



Prevalence, Perception and Complication of Obesity among Adults Who Visited Riyadh Park Mall during Obesity Awareness Day in Riyadh

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Introduction

Obesity is defined as the accumulation and storage of excess fat that affects the health and quality of life of a person. Body mass index (BMI) is one of the tools that is used in the classification of obesity, with a BMI more than or equal 30 kg/m² defining obesity. Globally, in 2016 there were 650 million people who were suffering from obesity and the mortality related to obesity was at least 2.8 million. Obesity prevalence tripled between 1975 and 2016 [1] and has currently reached epidemic proportions across the world.

With a multifactorial aetiology, obesity is a complex health issue to address. Studies conclude several factors like genetics, environmental factors and individual factors like dietary patterns, physical inactivity, medications, stress, endocrine and metabolic causes as related to obesity [2, 3]. Studies have found an association between elevated BMI and other chronic illness such as hypertension, type2 diabetes, obstructive sleep apnoea, hyperlipidaemia, osteoarthritis, certain types of cancer and other psychosocial effects [2]. A wide range of adverse surgical and obstetric outcomes are also associated with obesity. Reports from high-income countries indicate that a variety of emotional and psychological disturbances are also associated with obesity. It is reported to predispose people to

personal feelings of loss of self-esteem, resulting from prejudice and discrimination at work, school and social situations [4, 5]. The problem of obesity imposes substantial economic costs to the individual, the nation and the health system [6].

Obesity is a common chronic relapsing disease that affects the Saudi population; with high prevalence of overweight and obesity observed at regional and national level; in different age groups (adults, adolescents and children); and among both males and females. Obesity is found greater in males in urban areas; however, overall, it is more prevalent among females [7]. The 2013 Saudi Health Interview Survey (SHIS) [2] revealed obesity prevalence in Saudi Arabia to be around 28.7%. The prevalence was higher in females and those older (55-64 years). The highest prevalence was in the city of Hail and the lowest was in the city of Jazan [2].

A study [8] conducted in Al Kharj city with 1019 number of participant's revealed prevalence of overweight and obese at 54.3%. Another community based national epidemiological health survey [9] with 20,000 Saudi subjects in the age group of 30-70 years over a 5 years period (1995 -2000) showed the prevalence of obesity in Saudi Arabia to be about 35.5%. A national project [10] conducted in different regions of Saudi with 14,660 Saudi adults showed the prevalence of obesity was 13.05% and 20.26% in males and females respectively. They also found associations with several complications which increase both morbidity and mortality. A recent study of 1419 individuals (667 men and 752 women) from Jeddah

showed the prevalence of overweight and obesity was 35.1 and 34.8%, respectively, in men, and 30.1% and 35.6%, respectively, in women. Both overweight and obesity increased in prevalence to 60 years of age, and decreased in the oldest age group in both sexes [11].

The Saudi Burden of disease 2010 study showed that elevated BMI was the single leading risk factor for disability adjusted life years (DALYs) in Saudi Arabia [2]. Obesity accounted for 11.8% and 11.1% of DALYS for males and females respectively. Elevated BMI is the top risk contributing to death and DALYs combined in 2017 and this is up by 57.2% from the 2007-2017 number [12]. According to the Institute for Health Metrics and Evaluation, over the next 30 years, overweight will result in 462 million new cases of cardiovascular disease in 52 countries, and 212 million cases of diabetes - among other diseases. As a result, people will live on average 2.7 years less due to overweight, across Organisation for Economic Co-operation and Development (OECD) countries and an average 3.3 years less due to overweight in Saudi [13]. This decrease in life expectancy is the average across the total population - not just for people who are overweight.

The prevalence of overweight and obesity in the Saudi population still remains high and is predicted to increase drastically, indicating ineffectiveness or lack of preventive measures. Accurate body weight perception is important to maintaining an ideal body weight and seeking timely help if needed. Simultaneously, when the medical professionals and the public acknowledge obesity as a disease, this disease can be tackled without blame on the patients.

Our aim was to find out the prevalence, characteristics and complication of obesity among adults who visited the Riyadh Park Mall during the obesity awareness day on March 1st 2019. We also aim to measure the general knowledge, perceptions and attitudes of the adults toward obesity during the obesity awareness day. This research study will provide information necessary for bridging the gap in understanding the perceptions, beliefs, and knowledge of obesity among the public in Saudi. Therefore, data from this study will be used to formulate an effective national obesity control and prevention program aimed at not only educating, but also empowering the community to practice healthy lifestyles to decrease the prevalence and complications of obesity among our population.

