

Determinants of Overweight and Obesity Among Saudi Women of Childbearing

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Abstract

Background and Objective

Overweight and obesity among women of childbearing age are important. We aim to evaluate the frequency of overweight and obesity among Saudi women of childbearing age.

Methods

We conducted a cross section study to analyze female participants. A total of 5152 between the ages 15 to 49 years were selected to be enrolled for the present study between January 2018 to December 2019 at the Endocrinology Department of King Fahad Armed Forces Hospital, Jeddah, Saudi Arabia. BMI values classified into groups as lean (BMI <18.5), normal weight (BMI=18.5 - 24.9 kg/m²), overweight (BMI=25.0 - 29.9kg/m²), obese Grade I (BMI=30 - 34.9kg/m²), obese Grade II (BMI=35.0 - 39.9kg/m²) and morbidly obese (obese Grade III) (BMI≥40kg/m²).

Results

The total sample size was 5152 women. Mean age was 36.6 ± 9.0 years. BMI is skewed positively (0.706). We found 145 (2.8%) were lean, 947 (18.7%) were normal weight, 1363 (27.0%) were overweight, 1234 (24.4%) were obese Grade I, 830 (16.4%) were obese Grade II while 532 (10.5%) were morbidly obese (obese Grade III). The frequency of overweight and obesity increased with advance with age group and morbid obesity was highest in the 30 - 39 year age group. BMI are skewed positively with each age group respectively. BMI showed an increase with advanced age, The correlation coefficient (r) between age and BMI was $r = 0.337$, $P < 0.0001$.

Conclusion

The frequency of overweight and obesity among women of childbearing age is high and considered as a critical public health concern.

Introduction

For both the developing and developed nations, the increase in worldwide overweight and obesity rates was a major public health epidemic [1]. Several risk factors could attribute to body weight including behavior, environment, genes, metabolism and socioeconomic status [2-4]. Overweight and obesity are defined as abnormal or excessive fat accumulation in the fat tissues of the body which are measured by a body mass index (BMI) [5-7]. It is well established that obesity is associated with hypertension, diabetes mellitus and cardiovascular disease [8].

Globally, about 30% of the world's population are either overweight or obese [9-12]. In 2008, 35% of adults aged 20 plus were overweight (BMI $> 25\text{kg/m}^2$), 35% were female where 28% of pregnant women are overweight and 11% are obese [13]. The highest rates of overweight and obesity were seen in the North Africa and Middle East in 2013, where more than (65%) of female age 20 or older were found to be either overweight or obese [10]. More than 600 million of adults, aged 18 years and older, were overweight in 2014 [11,12,14]. By 2015, 700 million adults worldwide will be obese as projected by the world health organization (WHO). Overweight and obesity affects female and male disproportionately between developed and developing countries. In 2014, WHO found that about (40%) and (15%) of female in developing countries were either overweight or obese respectively [14-17]. Worldwide, the proportion of women who are obese is higher than that of male (40% vs. 38%).

The prevalence of obesity and overweight in Saudi Arabia has been reported to be high in Saudi females [18-25]. Research indicates that a woman who is overweight or obese before she becomes pregnant also has a higher risk of complications during her pregnancy and higher prevalence of health problems for her children.

Women of childbearing age, defined by the WHO as women aged between 15 and 49 years [26]. Since obesity increases the risk for several pregnancy complications and adverse maternal and fetal outcomes, prevention of obesity among women of childbearing age is crucial [27]. We aim to evaluate the frequency of overweight and obesity in women of childbearing age in the western part of Saudi Arabia.

Methods

We conducted a cross section study to analyze female participants who are between the ages 15 to 49 years. A total of 5152 were selected to be enrolled for the present study between January 2018 to December 2019 at the Endocrinology Department of King Fahad Armed Forces Hospital, Jeddah, Saudi Arabia. Pregnant women were excluded. Weight (kg) and height (cm) were measured by nurses. BMI values classified into groups as lean (BMI <18.5), normal weight (BMI=18.5 - 24.9kg/m²), overweight (BMI=25.0 - 29.9kg/m²), obese Grade I (BMI=30 - 34.9kg/m²), obese Grade II (BMI=35.0 - 39.9kg/m²) and morbidly obese (obese Grade III) (BMI≥40kg/m²) 28. The total number of females were separated on basis of age values into 4 groups: 15 - 19 years, 20 - 29 years, 30 - 39 years and 40 - 49 years.

