 to October 2021, through social media networks. Response rate was 32%. To increase the response rate, from October 2021 till January 2022, a paper-based version of the questionnaire was distributed, and the response rate increased to 58%.

The questionnaire consists of 4 sections. The first section addressed the participants' demographic data (age, gender, specialty, and years of practice). The second section included questions assessing the participant practice toward obesity and its management (patients' weight measurement, consideration for referral to bariatric surgery, percentage of morbidly obese patient seen in practice). The last two sections focused on participants' bariatric surgery related knowledge, attitude, and referral practice (Appendix 1).

Eight questions tested the knowledge about criteria for bariatric surgery, postoperative morbidity and mortality rates for bariatric procedures. Each correct response on the knowledge questions was scored '1', while each incorrect/ don't know response was scored '0'. This was followed by calculating the mean knowledge score for all respondents (Appendix 1).

APPENDIX 1

Demographic data

1. What is your age?
 - 25 – 35
 - 36 – 45
 - 46 – 55
 - > 55
2. What is your gender?
 - Male
 - Female
3. Years in practice:
 - < 5 years
 - 5-10 years
 - 10-20 years
 - > 20 years
4. What is your specialty?
 - Family physician
 - General practitioner
 - General practice with Diploma or Master degree
5. Currently at which health center are you practicing?

Obesity in your practice

1. How frequently do you weigh your patients?
 - Each visit
 - Every year
 - Every 3 years
 - Every 5 years
 - Never
2. When weight is measured, which do you determine? (Select all that apply):
 - BMI
 - Waist circumference
 - Other (please specify)
3. At what minimum BMI would you consider bariatric surgery appropriate for a patient WITHOUT weight related comorbidities?

- 30
- 35
- 40
- 45
- >50

4. In the past 12 months, what percentage of patients with morbid obesity (BMI>35) have you seen?

- <21%
- 21-30%
- 31-40%
- 41-50%
- >50%

About Bariatric operations

1. Are you supportive of bariatric surgery ("metabolic surgery") for patients with diabetes who have BMI<35?

- Yes
- No
- Unsure

2. In your opinion, what is the ideal bariatric surgical procedure in the average patient?

- Laparoscopic Roux-en-Y gastric bypass
- Laparoscopic sleeve gastrectomy
- Laparoscopic adjustable gastric band
- Duodenal Switch/Biliopancreatic Diversion
- Unsure
- Other (please specify)

3. What type of bariatric surgery do your patients show most interest in?

- Laparoscopic Roux-en-Y gastric bypass
- Laparoscopic sleeve gastrectomy
- Laparoscopic adjustable gastric band
- Not specified
- More than two of the above

4. How many patients in your current practice have had bariatric procedures?

- 0
- 1-5
- 6-10
- 11-15
- 16-20
- >20

5. What do you estimate as the 30-day mortality rate for the following bariatric procedures?

	<0.1%	0.1-0.2%	0.3-1.0%	1.1-2.0%	2.1-4%	>4.0%	Don't Know
Laparoscopic Roux-en-Y gastric bypass							
Laparoscopic sleeve gastrectomy							
Laparoscopic adjustable gastric band							

6. What do you estimate as the 30-day morbidity rate (significant complication) for the following bariatric procedures?

	0-5%	5-10%	10-15%	15-20%	>20%	Don't Know
Laparoscopic Roux-en-Y gastric bypass						
Laparoscopic sleeve gastrectomy						
Laparoscopic adjustable gastric band						

7. Do you initiate conversations with your patients about bariatric surgery?

- Yes
- No

8. How many of your morbidly obese patients inquire about bariatric surgery?

- <10%
- 10-20%
- 21-30%
- 31-40%
- 40%

9. Which of the following influence your decision to refer them to bariatric surgery? (Select all that apply):

- BMI
- Comorbidities
- Age
- Number of attempts at dieting
- Use of pharmacotherapy for obesity

Referral for bariatric surgery

1. Have you ever referred your patients for bariatric surgery?

- Yes
- No

2. If yes, what percentage of your morbidly obese patients (BMI >35 with related comorbidities) did you refer in the past 12 months?