Methods

A cross sectional mixed method study surveyed all adults (all nationalities 18 years and above) who visited the Riyadh park mall during the obesity awareness day on March 1st 2019. Excluded in this study are pregnant women, paediatric cases (age less than 18 years) and people who are dependent (on wheelchair, physical and mental disability etc). The Riyadh Park mall is recently opened and draws visitors from all over

Riyadh and neighbouring areas especially on a weekend, so non-probability convenience sampling was used to administer the questionnaire to those willing to participate.

Institutional Review Board (IRB) approval was obtained before the initiation of the study. Participants were assured that all collected data will be strictly confidential and will be used only for purpose of the research. Upon obtaining consent from each participant, self-administered questionnaires developed to elicit information about perceptions of weight status, physical activities, sedentary activities, as well as their knowledge and attitudes toward overweight and obesity in general were used.

The questionnaire formulated and reviewed by two obesity medicine consultants was based on previous literature review and the population characteristics. It was also reviewed by a research expert.

The questionnaire consists of three parts, the first part collects sociodemographic and socioeconomic information: gender, nationality, age, marital status, financial income, place of residence, education level, occupation and place of employment.

The participants' height, weight and waist size were measured. The weight of an individual body was measured in socks and light clothes to the nearest 0.1 kg, using a similar digital medical scale which was calibrated to the zero level and was also verified for repeatability of the readings. Height of a participant was measured to the nearest of 0.1 cm using a stadiometer precisely noted in standing position with no shoes on. Waist circumferences (WC), at the level of the hip and umbilicus circumference was measured at the widest girth of the hip using a flexible non-stretchable tape. BMI was computed by dividing weight by height in meters square (kg/m^2) and weight categories were demarcated following the WHO standard guidelines.

Overweight can be defined as a BMI of >25 and <30 , and 1st class obesity as an index of $30.0 - 34.9$, 2nd class obesity as BMI $35.0 - 39.9$ and 3rd class obesity as BMI > 40 [14]. Diabetes Mellitus (DM) was defined as a self-reported history of diabetes or using the American Diabetes Association (ADA) criteria for the HbA_{1c} test results where pre-diabetes was defined using HbA_{1c} cut-off level of $5.7 - < 6.5\%$, while DM was $\geq 6.5\%$ and $< 5.7\%$ was normal.

The second part of the questionnaire consists of close ended questions that address perception, attitude and knowledge about obesity and its complications. The third part of the questionnaire recorded whether the participants had taken any weight loss medicine, undergone weight loss surgery, had any comorbidities and about their exercise habits. Blood samples were also collected from each participant by trained nurses and phlebotomy for HbA_{1c}. The HbA_{1c} test results were recorded. The

questionnaires were examined for completeness and accuracy and then all questionnaires were coded and entered into a computer.

Data Analysis

Survey data was analysed using descriptive and inferential statistics, and content analysis was used for qualitative data. Mean and standard deviation will be used for quantitative variables while frequencies and percentages will be used for qualitative variables. Chi-Square test will be used to explore the association between categorical variables. A p-value of ≤ 0.05 and 95% confidence intervals will be used to report the statistical significance and precision of the results. Data will be analysed using the statistical software package SPSS version 23.

Results

Out of the 95 adults that participated in the study, 62.1% were female and 74.7% were Saudis. The mean age of the participants was 35.09 ± 10.07 years (range 18-70). The mean BMI was 30.05 ± 5.69 kg/m² with the BMI ranging from 19 to 45 kg/m². Thirteen (13.7%) participants were of normal BMI, 31 (32.6%) were overweight and 44 (46.31%) were obese. Male weighed statistically significant more than women (86.28 ± 17.29 vs. 74.45 ± 15.33 , $p = 0.0010$). Other anthropometric parameters based on gender were not statistically significant. The younger participants had a statistically significant lower BMI than their older counterparts (28.03 ± 6.56 vs. 30.81 ± 5.18 , $p = 0.04$). Other parameters based on age were not statistically significant. (Table 1) shows the anthropometric measurements of the participants with HbA_{1c} values and (Table 2) shows the number of people in each BMI and HbA_{1c} group.