Statistical Analysis

Univariate analysis of demographic and clinical laboratory was accomplished using unpaired t-test between variables, to estimate the significance of different between groups where appropriate. Chi square (X²) test were used for categorical data comparison. Pearson correlation was used for correlation between variables All statistical analyses were performed using SPSS Version 23.0. The difference between groups was considered significant when P<0.05.

Results

A total of 5152 women were analyzed. Mean age was 36.6±9.0 years. The median, mean, mode, standard deviation, kurtosis and skewness of BMI in the Saudi females is presented in Table 1. Frequency distribution histogram for BMI is presented in Figure 1. A normal Gaussian distribution is shown by the histogram. BMI is skewed positively with a skewness of 0.706.

Table 1: Mean, median, mode, standard, kurtosis and skewness of Body mass index (kg/m²) for Saudi females of childbearing age

Parameters	Body mass index (kg/m ²)
Number	5152
Mean	30.8
Standard Error of Mean	0.1024
Median	30.2
Mode	33.3
Std. Deviation	7.4
Variance	54.030
Skewness	0.706
Standard Error of Skewness	0.068
Kurtosis	1.955
Range	68.5

Minimum		14.0
Maximum		82.5
Percentiles	2.5	18.1
	97.5	46.3

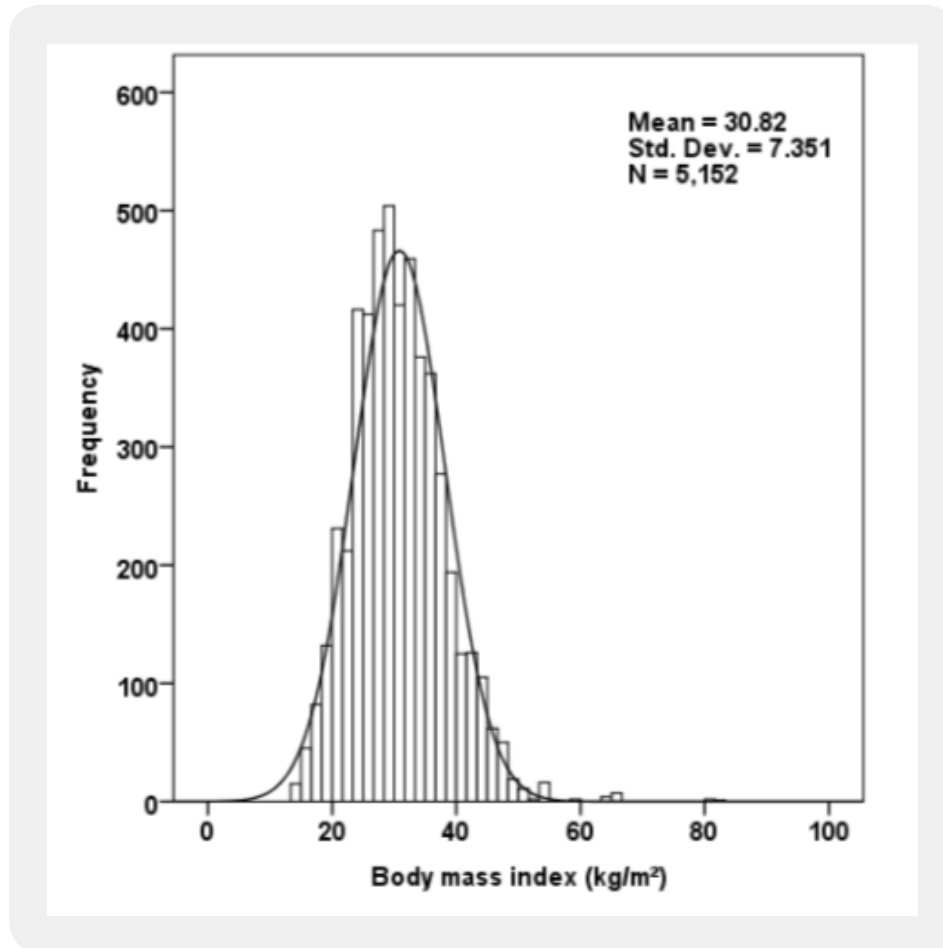


Figure 1: Frequency distribution histogram of body mass index (kg/m²) in Saudi females of childbearing age in different age groups.

