

## Assessment of Knowledge, Attitude and Practice of Safety, Effectiveness and Consequences of Bariatric Surgery among Community in Riyadh City

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### ABSTRACT

**Background:** Obesity is a public health problem and its prevalence is escalating in the recent years in Saudi Arabia. Bariatric surgery is the most effective treatment for the morbidly obese.

**Aim of the Work:** The aim of this study was to examine community health beliefs regarding obesity and bariatric surgery, and to evaluate the potential associations between demographic characteristics and agreement to bariatric surgery.

**Material and Methods:** A self-administered questionnaire was distributed to adult citizens of Riyadh city. The questionnaire included questions about obesity, its causes, lifestyle, and beliefs about the effectiveness of bariatric surgery and its complications.

**Results:** 27.6% of respondents were overweight and 33.6% were obese. The overweight/obese respondents were significantly inclined to be in the older age groups, married, and have high income and a family history of obesity. Most respondents showed good knowledge about obesity, its risk factors, and healthy life style, and they recognized the efficacy of bariatric surgery in reducing weight. However, more than half of the respondents doubted its safety and only 16.2% believed it to be the best choice. Male subjects - who were in older age groups, had a secondary school education and a body mass index above normal range - were more likely to regard surgery as the best choice for weight loss.

**Conclusion:** Most of respondents overestimated the risks of bariatric surgery and did not consider it as the best choice for weight loss. Health education is recommended to address these misconceptions and convince the public of its relative safety and the expected health benefits.

**Keywords:** obesity; overweight; body mass index; bariatric surgery; attitude; knowledge.

### INTRODUCTION

The prevalence of obesity is increasing worldwide at an alarming rate in both developing and developed countries. It has become a serious epidemic health problem, estimated to be the fifth leading cause of mortality at global level. In addition, 44% of the diabetes burden, 23% of the ischemic heart disease burden, and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity<sup>(1)</sup>.

Obesity is a syndrome with multifactorial etiology including metabolic, genetic, environmental, social, and cultural interaction. Obese persons have increased risk of hypertension, diabetes, metabolic syndrome, stroke, certain types of cancer (such as endometrial, breast, prostate, and colon cancers), dyslipidemia, gall bladder disease, sleep apnea, osteoarthritis, emotional distress, discrimination, and social stigmatization<sup>(2)</sup>.

The rapid cultural and social changes that have occurred in the Arabian Gulf region, since the discovery of oil and the economic boom, were associated with an alarming increase in obesity<sup>(3)</sup>. One of the major causes of obesity is the changes in the diet, in terms of quantity and quality, which has become more "Westernized"<sup>(4)</sup>. In the Kingdom of Saudi Arabia, recent studies revealed increasing consumption of animal products and

refined foods in the diet at the expense of vegetables and fruits<sup>(5)</sup>.

Several studies reported that, medical and surgical treatment programs are occasionally applied to treat morbidly obese patients. Surgery seems to have the successful and the longest period of sustained weight loss. Primary reasons for improved safety are the increased use of laparoscopy and advancements in surgical techniques. Overall mortality rate is about 0.1%, which is obviously less than that of gallbladder (0.7%) and hip replacement (0.93%) surgeries, and the overall likelihood of major complications is about 4.3%<sup>(6)</sup>. Patients may lose as much as 60% of excess weight six months after surgery and 77% of excess weight as early as 12 months after surgery. On average, five years after surgery, patients maintain 50% of their excess weight loss, which helps to improve or resolve more than 40 obesity-related diseases and conditions, including type 2 diabetes, heart disease, certain cancers, sleep apnea, gastro esophageal reflux disease, hypertension, and joint problems<sup>(7)</sup>.

In Saudi Arabia one out of three adults suffers from obesity and at least one out of ten adults has morbid obesity<sup>(8)</sup>. Although bariatric surgery was and still is the only available technique with established long-term effects on

weight loss, the Saudi community demonstrates exaggerated beliefs towards it and its complications, which may create barrier to surgical treatment of obesity. Hence, this study was designed to examine health beliefs about knowledge, attitude and practice of safety, effectiveness and consequences of bariatric surgery as a weight loss option. In addition, it applied the Health Belief Model to explain why patients choose this option and to determine barriers toward surgical treatment.

