Overweight and Obesity in Saudi Women of Childbearing Age

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Abstract

Background and Objective: The rise in global overweight and obesity rates over the last three decades. Obesity among women of childbearing age is important. The aims of the present study were to evaluate the frequency of overweight and obesity in Saudi women of childbearing age.

Methods: For the present study, we analyzed female participants who are between the age 15 to 44 years. A total of 2849 was selected to be enrolled for the present study. We excluded pregnant cases. All patients were from the population of the Primary health centre at King Fahad Armed Forces Hospital. All data were collected by personal interview and on the basis of a review of electronic medical data. Weight (kg) and height (cm) were measured by physician and nurse interviewers and recorded. Body mass index (BMI) values classified into groups as lean (BMI <18.5), normal weight (BMI = 18.5 - 24.9 kg/m^2), overweight (BMI = 25.0 - 29.9 kg/m^2), obese Grade I (BMI = 30 - 34.9 kg/m2), obese Grade II (BMI = 35.0 - 39.9 kg/m^2) and morbidly obese (obese Grade III) (BMI ≥ 40 kg/m^2). 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.

Main results: A total of 2849 women were analyzed. Age was 32.3 ± 9.1 years (minimum 15 and maximum 49 years). The mean, median, mode, standard deviation, kurtosis and skewness of BMI in the Saudi females is presented in table 1. Frequency distribution histogram for BMI suggested a normal Gaussian distribution as shown by the histograms. BMI is skewed positively with a skewness of 0.777. Within each age group, the frequency of leanness, normal weight, overweight, obesity and morbid obesity were calculated. 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 and on the basis of BMI values into groups classified as lean (BMI < 18.5), normal weight (BMI = 18.5 - 24.9), overweight (BMI = 25.0 - 29.9), obese Grade I (BMI = 30 - 34.9), obese Grade II (BMI = 35.0 - 39.9) and morbidly obese (obese Grade III) (BMI ≥ 40). In the study population, 165 (5.8%) were lean, 759 (26.6%) were normal weight, 785 (27.6%) were overweight, 637 (22.4%) were obese Grade I, 316 (11.1%) were obese Grade II while 187 (6.6%) were morbidly obese (obese Grade III). There was no significant difference between different BMI grades and mean age, frequencies of T2DM and HTN. The frequency of overweight and obesity increased with advance with age group and morbid obesity was highest in the 40 - 49year age group. BMI within age groups are skewed positively with a skewness of 0.771, 0.766, 0.945 and 0.971 respectively for each age group. 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. The correlation coefficient (r) and P value between age and BMI was r = 0.351, p < 0.0001.

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.

Keywords: Overweight; Obesity; Women of Childbearing Age

Introduction

Over the last three decades, the increase in worldwide overweight and obesity rates was a major public health epidemic in both the developing and developed nations [1]. A number of risk factors could attribute to body weight including behavior, environment, genes, metabolism, culture and socioeconomic status [2-4]. It is likely that obesity represents the manifestations of a spectrum of disorders, each arising from distinct defects or groups of defects in the weight regulatory system [2-4]. Overweight and obesity are defined as abnormal or excessive fat accumulation in the fat tissues of the body leading to impaired health or health hazards which are measured by a body mass index (BMI), a simple index to classify overweight and obesity in adults [5-7]. It is well established that obesity is associated with hypertension, diabetes mellitus and cardiovascular disease [8,9]. A strong association with up to 90% of type 2 diabetes mellitus being attributable to overweight and obesity have been demonstrated in epidemiological studies [10]. Life expectancy is reduced by an average of 2 to 4 years for those with BMI of 30 to 35 kg/m^2, and 8 to 10 years with a BMI of 40 to 50 kg/m^2 as suggested by the National Obesity Observatory estimates [11].

