

## Knowledge and Awareness of the Population towards Obesity and Weight Management Medications – A Cross-Sectional Study

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Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a health risk. Strategies for obesity management include lifestyle modification, physical activity, behavior therapy, pharmacologic therapy, and metabolic surgery. The prevalence of obesity in adults in Saudi Arabia (SA) showed a progressive increase from 22% to 36% in 15 years. Therefore, this study aimed to explore the percentage of obesity between adults in SA stratified by age and gender and highlight people's awareness in managing the problem. A Cross-sectional design using a questionnaire made out of 19 questions in both languages (Arabic and English) was designed and distributed for adults in Riyadh. There is a significant association of Body Mass Index (BMI) with both gender and age. Significantly higher percentages of females follow a specific diet plan or use weight-loss medications than males to manage their weight ( $P=0.02$ ). Intermittent fasting was the most tried diet plan between the study population (> 50%) with no significant difference between both genders. General awareness about obesity, its risk factors and management have to be increased to slow down the rapid increases in obesity prevalence in SA. A healthy lifestyle has been an indispensable choice not only for a healthy weight but also for an immunity boost.

**Keywords:** awareness, cross-sectional, obesity, weight management.

### INTRODUCTION

According to World Health Organization (WHO, 2017), overweight and obesity are defined as abnormal or excessive fat accumulation that presents a health risk. A crude population measure of obesity is the body mass index (BMI), a person's weight (in

kilograms) divided by the square of his or her height (in meters) (WHO, 2017). BMI is categorized into overweight (BMI 25 – 29.9), obese (BMI 30), and morbidly obese (BMI 40) (Denis and Obin, 2013). Obesity is a chronic disease characterized by a

remarkable increase in body fats, leading to disturbances in lipid and glucose metabolism, chronic inflammation, oxidative stress, and a higher risk of several diseases. Cardiovascular diseases, diabetes, hypertension, polycystic ovary syndrome (PCOS), and cancers are a few examples of such diseases (Ligibel et al., 2014; Leung et al., 2015; Scherer and Hill, 2016).

Obesity is associated with Deoxyribonucleic Acid (DNA) damage that will cause metabolic disorders such as diabetes and atherosclerosis-related diseases, increasing mortality rates (Van Gaal et al., 2006). The International Agency for Research on Cancer (IARC, 2018) has identified that several types of cancer, including postmenopausal breast cancer, endometrial cancer, renal cell carcinoma, esophageal adenocarcinoma, pancreatic, colorectal, and liver cancers, come up with obesity (Vainio and Bianchini, 2002; Chan et al., 2014; Nimptsch and Pischon, 2015; Pischon and Nimptsch, 2016; Secord et al., 2016). Polycystic ovary syndrome (PCOS) is the most common endocrine disorder in women of their reproductive ages (Collinson, 2017). In addition to endocrine disturbance, PCOS is a metabolic disorder whose central features are obesity, insulin resistance, hyperinsulinemia, dyslipidemia, increased oxidative stress, chronic inflammation and a high risk of cardiovascular diseases (Macut et al., 2015; Blagojević et al., 2018).

Strategies for obesity management include lifestyle modification, physical activity, behavior therapy, pharmacologic therapy, and metabolic surgery. Diet, exercise, and behavioral therapy should be included in all obesity management approaches for those with BMI of 25 kg/m<sup>2</sup> or higher. Pharmacotherapy should be considered when a BMI of 27 kg/m<sup>2</sup> or higher with comorbidity or BMI over 30 kg/m<sup>2</sup>. Bariatric surgery is an option for a BMI of 35 kg/m<sup>2</sup> with co-morbidity or BMI of over 40 kg/m<sup>2</sup> (Vetter et al., 2010).

Generally, the drugs approved by the US Food and Drug Administration (FDA) for obesity are intended for patients with a BMI of 30 or above (obese) or 27 or above (overweight) with a weight-related risk factor (For example, diabetes, hypertension) and they should be used as adjuncts to caloric restriction, physical activity, and behavior modification (FDA, 1999). According to Saudi Food and Drug Administration (SFDA, 2007), there are a few medications for obesity management in the local market; for examples, Orlistat (Xenical, Alli), Lorcaserin (Belviq) a fixed-dose combination of immediate-release phentermine and extended-

release topiramate (Qsymia), and a fixed-dose combination of bupropion and naltrexone (Contrave) and liraglutide (Saxenda) (SFDA, 2007).