- <1%
- 1-5%
- 6-10%
- 11-20%
- >20%

3. If no, why not? (Select all that apply):

- Lack of resources
- Limited benefits from procedure
- Disagree with procedure
- Lack of awareness about procedure or benefits
- Concerns with follow up
- Discomfort within own setup to manage patients
- Medical issues
- Psychosocial issues
- Other (please specify)

4. In your opinion, is cost of surgery a significant barrier?

- Yes
- No
- Unsure

5. Do you have the appropriate resources and equipment at your center to manage morbidly obese patients?
 - Yes
 - No
 - Unsure

6. If you have difficulties managing morbidly obese patients, do you know who to contact?
 - Yes
 - No
 - Unsure

7. Hypothetically, would you refer a family member or a friend for gastric bypass surgery?
 - Yes
 - No

8. Do you agree or disagree with the following statements?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Morbidly obese patients should attempt dieting for at least 6 months before considering surgery					
I have had morbidly obese patients who were successful at losing weight without surgery					
Bariatric surgeries result in sustained weight loss					
I feel comfortable explaining the procedural options to a patient					
I feel comfortable providing care to patients who have received bariatric surgery					
Additional continuing medical education resources in bariatric surgical care would be useful to primary care physicians in Bahrain					

Statistical Analysis

SPSS 26 was used for data entry and analysis. Frequencies and percentages were computed for the categorical variables. Means and standard deviations were computed for the quantitative variables. Mann Whitney test was used to determine whether there is a significant difference in means between two independent groups. Kruskal Wallis

test was used to determine whether there is a significant difference in means between more than two independent groups. Chi-Square test was used to determine whether there is a significant association between two categorical variables. In all statistical tests, p-value of less than 0.05 was statistically considered significant.

Ethical Considerations

The research was approved by the Primary Care Research Committee. Permission was obtained from Primary Care Administration to allow data collection among their employees. Permission from the primary researchers in Ontario was also obtained to use their questionnaire.

Informed nonverbal consents were obtained from participants prior to responding to the questionnaire. Confidentiality of all participants was preserved whenever appropriate. Collected data was used for research purposes only.

RESULTS

A total of 123 responded through online Google form questionnaire and a total of 101 responses were collected through manual distribution of the paper base self-administered questionnaire. Two of the self-administered questionnaires were excluded due to incomplete answers. Therefore, the sample included a total of 222 participants.

Table 1: PCPs' socio-demographic characteristics (Total = 222)

Socio-demographic Characteristics	n (%)
Age:	
25 – 35	87 (39.2)
36 – 45	68 (30.6)
46 – 55	39 (17.6)
>55	28 (12.6)
Gender:	
Male	40 (18)
Female	182 (82)
Years in Practice:	
<5	17 (7.7)
5 – 10	79 (35.6)
11 – 20	70 (31.5)
>20	56 (25.2)
Specialty:	
Family physician	195 (87.8)
General practitioner	12 (5.4)
General practice with Diploma or master's degree	15 (6.8)

Table 1 represents the socio-demographic characteristics of the participants. It shows that females represent 182(82%) of the sample and that the majority of the respondents were family physicians 195(87.8%). The rest of the table shows the distribution of the sample with regard to age, years in practice and the health region.