## METHODS

### Ethical considerations:

This study was approved by the institutional review board of the Faculty of Medicine. An informed consent was obtained from each participant.

### Study design

This study had a cross-sectional design, and it was carried out among community population in Riyadh city, Saudi Arabia, during the period from 1/9/2017 to 30/11/2017.

The study included both adult males and females in Riyadh city, only those who approved to participate in the study were included, but those not achieving inclusion criteria and those with incomplete data were excluded from the study.

### Study sample

Participants were chosen according to geographical and sex distribution. Sample size was calculated based on the total size of Riyadh population, confidence level (95%) and margin of error (5%) to be 385 participants. Additional 20% were added to cover the missing data. The total sample obtained was 460 participants.

### Study tool

A self-administered questionnaire was used for data collection. The questionnaire had two parts. The first part was about socio-demographic data of the participants. The second part was about awareness and knowledge of people regarding obesity, its causes, lifestyle, general health-related characteristics, and beliefs about bariatric surgery and complications, and surgical treatment response efficacy. The questionnaire was distributed to the participants by direct contact with them. Data were confirmed then coded and entered to a personal computer. Thanks and appreciations were used to inspire the participants to be involved in the study. Body mass index (BMI) was calculated for all respondents

according to the following equation: 
$$\text{BMI} = \frac{\text{Body weight (kg)}}{\text{Height (metre)}^2}$$

According to the recommendations of the World Health Organization, a BMI of 25-29.9 kg/m<sup>2</sup> was considered as overweight; and a BMI of 30 kg/m<sup>2</sup> or higher was considered obesity<sup>(9,10)</sup>.

### Statistical analysis

Data analysis was carried out using SPSS version 22. Categorical variables were summarized as frequencies and percentages and associations between variables were tested using Pearson's Chi square. Binary logistic regression analysis was carried out to assess the effect of socio-demographic factors (age, sex, education, income, marital status, smoking, and body mass index) on the agreement of respondents towards bariatric surgery as the best choice for weight loss. A p-value of < 0.05 was considered statistically significant<sup>(11)</sup>.

## RESULTS

In this study, 500 participants were asked to respond to the questionnaire. Most the respondents belonged to young age groups (18 to 25 and 26 to 35 years). More than half the respondents were male (56.2%), graduated from university or institute (56.6%), married (63.4%), and had a family history of obesity (59.2%). The extremes of income had nearly similar frequencies (34.8% for income less than 3000 SR and 38.2% for more than 9000 SR). Most of the respondents (77.2%) were not smokers (Table 1).

According to their body mass index, overweight and obese subjects represented 27.6% and 33.6%, while the normal and underweight constituted 34.8% and 4% respectively. The respondents were categorized into two groups: overweight/obese (54%) and under/normal weight (46%) (Figure1). On comparing the two groups, a significantly higher frequency of overweight/obese respondents were in older age groups (46 to 55 and 55 to 60 years old;  $p < 0.001$ ), had income exceeding 9000 SR ( $p = 0.003$ ), were married ( $p < 0.001$ ), and had a family history of obesity ( $p < 0.001$ ). There was no significant association between BMI and sex, education, and smoking (Table 1).

The majority of the respondents demonstrated a fairly good knowledge and awareness about obesity and its risk factors. They agreed that obesity is a disease (87.6%), is due to an increase in body fat (92%), and that the factors that play an important role are sleepiness and decreased mobility (92%), genetic factor (75.2%),

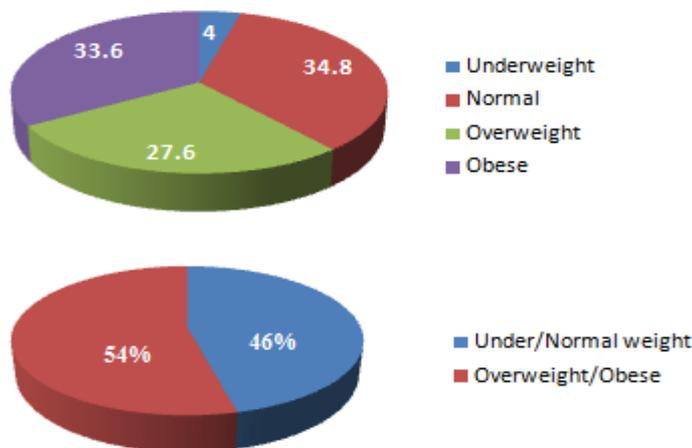
overeating (86.8%), and psychiatric illness (55%). Nearly half of the respondents practiced sport (Table 2); and one third of them practiced it once per week (Figure 2). A significantly higher frequency of overweight/obese respondents agreed to the role of sleepiness and decreased