Obesity is currently a major public health problem in most countries. As in the rest of the world, rising obesity prevalence has also been documented in the MENA (Middle East North Africa) countries, with roughly one-fifth of the adult population in the region considered as obese (Nikoloski and Williams, 2016). Saudi Arabia is one of the largest and wealthiest countries in the MENA region, and the prevalence of obesity in Saudi adults showed a progressive increase from 22% to 36% in 15 years (WHO STEP-wise approach, 2005). Al-Quwaidhi et al., (2014) indicated that the obesity prevalence would continue to increase in Saudi Arabia in both genders until 2022. Therefore, this study aimed to explore the prevalence of obesity between selected adults in Riyadh, Saudi Arabia with their awareness and attitude stratified by age and gender and measure their correlations to BMI.

## MATERIALS AND METHOD

### Study Design

A Cross-sectional study using a questionnaire made out of 19 questions in both languages (Arabic and English) was distributed randomly as a form/link to the adult population in Riyadh, Saudi Arabia in the period between January-2020 to March-2020.

### Venue

Riyadh, Saudi Arabia

### Inclusion Criteria

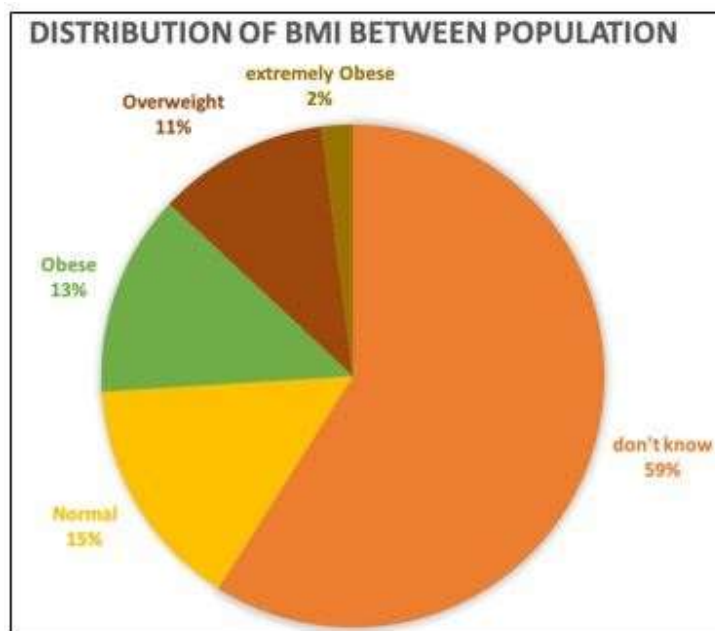
Both the genders, male and female between the age of 21 to 60 years, were included in the study.

### Exclusion Criteria

Pregnant and nursing females and those, who were under age 21 or above 60 years, were excluded.

### Study Tool

The proposed questionnaire was distributed randomly among adult populations in Riyadh, Saudi Arabia through a link to fill in a form. The



**Figure 1.** Distribution of categories of BMI.

questionnaire had multiple questions about the lifestyle that affects health and population awareness towards obesity and its management in addition to demographic data. A questionnaire comprising 19 questions was designed after referring to previous studies and interviews with two senior pharmacists, one clinical pharmacist, and one nutritionist who had over ten years of experience in their careers.

### Test of Validity

Two assistant professors, specialized in nutrition and family medicine, who had more than ten years of experience in the academic field, independently examined each question, and they stated that all questions fully capture the topic of weight management. Pretesting was done by distributing the questionnaire to a sample of 10 participants selected randomly. The responses from those individuals were subjected to factor analysis. As a result, minor changes to specific questions were made, and the total number of questions was reduced to 19 questions. The content validity was finally assessed by discussion and rating by academics and some college level students.

### Test of Reliability

A pilot questionnaire was given to 10 participants and

then re-given to them after 45 days to test reliability and reproducibility. Cronbach's alpha was used to test reliability. The values ranged from 0.82 to 0.95, with an overall Cronbach's alpha of 0.92 showing excellent reliability.

### Statistical Analysis

After two months, 601 responses were recorded. Collected data were analyzed using Statistical Package for the Social Sciences (SPSS) software analysis tool (version 18). Chi-square test with  $p < 0.05$  was used to check for the significance of differences in responses. Spearman's Correlation test was performed to find a correlation between BMI and different types of diets.