Table 2: PCPs' practice regarding obesity (Total = 222)

	n (%)
Frequency of Measuring Patient's Weight¹	
Each Visit	31 (14.1)
Every Year	122 (55.5)
Every 3 Years	29 (13.2)
Every 5 Years	3 (1.4)
Never	35 (15.9)

Other Measurements Taken When Measuring a Patient's Weight²	
BMI	217 (98.2)
Waist Circumference	19 (8.6)
Others	3 (1.4)
Minimum BMI at which Bariatric Surgery Is Appropriate for a Patient without Weight Related Comorbidities³	
30	5 (2.3)
35	61 (27.6)
40	124 (56.1)
45	24 (10.9)
>50	7 (3.2)
Percentage of Patients with Morbid Obesity (BMI>35) Seen in the Past 12 Months	
<21%	80 (36)
21 - 30%	77 (34.7)
31 - 40%	45 (20.3)
41 - 50%	16 (7.2)
>50%	4 (1.8)

¹Number of missing is 2. ²Number of missing is 1. ³Number of missing is 1.

With respect to participants' practice at their clinics, almost half of them 122 (55.5%) were measuring patient's weight annually and 217 (98%) were calculating the BMI along with measuring the patient's weight, whereas only 19 participants (8.6%) were measuring the waist circumference along with the weight (Table 2).

More than half of the participants 124 (56.1%) agreed that the minimum BMI at which bariatric surgery is indicated in patients without weight related comorbidities is 40 (Table 2).

Table 3: PCPs' attitude and practice concerning bariatric operations (Total = 222)

	n (%)
Support of Bariatric Surgery (Metabolic Surgery) for Patients with Diabetes Who Have BMI <35	
Yes	92 (41.4)
No	96 (43.2)
Unsure	34 (15.3)
Ideal Bariatric Surgical Procedure in the Average Patient	
Laparoscopic Roux-en-Y Gastric Bypass	42 (18.9)
Laparoscopic Sleeve Gastrectomy	101 (45.5)
Laparoscopic Adjustable Gastric Band	6 (2.7)
Duodenal Switch/Biliopancreatic Diversion	1 (0.5)
Unsure	70 (31.5)
Other	2 (0.9)
Type of Bariatric Surgery in which Patients are Most Interested¹	
Laparoscopic Roux-en-Y Gastric Bypass	19 (8.6)
Laparoscopic Sleeve Gastrectomy	139 (62.9)
Laparoscopic Adjustable Gastric Band	3 (1.4)
Not Specified	41 (18.6)
More than two of the above	19 (8.6)
Number of Patients in Current Practice Who have Had Bariatric Procedures	
None	3 (1.4)

1 – 5	72 (32.4)
6 – 10	68 (30.6)
11 – 15	35 (15.8)
16 – 20	10 (4.5)
>20	34 (15.3)
Initiate Conversations with your Patients about Bariatric Surgery:	
Yes	179 (80.6)
No	43 (19.4)
Number of Morbidly Obese Patients Inquire about Bariatric Surgery:	
<10%	123 (55.4)
10 - 20%	60 (27)
21 - 30%	23 (10.4)
31 - 40%	7 (3.2)
>40%	9 (4.1)
Factors that Influence Decision to Refer Patients to Bariatric Surgery:	
BMI	196 (88.3)
Comorbidities	195 (87.8)
Age	112 (50.5)
Number of Attempts at Dieting	124 (55.9)
Use of Pharmacotherapy for Obesity	83 (37.4)

¹Number of missing is 1.

Participants who supported bariatric surgery for patients with diabetes and BMI <35 were 92 (41.4%) and 96 (43.2%) were not supportive. On the other hand, 34 (15.3%) were unsure (Table 3).

101 (45.5%) of the participants think that the ideal bariatric surgical procedure in the average patient is laparoscopic sleeve gastrectomy. It is also the type of procedure which patients are most interested in, at 139 (62%) (Table 3).

More than half of the sample 140 (63%) had seen at least 10 patients who have had bariatric procedures in their current practice (Table 3). Most of the doctors in our sample 179 (80.6%) are comfortable to initiate conversations with their patients about bariatric surgery. The most influential factors for referral decision are the BMI, 196 (88.3%), followed by the presence of comorbidities, 195 (87.8%), the number of attempts at dieting, 114 (55.9%), age, 112 (50.5%), and the previous use of pharmacotherapy for obesity 83(37.4%) (Table 3).