In the study population, 145 (2.8%) were lean, 947 (18.7%) were normal weight, 1363 (27.0%) were overweight, 1234 (24.4%) were obese Grade I, 830 (16.4%) were obese Grade II while 532 (10.5%) were morbidly obese (obese Grade III), Table 2. The frequency of overweight and obesity increased with advance with age group and morbid obesity was highest in the 30 - 39 year age group.

Table 2: Body mass index (kg/m^2) categories in Saudi females of childbearing age in different age groups

Age (years)		Body mass index (kg/m^2)					
		<18.5	18.5-24.9	25.0-29.9	30.0-34.9	35.0-39.9	≥ 40.0
15-19	Count	41	137	70	10	19	10
	%	14.3%	47.7%	24.4%	3.5%	6.6%	3.5%
20-29	Count	74	325	242	98	72	29
	%	8.8%	38.7%	28.8%	11.7%	8.6%	3.5%
30-39	Count	15	313	457	445	283	258
	%	0.8%	17.7%	25.8%	25.1%	16.0%	14.6%
40-49	Count	15	172	594	681	456	235
	%	0.7%	8.0%	27.6%	31.6%	21.2%	10.9%
Total	Count	145	947	1363	1234	830	532
	%	2.9%	18.7%	27.0%	24.4%	16.4%	10.5%

BMI within age groups are skewed positively with a skewness respectively for each age group, Figure 2. The results show that the values of the mean, median and mode are very close to each other suggesting normal Gaussian distribution as shown by the histograms. With an increase in age, BMI showed a gradual increase, Figure 3 and 4. The correlation coefficient (r) and P value between age and BMI was $r = 0.337$, $P < 0.0001$, Figure 5.

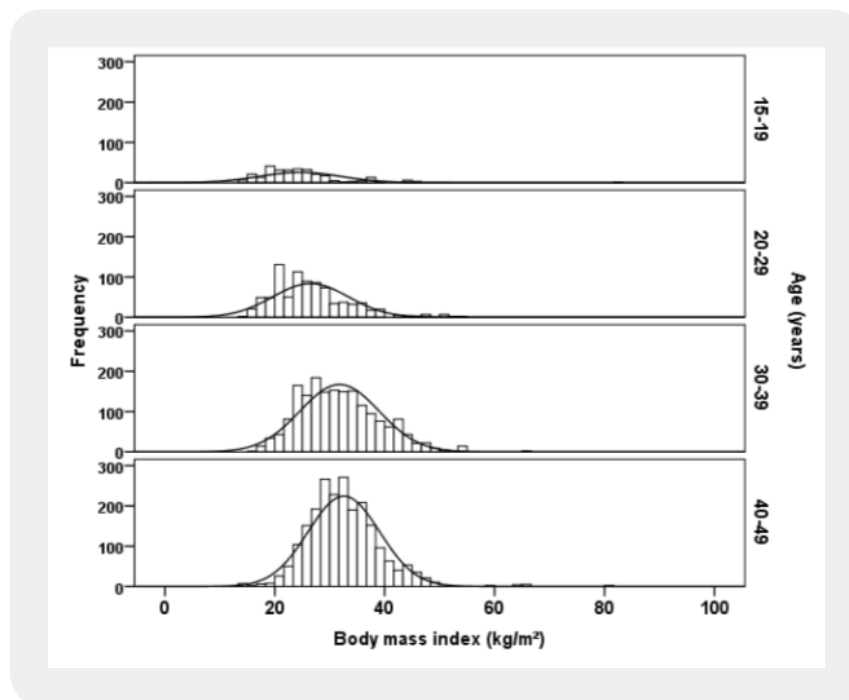


Figure 2: Frequency distribution histogram of body mass index (kg/m^2) in Saudi females of childbearing age in different age groups.