mobility (p = 0.016), overeating (p = 0.001) and psychiatric illness (p = 0.017). A significantly lower percentage of overweight/obese practiced sport (p = 0.021) (Table 2); however, the rate of sport practice was not significantly different between the two groups (p = 0.350) (Figure 2).

**Table 1: socio-demographic data of the respondents**

		Respondents						Pearson's Chi square test	
		All respondents (N = 500)		Underweight/normal (N = 194)		Overweight/obese (N = 226)		X <sup>2</sup>	p
		N	%	N	%	N	%		
Age (Years)	18-25	143	28.6	77	39.7	66	21.6	40.853	<0.001*
	26-35	178	35.6	70	36.1	108	35.3		
	36-45	118	23.6	43	22.2	75	24.5		
	46-55	51	10.2	4	2.1	47	15.4		
	56-60	10	2.0	0	0.0	10	3.3		
Sex	Female	219	43.8	94	48.5	125	40.8	2.789	0.095
	Male	281	56.2	100	51.5	181	59.2		
Education	Secondary/Diploma	194	38.8	70	36.1	124	40.5	1.077	0.584
	High	283	56.6	114	58.8	169	55.2		
	Postgraduate	23	4.6	10	5.2	13	4.2		
Income	< 3000	174	34.8	84	43.3	90	29.4	13.938	0.003*
	3000-6000	54	10.8	21	10.8	33	10.8		
	6000-9000	81	16.2	33	17.0	48	15.7		
	> 9000	191	38.2	56	28.9	135	44.1		
Smoking	Non-smoker	386	77.2	145	74.7	241	78.8	1.088	0.297
	Smoker	114	22.8	49	25.3	65	21.2		
Marital status	Single	183	36.6	102	52.6	81	26.5	34.873	<0.001*
	Married	317	63.4	92	47.4	225	73.5		
Family history	Yes	296	59.2	85	43.8	211	69.0	31.067	<0.001*