Table 4: PCPs' knowledge about estimated 30-Days Mortality Rate for the Bariatric Procedures (Total = 222)

Bariatric Procedures	Correct	Incorrect	Don't Know
	n (%)	n (%)	n (%)
1. Laparoscopic Roux-en-Y Gastric Bypass ¹	40 (18.1)	95 (43)	86 (38.9)
2. Laparoscopic Sleeve Gastrectomy ²	59 (26.8)	77 (35)	84 (38.2)
3. Laparoscopic Adjustable Gastric Band ²	20 (9.1)	112 (50.9)	88 (40)

¹Number of missing is 1. ²Number of missing is 2.

Table 4 shows participants' knowledge about the estimation of the 30 days' mortality rate for the bariatric procedures. Correct responses were 59 (26.8%) for laparoscopic sleeve gastrectomy, 40 (18.1%) for laparoscopic Roux-en Y gastric bypass and only 20 (9%) for laparoscopic adjustable gastric band.

Table 5: PCPs' knowledge about estimated 30-days morbidity rate for the bariatric procedures (Total = 222)

Bariatric Procedures	Correct	Incorrect	Don't Know
	n (%)	n (%)	n (%)
1. Laparoscopic Roux-en-Y gastric bypass ¹	58 (26.2)	78 (35.3)	85 (38.5)
2. Laparoscopic sleeve gastrectomy ²	49 (22.3)	90 (40.9)	81 (36.8)
3. Laparoscopic adjustable gastric band ²	81 (36.8)	54 (24.5)	85 (38.6)

¹Number of missing is 1. ²Number of missing is 2.

Table 5 shows participants' knowledge about the estimation of the 30 days' morbidity rate (significant complications) for the bariatric procedures.

Correct responses were 81 (36.8%) for laparoscopic adjustable gastric band, 58 (26.2%) for laparoscopic Roux-en Y gastric bypass and only 49 (22.3%) for laparoscopic sleeve gastrectomy.

36.8-40% of participants answered (Don't Know) for each question in tables 4 and 5.

Table 6: PCPs' practice regarding referral for bariatric surgery (Total = 222)

Referring Patients for Bariatric Surgery	
Yes	205 (92.3)
No	17 (7.7)
Percentage of Morbidly Obese Patients (BMI >35 with Related Comorbidities) Referred in the Past 12 Months (Total = 205)	
<1%	77 (37.6)
1 - 5%	98 (47.8)
6 - 10%	19 (9.3)
11 - 20%	8 (3.9)
>20%	3 (1.5)
Reasons of not Referring Patients for Bariatric Surgery (Total = 17)	
Lack of Resources	5 (29.4)
Limited Benefits from Procedure	1 (5.9)
Disagree with Procedure	3 (17.6)
Lack of Awareness about Procedure Or Benefits	2 (11.8)
Concerns with Follow up	4 (23.5)
Discomfort within Own Setup to Manage Patients	3 (17.6)
Medical Issues	2 (11.8)
Other	4 (23.5)
Cost of Surgery as a Significant Barrier	
Yes	186 (83.8)
No	19 (8.6)
Unsure	17 (7.7)
Having Appropriate Resources and Equipment at the Center to Manage Morbidly Obese Patients	
Yes	41 (18.5)
No	149 (67.1)
Unsure	32 (14.4)
knowing Who to Contact If There Are Difficulties Managing Morbidly Obese Patients ¹	
Yes	148 (67)

No	36 (16.3)
Unsure	37 (16.7)

¹Number of missing is 1.

The majority of participants (92.3%) are referring patients for bariatric surgery. Around half of those participants (47.8%) referred 1-5% of their morbidly obese patients for bariatric procedures in the past 12 months. Only 3 (1.5%) of them referred more than 20% (Table 6).