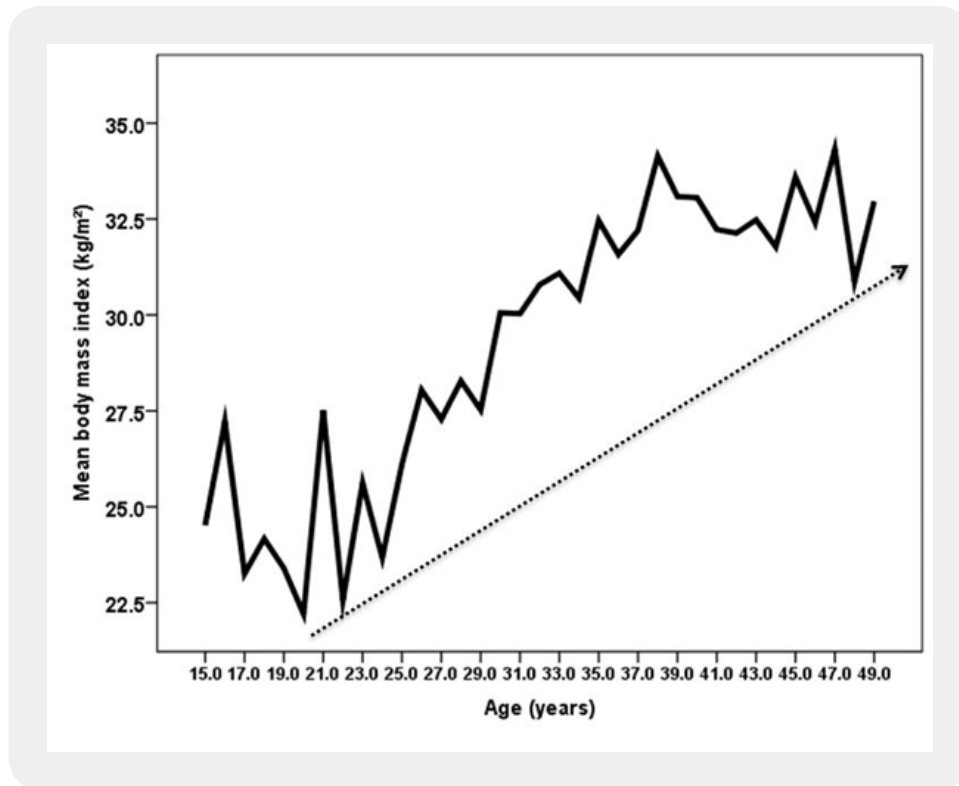


Figure 3: Mean body mass index (kg/m^2) in relation to age (years) in Saudi females of childbearing age

