Prevalence of Obesity in a Saudi Obstetric Population

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Key Words

Body mass index · BMI · Obesity · Overweight · Obstetric population · Saudi Arabia

Summary

Objective: To estimate the prevalence of obesity and its determinants during the first month of gestation in Saudi women. **Methods:** Retrospective chart review of measured BMI in Al-Hassa, the largest province in Saudi Arabia, in 2007. Data were collected from records of 791 (72.6% of 1,089) pregnant women registered for prenatal care. **Results:** Height shows a normal Gaussian distribution, whereas weight is skewed positively (skewness of 0.77). The prevalence of underweight, normal weight, overweight, obesity, and extreme obesity (BMI > 40 kg/m²) were 8.5, 39.3, 23.6, 23.9, and 4.7%, respectively. Logistic regression revealed that the most important significant independent predictors of obesity are parity of 4 and more (odds ratio (OR) = 5.8) and urban residence (OR = 4.9). **Conclusion:** Overweight, obesity, and extreme obesity are common (>52%) among pregnant women in Saudi Arabia. Health education to control body weight before pregnancy is warranted.

Introduction

The rising rate of obesity is a major public health concern in the West, where 28% of pregnant women are overweight and 11% are obese [1]. 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. This new information is especially troubling in light of the current obes-

ity epidemic. The epidemic is especially pronounced in young people, including women of reproductive age [2, 3]. Several studies of the prevalence of obesity and overweight in the general population of Saudi Arabia have reported high prevalences for both sexes [4–10]. One study of Saudi non-pregnant women of childbearing age revealed that 31.5% were overweight and 21.1% were obese [11].

Despite these alarming figures, to the best of our knowledge no studies have been done on the prevalence of obesity among pregnant women in the Kingdom of Saudi Arabia. As the first phase of an ongoing prospective study to examine the effects of BMI on pregnancy outcomes, this study aims to examine the prevalence and independent predictors of obesity in early pregnancy in Al-Hassa, Saudi Arabia.

Material and Methods

During 2007, initial antenatal care visits were carried out in Al-Hassa, the largest province in Saudi Arabia's Eastern region (population of 908,366) covering an area of 534,000 km². The total population of Saudi Arabia is approximately 27.6 million. Maternity care in Al-Hassa is provided through a network of 47 primary health care centers (PHCCs) covering urban, rural, and Hegar (in the Bedouin desert) areas in addition to facilities in the private sector, ARAMCO Petroleum Company and National Guard and Maternity Hospital. Health care services provided by the governmental sector in Saudi Arabia account for over 80% of total services and are almost free of charge. Health statistics of the region reveal that about 1.5% of deliveries take place in PHCCs and only less than 0.5% were home births, mostly in Hegar. The implemented antenatal care was the classic schedule with 13 visits throughout pregnancy. Eligible candidates were all women attending for antenatal care in PHCCs within the first month of pregnancy. Exclusion criteria were pre-pregnancy chronic medical disease (hypertension, diabetes, renal, cardiac, and sickle cell disease) and multiple (non-singleton) gestation. Mothers were counseled and assured that data collected will be dealt with confidentially. They gave verbal consent prior to the interview. The study was approved by the Al-Hassa Directorate of Health.

Table 1. Prevalence of obesity according to some maternal sociodemographic factors

	Total	Obesity, n (%)	Significance test	OR (95% CI)
Residence				
Hegar	45	6 (13.3)	$\chi^2 = 16.4^b$	1 (r)
Rural	323	75 (23.2)		1.7 (0.8–3.8)
Urban	423	145 (34.3)		2.6 (1.2–5.5)
Family income				
Unsatisfactory	264	55 (20.8)	$\chi^2 = 11.6^b$	1 (r)
Satisfactory	527	171 (32.4)		1.56 (1.2–2.0)
Age, years				
<20	63	11 (17.5)	$\chi^2 = 30.7^b$	1 (r)
20–29	452	104 (23.0)		1.3 (0.8–2.3)
30–39	228	88 (38.6)		2.2 (1.3–3.9)
≥40	48	23 (47.9)		2.7 (1.5–5.1)
Parity				
Nulliparous	229	30 (13.1)	$\chi^2 = 58.7^b$	1 (r)
2 and 3	305	82 (26.9)		2.3 (1.4–3.0)
4 and more	257	114 (44.4)		3.4 (2.4–4.9)
Education				
<Secondary	326	100 (30.7)	$\chi^2 = 2.2^a$	1 (r)
Secondary	301	77 (25.6)		0.8 (0.7–1.1)
>Secondary	164	49 (29.9)		0.97 (0.7–1.3)
Work				
Housewives	639	183 (28.6)	$\chi^2 = 0.01^a$	1 (r)
Working	152	43 (28.3)		0.99 (0.75–1.3)
Overall	791	226 (28.6)		(25.5–31.8)