17 (7.7%) of the respondents are not referring patients for bariatric surgery and their main reason is lack of resources (29.4%), followed by concerns with follow up (23.5%), and 23% other causes that was not mentioned by the participants (Table 6).

Most of the participants (83.3%) agreed that cost of bariatric surgery is a significant barrier (Table 6).

Almost two thirds of participants (67.1%) did not think that appropriate resources and equipment for managing morbidly obese patients are available at primary care centers (Table 6).

148 (67%) of participants knew whom to contact in case they had difficulties in managing morbidly obese patients, compared to 37 (16.7%) of participants who did not have clear idea about whom to contact (Table 6).

Three quarters of participants (73.9%) would refer a family member or a friend for gastric bypass surgery hypothetically (Table 6).

Table 7: PCPs' attitude toward obesity and its management options (Total = 222)

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	n (%)	n (%)	n (%)	n (%)	n (%)
1. Morbidly obese patients should attempt dieting for at least 6 months before considering surgery.	12 (5.4)	8 (3.6)	16 (7.2)	83 (37.4)	103 (46.4)
2. I have had morbidly obese patients who were successful at losing weight without surgery.	14 (6.3)	18 (8.1)	39 (17.6)	104 (46.8)	47 (21.2)
3. Bariatric surgeries result in sustained weight loss.	8 (3.6)	58 (26.1)	70 (31.5)	69 (31.1)	17 (7.7)
4. I feel comfortable explaining the procedural options to a patient.	15 (6.8)	51 (23)	76 (34.2)	61 (27.5)	19 (8.6)
5. I feel comfortable providing care to patients who have received bariatric surgery.	4 (1.8)	44 (19.8)	69 (31.1)	88 (39.6)	17 (7.7)

6. Additional continuing medical education resources in bariatric surgical care would be useful to primary care physicians in Bahrain.	4 (1.8)	9 (4.1)	23 (10.4)	72 (32.4)	114 (51.4)
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Many PCPs agree or strongly agree to the following: dieting attempts for at least 6 months before considering surgery 186 (83.8%), having morbidly obese patients who lost weight successfully without surgery 151 (68%), and additional medical education in bariatric surgical care would be useful 186 (83.8%) (Table 7).

Almost half of PCPs 105 (47.3%) agree or strongly agree about feeling comfortable when providing care to patients who have received bariatric surgery (Table 7).

More than one third of the participants agree or strongly agree to the following: bariatric surgery results in sustained weight loss 86 (38.8%), feeling comfortable explaining the procedural options to a patient 80 (36.1%) (Table 7).

Table 8: Difference in mean knowledge about bariatric operations according to participants' socio-demographic characteristics

	knowledge Mean ± SD	P-value
Age:		
25 – 35	45.8 ± 13.8	0.004 ^a
36 – 45	39.0 ± 12.0	
>45	42.7 ± 14.5	
Gender:		
Male	45.0 ± 14.8	0.254 ^b
Female	42.3 ± 13.5	
Years in practice:		
≤10	44.7 ± 13.7	0.037 ^a
11 – 20	39.6 ± 12.9	
>20	43.3 ± 14.3	
Specialty:		
Family Physician	43.0 ± 13.6	0.531 ^b
General Practitioner	40.7 ± 14.9	

Note: Mean ± SD was computed out of 100.

^aKruskal-Wallis test. ^bMann-Whitney test.

	Mean ± SD
knowledge about bariatric operations	42.8 ± 13.7

Table 8 shows the differences in mean knowledge about bariatric surgery according to participants' socio-demographic characteristics. Both participants' age and years of experience are significantly associated with the mean knowledge score about bariatric surgery (p=0.004, p=0.037). Participants' age groups (25- 35 years) and (above 45 years) show the highest mean knowledge score (45.8), (42.7) respectively, and those who had less than ten years of practice or more than 20 years show the highest mean knowledge score (44.7), (43.3) respectively.