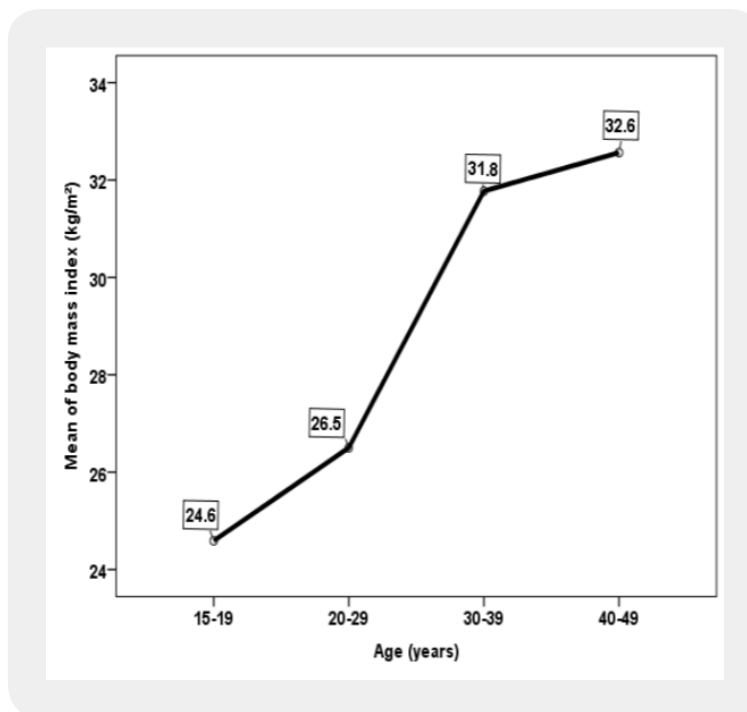


Figure 4: Mean body mass index and different age group

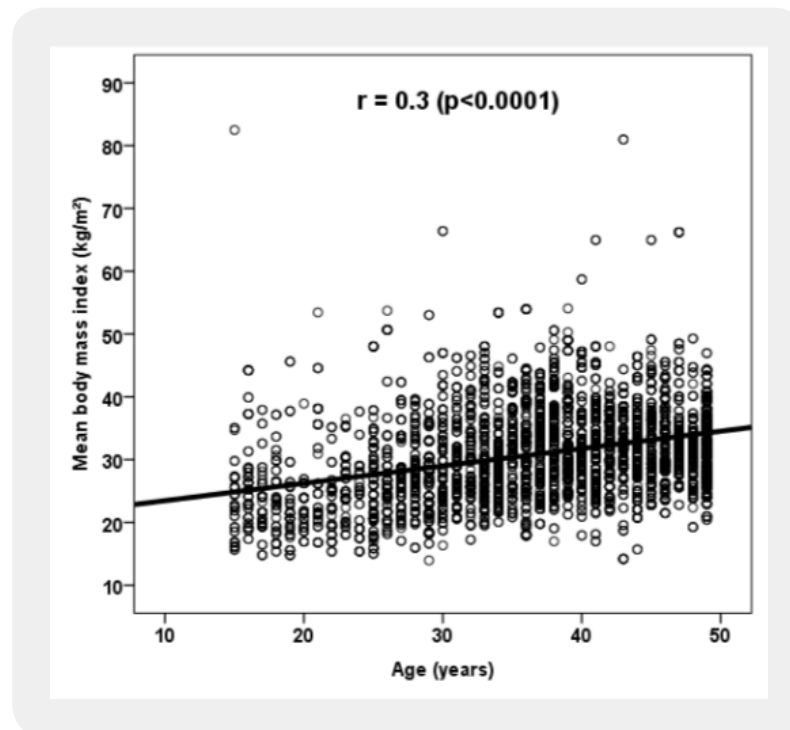


Figure 5: Mean body mass index (kg/m^2) in relation to age (years) in Saudi females of childbearing age

Discussion

Worldwide, 30% of the world's population are either overweight or obese [28]. Obesity is the most common nutritional disorder in developed countries and is becoming significant in developing countries, and more women in the fertile ages become overweight and obese. Obese women have higher risks of complications during pregnancy [29,30]. Obesity in women of reproductive age was found in 25% of cases. In the United States, obesity affects more than one third of the population and thus threatens the health of the nation including diabetes, heart disease [31,32]. In 2014, WHO found that about 15% and 40% of women in developing countries were either obese or overweight respectively [28]. In addition, the Health Survey for England found that obesity increased in women from 16% in 1993 to 26% in 2011 [33]. obesity may be regarded as an epidemic in Saudi adults like the developed countries of the world. Because of women's childbearing role, obesity in female has greater epidemiological importance than in male [34]. Females of childbearing age are at especially high risk because of the increased health risks of pregnancy complications and birth defects [35]. In our study, we randomly recruited adult Saudi females of childbearing age. We demonstrated that the frequency distribution histogram of BMI shows normal Gaussian distribution with skewness of 0.706 and kurtosis of 1.955. When the females are grouped into different age groups, an increase in BMI found from 24.6 ± 7.4 in the 15-19 y group to 32.6 ± 6.5 in the 40-49 years age group. The correlation coefficient is high and a statistically significant positive correlation between age and BMI is found ($r = -0.337$, $P < 0.0001$). These findings confirm other report that show that BMI increases with age in reports of Saudis and others [36-46].