OR = Odds ratio; CI = confidence interval; r = reference group.
^ap > 0.05.
^bp < 0.001.

During the year 2006, the maternity care registry of the Al-Hassa Directorate of Health registered a total of 8,154 mothers for antenatal care at PHCCs, whereas 1,109 (13.6%) of these mothers started care during the first month of pregnancy.

A pilot retrospective record-based study was carried out with 150 mothers registered for prenatal care at 15 PHCCs to assess the expected prevalence of obesity among the prenatal population to be used for sample size calculation for the full-scale study. The pilot study revealed that 37 (24.7%) mothers were obese (BMI ≥ 30 kg/m²). At 95% confidence level and 80% study power, the sample size required is at least 766 mothers.

Throughout 2007, a total of 1,089 mothers registered for prenatal care during the first month of pregnancy. Gestational age was assessed by self-reported last menstrual period. Of these mothers, 791 (72.6%) were included while 213 (19.6%) were not included due to exclusion criteria; the other 85 (7.8%) refused to participate in the study.

The sample members were interviewed at the PHCCs by Arabic-speaking female nurse interviewers who trained on data collection. A pre-designed, tested questionnaire was filled out. Data was collected from the family file and maternity cards kept at the PHCCs as well as from the mother during the interview. The Ministry of Health has developed special guidelines for using the card, explaining its contents and how to use it, as well as defining the various measurements, investigations, and their normal limits. The card is shared by the health centers and the hospital. Continuous emphasis is placed on the completeness of this card [12].

At the first antenatal visit, height (in cm) and weight (in kg) were recorded using a standard technique. Height was measured with a stadiometer accurate to 0.1 cm, with the mother standing and without wearing shoes. Body weight was measured with a calibrated electronic (Seca®) scale accurate to 0.1 kg while subjects were wearing the lightest possible clothes. The data was used to calculate Quetelet's index or the BMI. BMI values are classified into 5 weight categories according to the WHO: un-

derweight: <18.5 kg/m², normal weight: 18.5–24.99 kg/m², overweight: 25–29.9 kg/m², obese 30–39.9 kg/m², and extremely obese >40 kg/m² [13–15].

Statistics: Chi-squared test (χ^2) was used to test the significance between categorical variables in the full-scale study. $p \leq 0.05$ was chosen as the level of statistical significance using the SPSS version 11 (SPSS Inc.; Chicago, IL, USA). Significant predictors of obesity in univariate analysis were entered into multivariate stepwise forward Wald logistic regression analysis to find out the independent predictors of obesity. The outcome variable is obesity (BMI ≥ 30 kg/m²) including extremely obese women (BMI ≥ 40 kg/m²). To quantify the risk of different predictors, the relative risk (odds ratio (OR)) and 95% confidence intervals (CI) were computed.

Results

The full-scale study revealed that the values of the mean, median, and mode of height are very similar (155.6, 156, and 155, respectively), suggesting normal Gaussian distribution with skewness of 0.1. However, the mean, median, and mode of weight are 64.3, 61.5, and 57.0, respectively, with positive skewness of 0.77.

BMI groups are: underweight 8.5%, normal weight 39.3%, overweight 23.6%, obese 23.9%, and extremely obese 4.7%.