(mean ± SD)			
	Overall	Male (n=36)	Female (n=59)
Age	35.09 ± 10.07	33.86 ± 11.3	35.85 ± 9.27
Height	1.64 ± 0.11	1.6964 ± 0.1053	1.5957 ± 0.0885
Weight	79.23 ± 17.08	86.28 ± 17.29	74.45 ± 15.33
BMI	30.05 ± 5.69	30.52 ± 5.81	29.73 ± 5.64
Waist	93.60 ± 8.08	91 ± 8.5	94 ± 8.3
HbA _{1c}	6.46 ± 1.7	6.4 ± 1.6	6.5 ± 1.8

Table 1: Anthropometric and HbA_{1c} values.

		n	%
BMI	Normal	13	(13.7%)
	Pre obesity	31	(32.6%)
	1st class obesity	29	(30.5%)
	2nd class obesity	8	(8.4%)
	3rd class obesity	7	(7.4%)
	Missing data	7	(7.4%)
HbA _{1c}	Normal	31	(32.6%)
	Pre-Diabetic	15	(15.8%)
	Diabetic	22	(23.2%)
	Missing data	27	(28.42%)

Table 2: BMI and HbA_{1c} categories of participants.

		n (%)
Gender	Male	36 (37.9)
	Female	59 (62.1)
Nationality	Saudi	71 (74.7)
	Non-Saudi	24 (25.3)
Marital Status	Married	52 (54.7)
	Single	34 (35.8)
	Divorced	7 (7.4)
	Widowed	2 (2.1)
Income	< SAR 5000	38 (40.0)

	SAR 5001-10,000	28 (29.5)
	SAR 10001-20,000	22 (23.2)
	Above SAR 20001	7 (7.4)
Residence	Riyadh	82 (86.3)
	Outside Riyadh	13 (13.7)
Education level	Uneducated	0
	Primary	4 (4.2)
	Intermediate	3 (3.2)
	Secondary	13 (13.7)
	University	71 (74.7)
	Others	3 (3.2)
Job	Administrative employee	34 (35.8)
	Teacher	18 (18.9)
	Military field	6 (6.3)
	Doctor	7 (7.4)
	Lawyer	0
	Nurse	2 (2.1)
	Secretary	1 (1.1)
	Engineer	4 (4.2)
	Housewife	14 (14.7)

Table 3: Sociodemographic and socioeconomic profile of participants.

Most participants were married 54.7%, with an income <5000 SAR (40%) and living in Riyadh (86.3%). Majority of participants had university level education (74.7%) and were administrative employees (35.8%). (Table 3) outlines the sociodemographic characteristics of the participants.

Perception of their Weight

The nurses' measurements of BMI disagreed with the participants' perceptions of their own weight and obesity. Of the overweight participants, 45.9% thought they were not suffering from obesity. Of the obese participants, 29.62% thought they were not suffering from obesity. 10.3% of participants in the normal BMI category thought they were obese. (Table 4) shows the perceptions of participants on obesity depending on BMI class.

Do you suffer from obesity?		Yes (n=39)		No (n=37)		I don't know (n=19)	
		N	%	n	%	n	%
BMI cat	Normal	4	-10.30%	9	-24.30%	0	0.00%
	Pre obesity	7	-17.90%	17	-45.90%	7	-36.80%
	1st class obesity	15	-38.50%	5	-13.50%	9	-47.40%
	2nd class obesity	5	-12.80%	3	-8.10%	0	0.00%
	3rd class obesity	7	-17.90%	0	0.00%	0	0.00%

Table 4: Perception of obesity.

Knowledge on Obesity

The participants were asked three questions to assess their knowledge about obesity. First question asked participants to

identify the correct BMI value which is classified as obesity. The choices given was > 30 kg /m², > 35 kg /m² and > 40 kg /m². 60% of the participants got the correct answer, answers are tabulated in (table 5).

Obesity defined as BMI more than:	> 30 kg / m ²	57	-60.00%
	> 35 kg / m ²	23	-24.20%
	> 40 kg / m ²	15	-15.80%
Summary of answer to the question	Wrong	38	-40.00%
	Correct	57	-60.00%

Table 5: Definition of obesity.

The second question asked participants if they thought obesity was a disease. The choices given were yes, no and I don't know. 91.6% of the participants got the correct answer, this is tabulated in (table 6).

Do think obesity is a disease?	Yes	87	-91.60%
	No	3	-3.20%
	I don't know	3	-3.20%
Summary of answer to the question	Wrong	6	-6.30%
	Correct	87	-91.60%

Table 6: Is obesity a disease?