## RESULTS

More than half of the population did not know their BMI, although they knew their weight and height (Figure 1, Table 1). About one quarter (26%) of the selected participants indicated their BMI as more than 25 (Figure 1), although, fifty-eight percent of the studied population had a self-perception of being overweight/obese. This was indicated by the responses that showed almost half of them (49.3%) did not frequently weigh themselves while only 22.8%

**Table 1.** Characteristics of the study participants (n=601).

Characteristics	n	%	
Gender	Male	101	16.8
	Female	500	83.2
Age	21-30	295	49.1
	31-40	118	19.6
	41-50	98	16.3
	> 50	90	15.0
Weight (Kgs)	50-69	286	47.6
	70-89	226	37.6
	90-109	89	14.8
Height (Cms)	150 - 159 cm	281	46.8
	160 - 169 cm	232	38.6
	> 169 cm	88	14.6
BMI	18.5 – 25	92	15.3
	26 – 30	65	10.8
	31- 35	52	8.7
	36 – 40	25	4.2
	> 40	11	1.8
	I do not know	356	59.2
Self-perceived weight	Normal weight	252	41.9
	Overweight	295	49.1
	Obese	54	9.0
How often check weight	Every day	69	11.5
	Every week	137	22.8
	Every month	74	12.3
	Not frequent	296	49.3
	Never	25	4.2

were regularly checking their weights on weekly basis (Tables 1 and 2). There is a significant association of BMI with both gender and age, while most of those who were ignorant to their BMI were millennials (Table 2).

Significantly higher percentages of females follow a specific diet plan or use weight-loss medications than males to manage their weight ( $p=0.02$ ). Males significantly preferred to do exercises rather than females ( $p=0.02$ ) (Table 3). Less than 10% of the study population depended on weight loss

medications whereas females were significantly more than males (Table 3). There were no significant differences between males and females regarding sleeping and drinking water ( $p>0.05$ ) (Table 3). From the different diet plans that the population usually follows, more than half of the population tried intermittent fasting with no significant difference between both genders ( $p=0.09$ ) (Table 4). Ketogenic diet plans were not very popular among participants with less than 15% of the total population (Table 4). Additionally, more male participants, significantly,

**Table 2.** BMI of the study participants.

Variables		18.5 - 25		26 - 30		31- 35		36 - 40		> 40		Don't know		$\chi^2$	Df	p
		n	%	n	%	N	%	N	%	n	%	n	%			
Gender	Male	14	15.2	11	16.9	16	30.8	2	8.0	5	45.5	53	14.9	16.199	5	0.006*
	Female	78	84.8	54	83.1	36	69.2	23	92.0	6	54.5	303	85.1			
Age	21-30	69	75.0	24	36.9	17	32.7	9	36.0	6	54.5	170	47.8	48.764	15	0.000
	31-40	15	16.3	17	26.2	10	19.2	3	12.0	2	18.2	71	19.9			
	41-50	3	3.3	14	21.5	16	30.8	6	24.0	2	18.2	57	16.0			
	> 50	5	5.4	10	15.4	9	17.3	7	28.0	1	9.1	58	16.3			

**Table 3.** Weight loss management among different genders.

Variables		Male		Female		$\chi^2$	Df	p
		n	%	n	%			
Follow diet	No	48	47.5	178	35.6	5.092	1	0.024*
	Yes	53	52.5	322	64.4			
	Total	101	100.0	500	100.0			
Exercise	No	33	32.7	225	45.0	5.211	1	0.022*
	Yes	68	67.3	275	55.0			
	Total	101	100.0	500	100.0			
Sleep well	No	77	76.2	411	82.2	1.957	1	0.162
	Yes	24	23.8	89	17.8			
	Total	101	100.0	500	100.0			
Drink water	No	58	57.4	238	47.6	3.246	1	0.072
	Yes	43	42.6	262	52.4			
	Total	101	100.0	500	100.0			
Weight loss medication	No	100	99.0	468	93.6	4.739	1	0.029*
	Yes	1	1.0	32	6.4			
	Total	101	100.0	500	100.0			

follow the Dukan diet plan to control their weight than females ( $p=0.004$ ) (Table 4).