Globally, about 2.1 billion people nearly 30% of the world's population are either overweight or obese [12-15]. In 2008, 35% of adults aged 20 plus were overweight (BMI > 25 kg/m^2), 34% of male and 35% of female. In 2008, compared with 5% of male and 8% of female in 1980, 10% of male and 14% of female in the world were obese (BMI > 30 kg/m^2) [16]. 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 [13]. It was estimated in 2014 that, more than 1.9 million of adults, aged 18 years and older, were overweight and of these, over 600 million were obese [13,17,18]. By 2015, the world health organization projected that more than 700 million adults worldwide will be obese. Overweight and obesity affects female and male disproportionately between developed and developing countries. In developed countries for example, male tend to have higher rates of overweight and obesity, while female in developing countries exhibit higher rates of the two measures. In 2014, WHO found that about (40%) and (15%) of female in developing countries were either overweight or obese respectively [11,16,19,20]. Worldwide, the proportion of women who are obese is slightly higher than that of male (40% vs. 38%).

In reports from Saudi Arabia, the prevalence in the general population of obesity and overweight has been reported to be high both in Saudi males and females [21-28]. Some of these studies were conducted on individuals attending health care centers and only one study reports results from nursing and medical students at the University [25].

Women of childbearing age defined by the WHO as women aged between 15 and 49 years [29]. Prevention of obesity among women of childbearing age is important since obesity increases the risk for several pregnancy complications and adverse maternal and fetal outcomes [30]. The aims of the present study were to evaluate the frequency of overweight and obesity in Saudi women of childbearing age.

Methods

For the present study, we analyzed female participants who are between the age 15 to 44 years. A total of 2849 was selected to be enrolled for the present study. We excluded pregnant cases. All patients were from the population of the Primary health center at King Fahad Armed Forces Hospital. All data were collected on the basis of a review of electronic medical data and through a personal interview. Weight (kg) and height (cm) were measured by physician and nurse interviewers and recorded. BMI values classified into groups as lean (BMI < 18.5), normal weight (BMI = 18.5 - 24.9 kg/m^2), overweight (BMI = 25.0 - 29.9 kg/m^2), obese Grade I (BMI = 30 - 34.9 kg/m^2), obese Grade II (BMI = 35.0 - 39.9 kg/m^2) and morbidly obese (obese Grade III) (BMI ≥ 40 kg/m^2) [31]. 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 (X^2) test were used for categorical data comparison. Pearson correlation was used for correlation between variables All statistical analyses were performed using SPSS Version 22.0. The difference between groups was considered significant when $P < 0.05$.

Results

A total of 2849 women were analyzed. Age was 32.3 ± 9.1 years (minimum 15 and maximum 49 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 0.777.

Parameters		Body mass index (kg/m^2)
N		2849
Mean		28.797
Std. Error of Mean		0.1369
Median		28.200
Mode		27.0
Std. Deviation		7.3091
Variance		53.423
Skewness		0.777
Std. Error of Skewness		0.046
Kurtosis		1.578
Range		52.9
Minimum		13.1
Maximum		66.0
Percentiles	2.5	16.525
	97.5	44.500

Table 1: Mean, median, mode, standard, kurtosis and skewness of Body mass index (kg/m^2) in Saudi females of childbearing age.
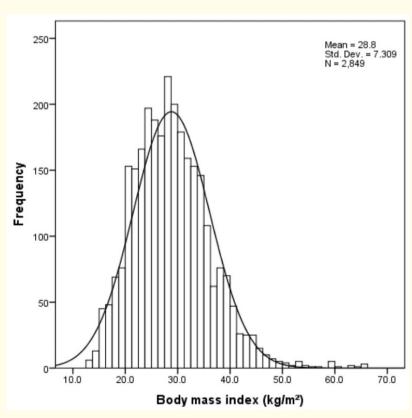

Figure 1: Frequency distribution histogram of body mass index (kg/m^2) in Saudi females of childbearing age in different age groups.

Within each age group, the frequency of leanness, normal weight, overweight, obesity and morbid obesity were calculated, and the results are presented in table 2. 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 and on the basis of BMI values into groups classified as lean (BMI < 18.5), normal weight (BMI = 18.5 - 24.9), overweight (BMI = 25.0 - 29.9), obese Grade I (BMI = 30 - 34.9), obese Grade II (BMI = 35.0 - 39.9) and morbidly obese (obese Grade III) (BMI ≥ 40). In the study population, 165 (5.8%) were lean, 759 (26.6%) were normal weight, 785 (27.6%) were overweight, 637 (22.4%) were obese Grade I, 316 (11.1%) were obese Grade II while 187 (6.6%) 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 40 - 49year age group.