There was significant difference between genders in answering the question about the definition of obesity, men were significantly more knowledgeable in answering the correct BMI value. In the other questions there were no significant differences based on gender and education as tabulated in (table 7).

Question	Answer	Gender n (%)			Education n (%)		
		Male	Female	p-value	Less than college (n = 20)	College and higher (n=74)	p value
Obesity defined as BMI more than -----	Wrong	8 (22.2%)	30 (50.8%)	0.01	27 (50.0%)	27 (36.5%)	0.27
	Correct	28 (77.8%)	29 (49.2%)		47 (50.0%)	47 (63.5%)	
Do think obesity is a disease?	Wrong	2 (5.6%)	4 (6.8%)	0.87	2 (10.0%)	4 (5.4%)	0.48
	Correct	32 (88.9%)	55 (93.2%)		18 (90.0%)	68 (91.9%)	

Table 7: Knowledge on obesity based on gender and education level.

The third question asked participants to identify the causes of obesity. 67.4% of the participants said obesity was caused due to nutrition and food intake, 55.8% said it was due to lack of physical activity and 47.4% said it was due to genetics. The causes reported by participants are tabulated in (table 8).

Cause	n	%
Genetic	45	(47.4%)
Nutrition-food intake	64	(67.4%)
Lack of physical activity	53	(55.8%)
Side effect or related to some medications uses	25	(26.3%)
Smoking	5	(5.3%)
Sleep disorder	8	(8.4%)
Endocrine and Metabolic Disorders	23	(24.2%)
Psychiatric illness	10	(10.5%)
Others	4	(4.2%)

Table 8: Causes of obesity.

The questionnaire revealed the following key themes and perceptions among participants:

1. Obesity was considered an abnormal or disease condition
2. Genetics, unhealthy diets and lack of exercise were the most contributing factors to obesity
3. Majority of the participants (60 %) correctly answered that a BMI of > 30 km/m² defined obesity. There was a significant difference (p=0.01) in knowing this fact between genders, with 77.8% of men answering correctly versus 49.2 % of women.

The HbA_{1c} results of the participants with no known history of diabetes showed 55.36% were normal, 23.21% were diabetic and 21.43% were pre diabetic. Of the 12 known diabetes patients 25% had good control and the rest had HbA_{1c} values >6.5%. The results are tabulated in (Table 9).

		Diabetes Mellitus				
		No (n=56)		Yes (n=12)		Missing (n=27)
		N	%	N	%	
HbA _{1c} Category	Normal (<5.7%)	31	-55.36%	0	0.00%	
	Pre DM (5.7- <6.5%)	12	-21.43%	3	-25.00%	
	DM (≥6.5%)	13	-23.21%	9	-75.00%	

Table 9: HbA_{1c} results.

Part three of the questionnaire focused on co-morbidities of the participants and weight loss strategies used by the participants. Most participants had not participated in any weight loss programs. Of the 35% of participants that had participated in a weight loss program 90% used diet as their weight loss strategy. Majority (90%) believed their weight loss

program was beneficial. Most participants (92.6%) did not use any treatment or medicine for weight loss. Of the five participants that used treatment four of them found it beneficial. Six of the participants had surgery for obesity and three said it was beneficial for them. (Table 10) tabulates the various weight loss strategies used by the participants.

		N	%
Have you ever participated in a weight loss program?	Yes	33	34.70%
	No	62	65.30%
What type of program:	Diet	19	57.60%
	Fasting	1	3.00%
	Physical exercise	11	33.30%
Was it beneficial?	Yes	30	90.90%
	No	2	6.10%
Have you ever had a treatment or given medications for obesity?	Yes	5	5.30%
	No	88	92.60%
Was it beneficial?	Yes	4	80.00%
	No	1	20.00%
Have you ever had obesity surgery?	Yes	6	6.30%
	No	88	92.60%
What kind of surgical intervention	Liposuction	1	16.70%
	Sleeve	2	33.30%
Was it beneficial?	Yes	3	50.00%

Table 10: Weight loss strategies opted.

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	n (%)
Do you suffer from any chronic disease?	Yes (17-17.9%) No (77-81.1%)
Hypertension	5 (29.4)
Type 2 diabetes	12 (70.6)
Obstructive sleep apnoea	2 (11.8)
Fatty liver /liver fibrosis	2 (11.8)
Psychiatric illness (depression/anxiety/others)	1 (5.9)

Table 11: Co-morbidities of participants.