\*Significant

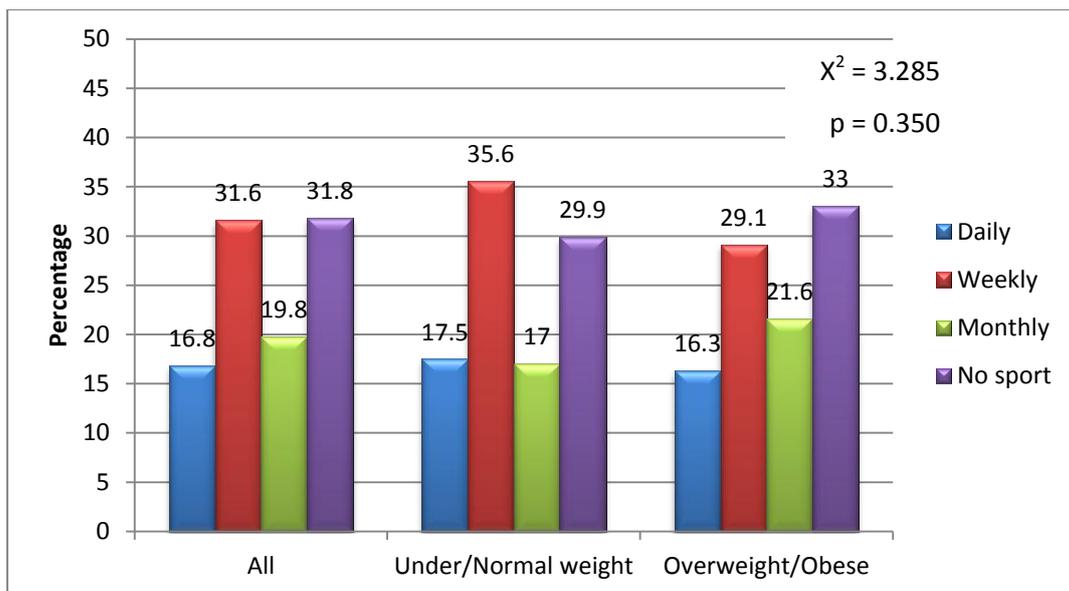


**Figure 1: Distribution of the respondents (percentage) according to body mass index.**

**Table 2: knowledge and awareness of the respondents about obesity**

		Respondents						Pearson's Chi square test	
		All respondents (N = 500)		Underweight/normal (N = 194)		Overweight/obese (N = 226)			
		N	%	N	%	N	%	X <sup>2</sup>	p
Do you think obesity is a disease?	Yes	438	87.6	168	86.6	270	88.2	1.763	0.414
Obesity is an increase in body fat	Yes	460	92.0	172	88.7	288	94.1	5.032	0.081
Do Sleep & decreased mobility contribute to obesity?	Yes	460	92.0	171	88.1	289	94.4	8.213	0.016*
Do you practice sport?	No	236	47.2	79	40.7	157	51.3	5.338	0.021*
	Yes	264	52.8	115	59.3	149	48.7		
Genetic factors play a role in obesity	Yes	376	75.2	149	76.8	227	74.2	4.971	0.083
Overeating results in obesity	Yes	434	86.8	155	79.9	279	91.2	13.187	0.001*
Psychiatric illnesses, e.g. anxiety, lead to obesity	Yes	275	55.0	92	47.4	183	59.8	8.176	0.017*

\*Significant



**Figure 2: the rate of sport practice among the respondents.**

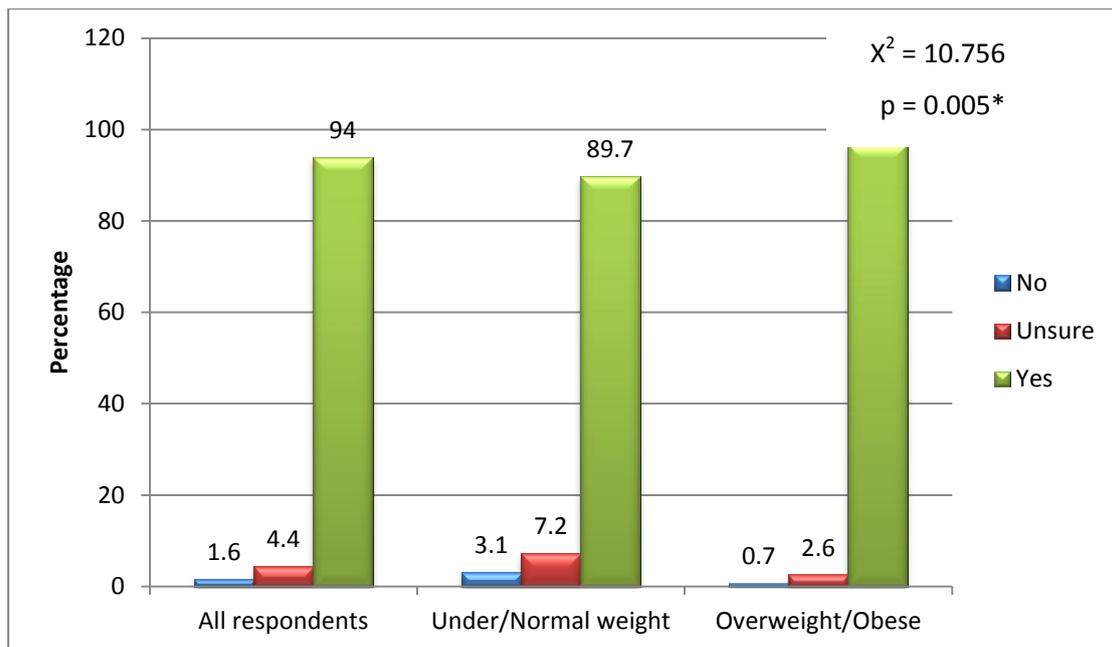
Most of the respondents agreed that practicing sport (99.8%), drinking water (79.2%), and eating fruits (60.6%) can attribute to weight reduction. The majority of respondents (88.4%) did not calculate their intake of calories. The only significant difference between the two groups was that more overweight/obese subjects appreciated the role of drinking plenty of water in decreasing body weight ( $p = 0.008$ ) (Table 3).