Table 9: Difference in mean knowledge about bariatric operations according to frequency of measuring patient's weight, support of bariatric surgery, initiate conversations with patients, referring patients for bariatric surgery, and knowing whom to Contact

	Mean ± SD	
Frequency of Measuring Patients' Weight		
Each Visit	45.2 ± 15.9	
Every Year	43.6 ± 12.8	
Every 3 or 5 Years	40.6 ± 13.2	0.398 ^a
Never	39.5 ± 14.5	

	Mean ± SD	
Support of Bariatric Surgery (Metabolic Surgery) for Patients with Diabetes and BMI<35		
Yes	43.8 ± 15.2	
No	41.1 ± 13.2	0.180 ^a
Unsure	44.9 ± 10.5	

	Mean ± SD	
Initiate Conversations with your Patients about Bariatric Surgery		
Yes	43.2 ± 14.1	
No	40.7 ± 12.0	0.279 ^b

	Mean ± SD	
Referring Patients for Bariatric Surgery		
Yes	43.0 ± 13.7	
No	40.2 ± 13.6	0.382 ^b

Note: Mean ± SD was computed out of 100. ^aKruskal-Wallis test.

^bMann-Whitney test.

The difference in respondents' mean knowledge about bariatric operations has no significant association with frequency of measuring patients' weight, whether to support the procedure or not for diabetic patients, initiation conversations about the procedure or even for the decision for referring patients for bariatric surgery (Table 9).

Table 10: Association between PCPs' socio-demographic characteristics and the frequency of measuring patients' weight

	Frequency of Measuring Patient's Weight				
	Each Visit	Every Year	Every 3 or 5 Years	Never	>30%
	n (%)	n (%)	n (%)	n (%)	n (%)
Age:					
25 – 35	12 (13.8)	49 (56.3)	13 (14.9)	13 (14.9)	29 (33.3)
36 – 45	6 (9)	36 (53.7)	12 (17.9)	13 (19.4)	24 (35.3)
>45	13 (19.7)	37 (56.1)	7 (10.6)	9 (13.6)	12 (17.9)
P-Value:	0.570				

Gender:					
Male	13 (34.2)	15 (39.5)	5 (13.2)	5 (13.2)	4 (10)
Female	18 (9.9)	107 (58.8)	27 (14.8)	30 (16.5)	61 (33.5)
P-Value	0.001				

Years in Practice:					
≤10	13 (13.5)	52 (54.2)	16 (16.7)	15 (15.6)	31 (32.3)
11 – 20	6 (8.6)	37 (52.9)	11 (15.7)	16 (22.9)	22 (31.4)
>20	12 (22.2)	33 (61.1)	5 (9.3)	4 (7.4)	12 (21.4)
P-Value	0.106				

Specialty					
Family Physician	24 (12.4)	111 (57.2)	29 (14.9)	30 (15.5)	59 (30.3)
General Practitioner	7 (26.9)	11 (42.3)	3 (11.5)	5 (19.2)	6 (22.2)
P-Value	0.191				

Note: P-values were calculated by using Chi-Square test.

Participants' gender showed significant association with the frequency of measuring patients' weight ($p=0.001$). The results showed that male doctors more frequently measured patients' weight; every visit or at least annually (73.7%) than female doctors (68.7%). On the other hand, age, years of practice and specialty of participants had no significant association with the frequency of measuring patient's weight. (Table 10)

Table 11: Support of bariatric surgery for patients with diabetes and BMI<35 in relation to PCPs' socio-demographic data