Discussion

Prevalence of overweight and obesity matched other studies, where we found 32.6% of participants were overweight (which was stated as 23.1% -38.3% in other studies from Saudi [7, 9, 15]) and 46.3% being obese (which ranged from 20.3%-46% in other Saudi studies [2,8-11]).

A major factor that hinders efforts to treat or confront obesity and overweight include a lack of recognition by patients. Patients' perception on obesity were similar to other studies, where many patients thought they were not obese or overweight. Of the overweight participants, 45.9% thought they were not suffering from obesity. Of the obese participants, 29.62% thought they were not suffering from obesity. On the other hand, 10.3% of participants in the normal BMI category thought they were obese. A study [16] showed that only 59.9% of patients with obesity perceived their weight as obese, 33.7% of patients with a BMI of 30 to 34.9 kg/m² perceived themselves as having obesity and 71.4% of patients with a BMI of 45 to 49.9 kg/m² perceived themselves as having obesity. For patients with a BMI ≥50 kg/m², 52.9% perceived their weight to be obese. Patients' perception of obesity were significantly less than the prevalence of obesity, making this a barrier for patients to confront their obesity at the early stages.

According to the WHO, 44% of the diabetes burden, 23% of the ischaemic heart disease burden, and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity [14]. A study done in Hail, Saudi [17] concluded of the 2452 obese persons, 746/2452 (30.4%) and 781/2452 (32%) were hypertensive and diabetic patients, respectively. The Swedish Obesity Study showed hypertension to be present at baseline in 44-51% of obese subjects [18]. Excess body weight may account for up to 26% of cases of hypertension in men and up to 28% in women [19]. We found in this study 29.4% of participants were hypertensive and 70.6% had type 2 diabetes. Higher prevalence in our study can be attributed to the fact that participants are mostly from Riyadh where the diet and lifestyle pattern differs from Hail a lot.

Accurate body weight perception is important to maintaining an ideal body weight. People with obesity who gain weight perceive their own body size as smaller than it actually is compared to those who maintain a stable weight, according to the latest research [20] of over 2,000 obese people from the Swedish Obese Subjects (SOS) study done over a decade.

Another global obesity study [21] of UK data shows, on average, obese people in the UK struggling with their weight for nine years before they seek medical help -higher than the global average of six years. These delays increase their risk of developing obesity-related conditions such as type 2 diabetes, obstructive sleep apnea and cancer. Almost more than half of the obese people never discussed their weight with doctor since obese people felt that it was on them to manage their excess weight, and UK doctors incorrectly perceived their patients to be not motivated to lose their weight.

These incorrect perceptions both by the people and health care workers hinder the battle against obesity. In 2013, the American Medical Association [22] acknowledged obesity as a complex, chronic disease that requires a comprehensive approach to prevention and treatment. This recognition takes away some personal blame by acknowledging that obesity involves more than just food and exercise and it allows more obese patients to access healthcare if medical sources and insurance providers see obesity as a disease. In spite of this recognition, many do not believe they suffer from obesity and seek help too late.

According to our study of the overweight participants, 45.9% thought they were not suffering from obesity. Of the obese participants, 29.62% thought they were not suffering from obesity. 10.3% of participants in the normal BMI category thought they were obese. It is essential to address this perception and stigma to combat obesity by more awareness campaigns.

Most of the participants acknowledged that obesity is a disease and that the BMI>30 kg/m² defined obesity. However, there was a significant difference in this knowledge of BMI>30 kg/m² as defining obesity amongst gender. Thus, it is essential more public awareness is made about obesity to the general public and especially to the women as they are the

care takers of each household. Awareness will help people to get help early before their obesity becomes difficult to tackle. Most participants understood genetics, lifestyle and nutrition play an important role in obesity. Many studies also showed that there was a lack of awareness among Saudis and expatriates of obesity, its causes and effects [7, 23].

Conclusion

The present study exposes the lack of knowledge regarding obesity definition and erroneous perceptions of obesity among the participants. In spite of the efforts made to increase obesity awareness, the rate of obesity is significantly high in the country, and expected to increase in future. Therefore, it is imperative to raise the issue at the national level, and design efforts and strategies to tackle obesity in the country, through involvement of policy makers, educators, healthcare providers, and individual citizens.

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