Table 1 reveals that obesity is significantly higher among urban women, those with satisfactory family income (meeting their expenses and being able to save as reported by women), older age groups, and those of higher parity. However, logistic

Table 2. Logistic regression analysis of the significant independent predictors of obesity^a

Predictor	Obesity	
	β	OR (95% CI)
Parity		
Nulliparous	–	1 (r)
2 and 3	0.97	2.6 (1.6–4.2) ^d
4 and more	1.76	5.8 (3.7–9.3) ^d
Residence		
Hegar	–	1 (r)
Rural	1.2	3.2 (1.3–7.96) ^b
Urban	1.6	4.9 (2.0–12.1) ^d
Family income		
Unsatisfactory	–	1 (r)
Satisfactory	0.6	1.8 (1.2–2.6) ^c

OR = Odds ratio; CI = confidence interval; r = reference group.
^aConstant: –3.7; percent correctly predicted: 72.9; model χ^2 : 91.9, $p = 0.000$.
^b $p < 0.05$.
^c $p < 0.01$.
^d $p < 0.001$.

regression revealed that the most important significant independent predictors of obesity are parity of 4 and more (OR = 5.8), urban residence (OR = 4.9), and satisfactory family income (OR = 1.8) (table 2).

Discussion

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 [16, 17].

Our results showing mean height, mean weight, and mean BMI of 155.6 cm, 64.3 kg, and 26.5 kg/m², respectively, are in general agreement with a recent study of non-pregnant Saudi Women of childbearing age [11]. However, our prevalence of obesity (23.9%) and extreme obesity (4.7%) is much greater than the combined rate of obesity and extreme obesity in the non-pregnant population (21.1%). In 1992, it was reported that Saudi women are on average more obese than their European counterparts [8].

Logistic regression analysis revealed that the independent predictors of obesity in the studied population are parity, place of residence, and family income. Compared to nulliparous women, the risk of obesity rises 5.8-fold among mothers with parity of 4 or more and 2.6-fold with 2 or 3 pregnancies. This agrees with other studies [18–20]. The increased parity of women in higher BMI categories may be related to the tendency to gain weight with each pregnancy [19].

Urban mothers are about 5 times and rural mothers are about 3 times more likely to be obese than nomadic Bedouins.

This is a reflection of the sedentary life of urban residents. The rapid urbanization of rural areas will mask the differences between urban and rural localities. The Hegar population is poor, living primitively with great reliance on natural food and high energy expenditure, searching for grass to feed their animals.

Women with satisfactory family income are about 2 times more likely to be obese than those with unsatisfactory income. Again, this is a reflection of food consumption and sedentary lifestyle. It was reported that obesity is associated with high social class in some other populations, too [18, 20]. Obesity is the result of complex interaction between multiple factors. High social class is associated with excess energy intake and low physical activity; both of these are characteristics of the Saudi society. Obesity and overweight are frequent in the Saudi obstetric population and may be regarded as an epidemic in the Saudi population in general.

Health education to control body weight before pregnancy is warranted. Birth control measures to limit parity could contribute, indirectly, to a decrease of obesity among Saudi women.

A nationwide community-based prospective study may provide in-depth knowledge about the prevalence and the wider range of predictors of different categories of BMI. It is important to standardize the definition of BMI range categories to facilitate comparison over time and between different countries.

Study Limitations

The study is clinic-based and included only mothers attending for care at PHCCs in one region of the kingdom. Late attendees, those who received care at other health sectors, and those not receiving care at all were not included. Furthermore, by excluding women with pre-pregnancy diabetes, hypertension, and other chronic diseases known to be associated with higher BMI and the metabolic syndrome, we might have underestimated the overall prevalence of obesity.

Weight and height were measured at the antenatal booking visit during the first month of pregnancy utilizing BMI cutoff points derived from non-pregnant population in the absence of pre-pregnancy measures, rather than relying on self-reported pre-conception weight. However, it was reported that gestational BMI had a similar predictive capacity as pre-pregnancy BMI [21].

The levels of physical activity and food intake are independent predictors of obesity but were not studied due to lack of validated measurement tools suitable for pregnant women in the Saudi culture.

Disclosure

The authors declared no conflict of interest.

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