	Support of Bariatric Surgery for Patients with Diabetes and BMI<35 in relation		
	Yes	No	Unsure
	n (%)	n (%)	n (%)
Age:			
25 – 35	36 (41.4)	38 (43.7)	13 (14.9)
36 – 45	36 (52.9)	27 (39.7)	5 (7.4)
>45	20 (29.9)	31 (46.3)	16 (23.9)
P-Value	0.030		
Gender:			
Male	10 (25)	23 (57.5)	7 (17.5)
Female	82 (45.1)	73 (40.1)	27 (14.8)
P-Value	0.060		
Years in practice:			
≤10	38 (39.6)	44 (45.8)	14 (14.6)
11 – 20	39 (55.7)	26 (37.1)	5 (7.1)
>20	15 (26.8)	26 (46.4)	15 (26.8)
P-Value	0.004		
Specialty:			
Family Physician	82 (42.1)	84 (43.1)	29 (14.9)
General Practitioner	10 (37)	12 (44.4)	5 (18.5)
P-Value	0.835		

Note: P-values were calculated by using Chi-Square test.

PCPs aged 36-45 years who had work experience of 11-20 years show the highest support percentage (52.9%, 55.7%) for bariatric surgery in patients with diabetes and BMI<35($p=0.030$, $p=0.004$) (Table 11).

DISCUSSION

Obesity is considered one of the non-communicable diseases with accelerating incidence in our society³. As primary care includes promotive, preventive and curative services; family physicians play an important role in the management of obesity through therapeutic lifestyle changes which can lead to clinically important weight loss of 5%³.

According to the national Bahrain guideline for the evaluation and management of overweight and obesity the clinical assessment includes: BMI calculation, waist circumference measurement, risk Status determination and assessment of patient motivation¹⁶. Yet, waist circumference was measured by less than 10% of our participants. It is an appropriate measure of intra-abdominal fat mass and disease risk in individuals with body mass index less than 35¹⁶.

Patients with a BMI ≥ 40 kg/m² and those with a BMI ≥ 35 kg/m² who also have obesity-related comorbidities should be referred for consideration of bariatric surgery. Patients with a BMI ≥ 30 kg/m² who also have obesity-related comorbidities may be candidates for bariatric surgery^{4,5,17}. The practice of our participants was consistent with the guidelines for the management of obese patients without comorbidities.

Family physicians in Bahrain are trained to be initiative in the management of obesity, which explains the high percentage of conversation initiation and referral to bariatric surgery found in this study in comparison with other studies^{7-10,12-14,18}.

Factors influencing decision for referral to bariatric surgery are BMI, comorbidities, number of attempts in dieting and use of pharmacotherapy¹⁹. In this study, 50% thought that age was considered as a factor.

The most common reported barrier to referral for bariatric surgery is lack of resources. The sample study was limited to PCPs working in the governmental primary care centers which has established referral system to secondary care governmental hospital, hence physician can refer eligible patients to surgical clinics to have bariatric surgery free of charge.

The second most common barrier was concern for follow-up probably due to lack of clear national guidelines for the post bariatric management and care at primary care level.

The majority of participants felt that primary care centers are not well-equipped for the management of obese patients which is consistent with other studies^{7,12}.

Continuing medical education is an integral part in improving the management of obesity^{7,12,13,18}.

Limitation

This is a cross-sectional study using convenience sampling; hence it is ungeneralizable and subjective to recall bias.

CONCLUSION

Primary care physicians showed well knowledge about the referral criteria to bariatric surgeries and that's reflected by the high referral rate (92.3%) and the high percentage of PCPs being comfortable to start conversation with patients who need bariatric surgery (80.6%). But when it comes to diabetic patients they were more reluctant for referral with BMI<35.

On the other hand, PCPs knowledge about the mortality and morbidity of different types of bariatric procedures is poor. The results also showed a gap in the knowledge mean score across different age groups and experience. In the postoperative management less than half of the physicians are not comfortable dealing with patients and the need of continued medical education about this topic is agreed by 80%.

We recommend a comprehensive Obesity management guideline with integrated efforts from primary and secondary care is a necessity, in addition to regular update of guidelines and reinforcement of implementation of this guideline.

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