**Table 3: knowledge and awareness of the respondents about factors that aid in reducing body weight.**

		Respondents						Pearson's Chi square test	
		All respondents (N = 500)		Underweight/normal (N = 194)		Overweight/obese (N = 226)			
		N	%	N	%	N	%	X <sup>2</sup>	p
Eating fruits leads to weight loss	Yes	303	60.6	110	56.7	193	63.1	3.665	0.160
Drinking plenty of water leads to weight loss	Yes	396	79.2	140	72.2	256	83.7	9.602	0.008*
Practicing sport leads to weight loss	Yes	499	99.8	193	99.5	306	100.0	1.580	0.209
Do you Calculate your intake of calories?	No	442	88.4	167	86.1	275	89.9	1.660	0.198

\*Significant

The majority of respondents agreed that obesity is associated with an increased risk of medical diseases such as diabetes mellitus and hypertension, with a significantly higher percentage in the obese group (p = 0.005) (Figure 3).



**Figure 3: opinion of the respondents as regards the association between obesity and medical diseases e.g. diabetes mellitus, hypertension.**

Most of the respondents agreed about the bariatric surgery results in weight loss (70.8%). However, their opinion as regards the efficacy and safety of bariatric surgery was highly skeptical. Nearly half of the respondents did not agree that it is the easiest and fastest method of weight loss and that it has no complications. Besides, 73% were conceived that its complications are life threatening, and only 16.2% regarded surgery as the best choice for weight reduction. Significantly higher percentages of the overweight/obese group stated that bariatric surgery is the easiest, fastest and best choice for treatment of obesity (p = 0.039 and p = 0.003) (Table 4).

**Table 4: knowledge, awareness and attitude of the respondents as regards bariatric surgery.**

		Respondents						Pearson's Chi square test	
		All respondents (N = 500)		Underweight/normal (N = 194)		Overweight/obese (N = 226)		X <sup>2</sup>	p
		N	%	N	%	N	%		
Bariatric surgery decreases body weight	Yes	354	70.8	129	66.5	225	73.5	4.175	0.124
Bariatric surgery is the easiest & fastest solution for obesity	No	232	46.4	102	52.6	130	42.5	6.499	0.039*
	Unsure	55	11.0	23	11.9	32	10.5		
	Yes	213	42.6	69	35.6	144	47.1		
Bariatric surgery has no complications	No	297	59.4	122	62.9	175	57.2	2.522	0.283
Complications of bariatric surgery can result in death	Yes	365	73.0	144	74.2	221	72.2	0.385	0.825
Bariatric surgery is the best choice for weight loss	No	364	72.8	151	77.8	213	69.6	11.504	0.003*
	Unsure	55	11.0	25	12.9	30	9.8		
	Yes	81	16.2	18	9.3	63	20.6		

\*Significant

Logistic regression analysis showed that - among the socio-demographic factors examined - age, sex, education, and body mass index had a significant effect on the opinion of respondents towards considering bariatric surgery as the best choice for weight loss. Respondents who were more likely to regard bariatric surgery as the best choice were in age groups "25 - 30" or "56 - 60" (about 3 and 6 times than age group "18 - 25"); male (about one a half time more than female), and overweight/obese (about two folds than under/normal weight subjects). Higher levels of education were associated more with opponents to the surgery (Table 5).