The frequencies of leanness, normal weight, overweight, obesity grade I and II and morbid obesity in the total study group was 2.9%, 18.7%, 27.0%, 24.4%, 16.4% and 10.5% respectively. We showed that 47.8% of non-pregnant women aged 20-39 years were overweight or obese ($BMI \geq 25\text{kg/m}^2$), 45.9% were obese ($BMI \geq 30\text{kg/m}^2$) and 17.7% were extremely obese ($BMI \geq 40\text{kg/m}^2$). Our prevalence estimates are higher than those from Ogden *et al*, who published a prevalence data from NHANES 1999-2004 [47]. In their analysis of 2003-2004 NHANES data specifically, 51.7% of non-pregnant women aged 20-39 years were overweight or obese ($BMI \geq 25\text{kg/m}^2$), 28.9% were obese ($BMI \geq 30\text{kg/m}^2$) and 8.0% were extremely obese ($BMI \geq 40\text{kg/m}^2$). We showed the frequency of obesity was higher compared to other reports which reported an obesity prevalence of 26.1% and 18.8% respectively and morbid obesity in 4.5% and 2.3% respectively [22,36]. Two reports in 1994, one reported obesity in 41.9% and morbid obesity in 5.18% of females, while in the same year Khashoggi *et al* reported 64.3% of Saudi females to be obese [24,25]. However, due to the difference in the nature of the study group, it must be stressed that it is difficult to compare the results of the present study with those reported previously. Al Nuaim *et al* in two separate studies in 1997, reported 29.4% and 27% to be overweight, while El-Hazmi reported 25.2% of Saudi females aged between 14-70 y to be overweight [19-21]. Our data shows that as many as 2.9% of the Saudi females can be classified as lean which is lower than previously reported (10.17%) [36]. According to the Health Survey for England 2011 data, morbid obesity rates are higher for women (3.2%) than for men (1.7%) [33]. However, some data should be interpreted with caution as there is a margin of error due to the small proportions [48].

Clinical decision-making is driven in part by the prevalence of the condition in the general population. Obesity is considered to be a lifestyle disease, a result of modern living which has led to the creation of an obesogenic environment [49]. The need for effective weight management strategies is described in the mass media as well as in the healthcare literature [50]. In spite of public awareness of nutrition and fitness, of educational initiatives, and of the regulation of food marketing and other strategies, obesity continues to be a significant health risk for female Saudis. The impact of this health problem is described in terms of significant morbidity and mortality to childbearing-age women [51]. Childbearing-age women are a priority population for weight management initiatives because not only does maternal obesity affect the mother's health, it is associated with delivery complications and complications with the child's health, including a higher rate of birth defects [51].

The barriers, attitudes and motivators that affect weight management of childbearing age women are important to understand when considering measures to improve weight management of this high risk group [35,52,53]. These Saudi females present an ideal group for implementation of awareness programs as they can apply this information to prevent obesity development in themselves, their family members and their children.

This paper has provided evidence to the high frequency overweight and obesity amongst non-pregnant women of child bearing age resident in a sample size of our population exist. Results of our investigation must be interpreted in light of some limitations such as the cross-sectional design, which does not let to establish any causal relation with respect to obesity state and only provides mere associations. Considering the goal population, a larger cohort would have probably provided a greater power of the statistical analyses.

Conclusion

The frequency of overweight and obesity among women of childbearing age remains a critical public health concern. Clearly, despite the small sample size, this study has posed important public health issues that require immediate attention from the health authority. Unless immediate steps are taken to contain the increasing prevalence of obesity, the health care costs for chronic diseases will pose an enormous financial burden to the country.

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