Age (years)		Body mass index (kg/m^2)					
		18.5 - 24.9	25.0 - 29.9	30.0 - 34.9	35.0 - 39.9	≥ 40.0	< 18.5
15 - 19	Count	47	80	31	19	3	1
	%	26.0%	44.2%	17.1%	10.5%	1.7%	0.6%
20 - 29	Count	90	366	303	180	80	45
	%	8.5%	34.4%	28.5%	16.9%	7.5%	4.2%
30 - 39	Count	17	218	266	200	104	64
	%	2.0%	25.1%	30.6%	23.0%	12.0%	7.4%
40 - 49	Count	11	95	185	238	129	77
	%	1.5%	12.9%	25.2%	32.4%	17.6%	10.5%
Total	Count	165	759	785	637	316	187
	%	5.8%	26.6%	27.6%	22.4%	11.1%	6.6%

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

The mean, median, mode, standard deviation, kurtosis and skewness of BMI in the Saudi females within each age group is presented in table 3. BMI within age groups are skewed positively with a skewness of 0.771, 0.766, 0.945 and 0.971 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. The correlation coefficient (r) and P value between age and BMI was r = 0.351, p < 0.0001, figure 3.

Parameters		Age groups (years)			
		20 - 29	30 - 39	40 - 49	15 - 19
Numbers		181	1064	869	735
Mean		22.796	26.901	29.703	31.949
Standard Error of Mean		0.4272	0.2080	0.2362	0.2613
Median		21.600	26.100	29.000	31.400
Mode		18.0	28.0	29.0	31.0
Standard Deviation		5.7468	6.7853	6.9617	7.0841
Variance		33.026	46.041	48.465	50.184
Skewness		0.771	0.766	0.945	0.971
Kurtosis		0.149	0.905	1.793	3.182
Range		28.9	46.4	49.4	52.0
Minimum		13.1	13.1	14.3	14.0
Maximum		42.0	59.5	63.7	66.0
Percentiles	**2.5**	13.820	15.9	18.975	20.0
	97.5	35.395	42.413	44.850	46.860

***Table 3:** Mean, median, mode, standard, kurtosis and skewness of Body mass index (kg/m^2) in Saudi females of childbearing age within each age group.*
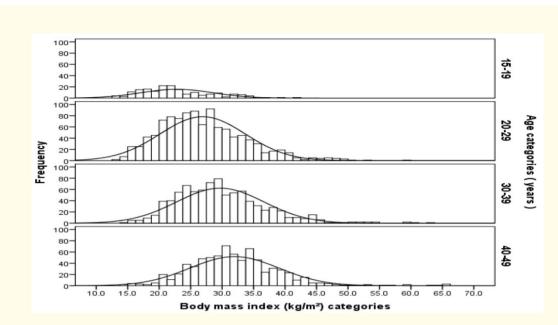
Figure 2: *Frequency distribution histogram of body mass index (kg/m²) in Saudi females of childbearing age in different age groups.*
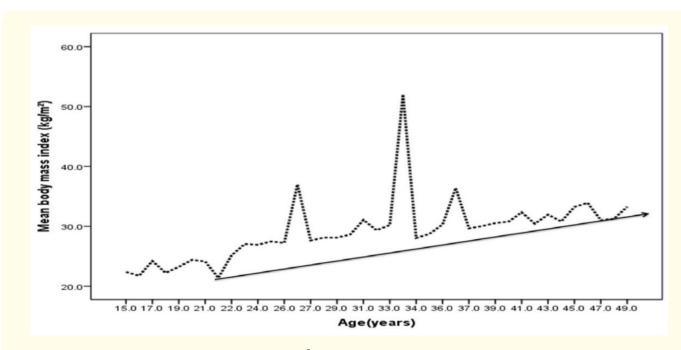

Figure 3: *Mean body mass index (kg/m²) in relation to age (years) in Saudi females of childbearing age.*