**Table 5: logistic regression analysis to assess the effect of socio-demographic factors on the agreement of respondents to bariatric surgery as the best choice for weight loss.**

	p	Odds ratio	95% C.I. for odds ratio	
			Lower	Upper
Age	0.019*			
25-35	0.002*	3.157	1.528	6.523
36 - 45	0.067	2.123	0.948	4.754
46 - 55	0.104	2.166	0.853	5.499
56 - 60	0.017*	6.156	1.390	27.266
Sex (Male)	0.050	1.703	1.000	2.898
Education	0.041*			
High	0.020*	0.536	0.317	0.905
Postgraduate	0.154	0.385	0.104	1.430
BMI (overweight/obese)	0.012*	2.139	1.182	3.868
Constant	0.000*	0.064		

\*Significant

## DISCUSSION

Obesity represents a worldwide medical and social problem that has a great morbidity and mortality rates. Globally, 1.9 billion adults were overweight in 2016; among them 650 million were obese<sup>(1)</sup>. Many lines of treatment are used to address the problem of obesity; however, bariatric surgery is considered the only effective treatment for individuals with a BMI above 40 kg/m<sup>2</sup><sup>(12)</sup>. The behaviour of patients after bariatric surgery can be greatly influenced by their expectations of weight loss and knowledge about the surgery efficacy and safety<sup>(13)</sup>. Therefore, the aim of this study was to examine community health beliefs regarding obesity and bariatric surgery, and to assess the potential associations between demographic characteristics and agreement to bariatric surgery.

In this study, we found that 54% of respondents have BMI above the normal range (27.6% overweight and 33.6% obese). This prevalence is similar to that reported by Al-Nuaim et al.<sup>(14)</sup> in Saudi adults (53%). While, it is lower than the prevalence rates of<sup>(15)</sup> 63.6%,<sup>(16)</sup> 69.9%,<sup>(17)</sup> 72.5% and<sup>(18)</sup> 82% during their studies in Saudi Arabia. Similarly high prevalence rates - ranging from 61% to 73% - of overweight or obese adults were reported in the United States<sup>(19)</sup>. This high prevalence of overweight and obesity in Saudi Arabia are attributed to the economic growth and prosperity that bring about unhealthy lifestyle; which is characterized by decreased physical activity (due to more dependence on vehicles) and increased consumption of high energy foods. Despite these facts, there is a paucity of studies that evaluate the knowledge and attitude of Saudi people towards obesity and bariatric surgery.

In this study, the overweight/obese respondents were significantly inclined to be in the older age groups (above 46 years), married, and have high income and a family history of obesity. There was no significant association between BMI and sex, education, and smoking. On the other hand, other studies found that Saudi females were significantly more obese than males<sup>(15, 17)</sup>. This difference may be due to variations in the studied population. High income is expected to be associated with less physical activity and consumption of fast restaurant foods that are rich in refined sugar and fat. Family history of obesity may affect the weight of an individual, either through genetic factor or the unhealthy lifestyle factors prevalent in the individual's family

environment. Studies have shown that obese parents are more likely to raise obese children<sup>(20)</sup>.

In the current study, most respondents demonstrated good knowledge about obesity and its risk factors. The most identified risk factors included sleepiness and decreased mobility (92%), overeating (86.8%), and genetic factor (75.2%). Psychiatric illness was chosen only by nearly half the respondents. Differences in knowledge between the two groups appeared in the form of a significantly higher percentage of overweight/obese respondents identifying sleepiness and decreased mobility, overeating and psychiatric illness. Most cases of obesity occur due to the combined effect of increased food intake and lack of physical activity<sup>(21)</sup>. In some cases, genetic factors, medical or psychiatric diseases play a role in the development of obesity<sup>(22, 23)</sup>. In Saudi Arabia, changes in diet - in the form of an increased consumption of fried, sweetened, and fast restaurant foods as well as a decreased intake of vegetables and fruits - are accused for the escalating rates of obesity among both children and adults<sup>(24)</sup>.

In the present study, most respondents displayed also a good knowledge about practices that may prevent weight gain or enhance weight loss. These included: practicing sport (99.8%), drinking water (79.2%), and eating fruits (60.6%). Significantly higher percentage of overweight/obese subjects recognized the importance of drinking plenty of water. Although a large proportion of the respondents recognized the contribution of decreased mobility to development of obesity, sport was practiced by about half the respondents only. Even among those who practiced sport, about one third only practiced it once per week and one sixth on daily basis. As could be expected, significantly lower percentage of overweight/obese practiced sport; though the rate of sport practice was not significantly different between the two groups. Decreased levels of physical activity play a significant role in increasing the rates of obesity in Saudi people<sup>(16, 25)</sup>.