Spearman's correlation test showed a weak positive correlation between BMI and Dukan diet ( $r = 0.013$ ,  $p=0.753$ ), while, Atkins ( $r = -0.004$ ,  $p=0.922$ ) and Keto ( $r = -0.048$ ,  $p=0.242$ ) diets showed very weak negative correlations with the BMI categories, as shown in Table 5.

## DISCUSSION

The concept of body mass index (BMI) may not be well understood by most of the study population. This shares similar views with Post and his collaborators in 2015 which indicated low comprehension of BMI (Post et al., 2015). The contradiction in responses between the ignorance of BMI and checking the

**Table 4.** Various types of diet plans tried by the participants.

Variables		Male		Female		$\chi^2$	Df	p
		n	%	N	%			
Dukan	No	87	86.1%	471	94.2%	8.220	1	0.004*
	Yes	14	13.9%	29	5.8%			
Atkins	No	92	91.1%	463	92.6%	.271	1	0.602
	Yes	9	8.9%	37	7.4%			
Keto	No	96	95.0%	458	91.6%	1.387	1	0.239
	Yes	5	5.0%	42	8.4%			
Intermittent fasting	No	55	54.5%	227	45.4%	2.767	1	0.096
	Yes	46	45.5%	273	54.6%			
Others	No	85	84.2%	402	80.4%	.772	1	0.380
	Yes	16	15.8%	98	19.6%			

**Table 5.** The correlation between BMI and types of diets.

		BMI	Dukan	Atkins	Keto
BMI	Correlation Coefficient	1.000			
	Sig. (2-tailed)	.			
Dukan	Correlation Coefficient	.013	1.000		
	Sig. (2-tailed)	.753	.		
Atkins	Correlation Coefficient	-.004	.017	1.000	
	Sig. (2-tailed)	.922	.674	.	
Keto	Correlation Coefficient	-.048	.039	.126**	1.000
	Sig. (2-tailed)	.242	.335	.002	.

\*\* . Correlation is significant at the 0.01 level (2-tailed).

weight on regular basis with their self-perception of being overweight or obese assure the poor comprehension of BMI. This can be explained as people may depend solely on body weight without taking their heights in consideration. Males and older participants were significantly better than females and millennials in knowing their BMI, respectively. The exercise was a considerable lifestyle practice that significantly differentiated between males and females in Saudi Arabia as females were considerably less active and did not pay much attention to regular exercises. In 2018, Al-Hazaa

reported that the majority of Saudi children, youth and adults were not active enough to meet the recommended guidelines for moderate to vigorous physical activity while Saudi females were disproportionately less active than males (Al-Hazaa, 2018). Unfortunately, this might lead to an increased risk of non-communicable diseases. Drinking water or getting enough sleep could not significantly differentiate between both genders of the studied population. While the two factors are significant in any lifestyle regimen that aims to manage body weight. Body weight regulation is a complex process, and

increased water intake should be part of the measures required to reduce the overall risk factors (Thornton, 2016).

Fortunately, a few participants were dependent on weight loss medications and more proportions were dependent on following a specific diet plan with or without exercises. Although, Dukan diet was not very popular among participants; however, from those who followed it, males were significantly higher than females. This could be due to the high protein content of this type of diet regimen. The low-carbohydrate ketogenic (Keto) diet plan was only followed by less than 14% of the study participants and this might be due to its complications such as loss of muscle mass and the prevalent keto flu symptoms. Also, the ketogenic diet could be too extreme for chronic use in adult patients since it may produce unwanted iatrogenic effects. People with type-two diabetes mellitus on oral hypoglycemic agents who were put on a ketogenic diet were at increased risk of developing hypoglycemia (Feinman et al., 2015).

## CONCLUSION

General awareness about obesity, its risk factors and management need to be increased. Comprehension of the concept of BMI between adults in Riyadh, Saudi Arabia may help those who are overweight, obese or clinically obese to address their risk factors and thus start their successful journey of obesity management. Besides, this would help in slowing down the rapid increase in obesity prevalence and hence lower the risk of non-communicable diseases in Saudi Arabia.

More efforts from all health care professionals are needed to increase the alertness of the Saudi population towards regular exercises. These intensified efforts will lead to a reduction in their sedentary behaviors and improvement of their physical activities and thus lower their risks of getting diseases associated with excess weight. A healthy lifestyle has been an indispensable choice not only for maintaining a healthy weight but also for boosting immunity against the uprising percentages of mutant viruses and bacteria at the current time.

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