Discussion

Different method to assess obesity included weight and height, cube root of weight and height; estimation of total body fat and skin fold measurement. Globally, about 2.1 billion people (30%) of the world's population are either overweight or obese [31]. Obesity in women of reproductive age was found in one out of four of cases, with a well-documented increase since 1960. In the United States Obesity affects more than one third of the population and thus threatens the health of the nation causing health problems including diabetes, heart disease [32,33]. In 2014, World health organization found that about 15% and 40% of women in developing countries were either obese or overweight respectively [31]. In addition, oobesity increased in women from 16% in 1993 to 26% in 2011 as measured by the Health Survey for England [34]. Like the developed countries of the world, obesity may be regarded as an epidemic in Saudi adults. Because of women's childbearing role, obesity in female has greater epidemiological importance than in male [35]. Female of childbearing age are at especially high risk because of the increased health risks of pregnancy complications and even birth defects [36]. In our study, we randomly recruited adult Saudi females of childbearing age. Our report demonstrated that the frequency distribution histogram of BMI shows normal Gaussian distribution with skewness of 0.777 and kurtosis of 1.578. When the females are grouped into different age groups, an increase in BMI found from 22.8 ± 5.7 in the 15 - 19 y group to 31.9 ± 7.1 in the 40 - 49 years age group. The correlation coefficient is high and a statistically significant positive correlation between age and BMI is found ($r = - 0.351$, $P < 0.0001$). These findings confirm other report that show that BMI increases with age in reports of Saudis and others [37-47].

The prevalence of leanness, normal weight, overweight, obesity grade I and II and morbid obesity in the total study group was 5.8%, 26.6%, 27.6%, 22.4%, 11.1% and 6.6% respectively. Our prevalence estimates are lower than those from Ogden., *et al.* who published a prevalence data from NHANES 1999 - 2004 [48]. In their analysis of 2003 - 2004 NHANES data specifically, 51.7% of non-pregnant women aged 20 - 39 years were overweight or obese (BMI ≥ 25 kg/m^2), 28.9% were obese (BMI ≥ 30 kg/m^2) and 8.0% were extremely obese (BMI ≥ 40 kg/m^2). We showed the frequency of obesity was higher compared to other reports when in 1994 investigated the prevalence of obesity in university medical and nursing students and reported an obesity prevalence of 26.1% and 18.8% respectively and morbid obesity in 4.5% and 2.3% respectively [25,37]. 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 attending Health Centers to be obese [27,28]. 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 [22-24]. Our data shows that as many as 5.8% of the Saudi females can be classified as lean which is lower than previously reported (10.17%) [37]. According to the Health Survey for England 2011 data, morbid obesity rates (BMI equal or greater than 40) are higher for women (3.2%) than for men (1.7%) [34]. Using our data to estimate the number of morbidly obese adults living in Jeddah (a population of 2.8 million) suggests that there are 184,800 men and women who are morbidly obese [49]. However, the data should be interpreted with caution as there is a margin of error due to the small proportions [50].

Clinical decision-making and education and public health policy are 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' [51]. An imbalance between energy intake (increased food consumption) and energy expenditure (reduced physical activity) is the main cause of obesity. Although individuals have a responsibility over the lifestyle choices they make, it is important to consider the complexities of the origin of obesity in that many factors will affect these decisions. These include genetic, economic, social, psychological, environmental and cultural factors [51]. The need for effective weight management strategies is described in the mass media as well as in the healthcare literature [52]. 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 [53]. Childbearing-age women are a priority population for weight management initiatives because not only does maternal obesity affects the mother's health, it is associated with delivery complications and complications with the child's health, including a higher rate of birth defects [53].

Further, women strongly influence the lifestyle choices of their entire family affecting the alarming childhood obesity rates [54,55]. 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 [36,56,57]. Weight management requires changes in dietary habits and lifestyle modification. Measures that can be adopted to reduce obesity and prevent its development and awareness about the harmful effects of obesity are necessary. For all age groups, these programs need to be implemented. 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 oversight 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.

Acknowledgments

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