Decreased consumption of fruits is known to be associated with higher BMI<sup>(26)</sup>. Vegetables and fruits have low energy, high water and fibre content, thus, their inclusion in the diet helps to maintain body weight while achieving satiety. Drinking plenty of water can promote weight loss either through changes in metabolism or decreasing total caloric intake<sup>(27, 28)</sup>. Moreover, the majority of respondents did not calculate their intake of calories, therefore they

would not be able to assess their consumed quantity of calories and whether if it requires modification. Restriction of caloric intake was found to induce more weight loss than high fruit and vegetable diet<sup>(29)</sup>.

In this study, the majority of respondents - particularly the overweight/obese subjects - identified the association between obesity and medical diseases. Several studies have confirmed that obesity imposes a great risk to health and life. Obesity is a major risk factor for a variety of disorders, including hypertension, type 2 diabetes mellitus<sup>(30)</sup>, coronary heart disease<sup>(31)</sup>, stroke, gallbladder disease, dyslipidemia, osteoarthritis, gout, and sleep apnoea syndrome<sup>(10)</sup>. The ill effects of obesity are reversible if the excess weight is lost and the body mass index returns within normal range placing utmost importance on the implementation of weight reduction therapies for obese individuals<sup>(32)</sup>.

In the current study, the efficacy of bariatric surgery in reducing weight was recognized by most respondents (70.8%); which is a higher percentage than those reported by **Sarwer *et al.***<sup>(33)</sup> and **Sikorski *et al.***<sup>(34)</sup> (28.5% and 50% respectively). The amount of weight loss after bariatric surgery surpasses that achieved by other treatments for obesity; reaching 50% to 75% of excess weight<sup>(35, 36)</sup> and body weight is maintained for years. However, more than half the respondents did not view it as the easiest and fastest method and doubted its safety. Overall, only 16.2% believed that surgery is the best choice for weight reduction. Overweight/obese subjects seemed to hold better concepts about bariatric surgery as significantly higher percentages agreed to its being the easiest, fastest and best choice for treatment of obesity. Previous studies have reported also variable percentages of participants that support bariatric surgery, ranging between 2.2% in general population<sup>(37)</sup> to 45% in diabetic patients<sup>(33)</sup>. It appears that the presence of obesity and medical disorders is associated with agreement to weight reduction surgeries. Wee *et al.*<sup>(38)</sup> found that subjects with morbid obesity were willing to undergo surgery even if the risk of death is high. Munoz *et al.*<sup>(39)</sup> reported that seeking health benefits was the main motive for undergoing bariatric surgeries, followed by preventing medical disorders, and self-esteem.

Respondents in the present study expressed exaggerated concern and misconceptions about the complications of bariatric surgery, as 73% agreed that surgery may have fatal complications. Similar concerns were

reported in previous studies<sup>(33)</sup>. Even health care professionals were found to share these misconceptions and overestimation of surgery risks<sup>(40)</sup>. The well-known reported complications of weight reduction surgeries include deficiencies of protein, vitamins and iron, early postoperative gastrointestinal hemorrhage, gall stones, marginal ulceration and vomiting<sup>(41)</sup>. The mortality risk of bariatric surgery was reported to be less than 0.5%<sup>(42)</sup>.

In the present study, we found that male subjects - who were in older age groups, had a secondary school education and a body mass index above normal range - were more likely to regard bariatric surgery as the best choice for weight loss. On the other hand, Sikorski *et al.*,<sup>(34)</sup> found that higher age was associated with decreased expectations of effectiveness.

**Conclusion:**

The results of this study indicated a high prevalence of overweight and obesity in the studied population. Lack of practicing sport and non-monitoring of caloric intake are potential risk factors for excess body weight that were identified among the respondents. Most respondents expressed their doubt about the complications of surgery, overestimated its risks, and did not view bariatric surgery as the best choice for weight loss. This negative attitude towards bariatric surgery forms a barrier that makes patients refuse surgery, even if seriously indicated for their health. Health education is recommended to address these misconceptions and convince those in need of surgery of its relative safety and the expected health benefits.

**Limitations:**

The body weight and height was reported by the individuals themselves and not measured by the researchers, which may be subject to inaccuracies. The results were derived from analysis of questionnaires by citizens of Riyadh and may not be generalized to other regions of Saudi Arabia.

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