

Knowledge and Perception of Risks and Complications of Maternal Obesity during Pregnancy

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Abstract

The goal of this prospective survey study was to assess the knowledge and understanding of the risks of maternal obesity during pregnancy in patients visiting a prenatal Health Clinic at an academic, public medical center located in Macon, Georgia. Demographic information and questions about knowledge and perception of Body Mass Index (BMI) and maternal obesity risks were collected. Responses were scored between 0-100% and categorized to minimal, good and broad knowledge groups. The study population ranged in age from 18 to 69 years and 85.3% of the study participants were African American and 12.7% Caucasian. Most respondents have moderately good knowledge of maternal obesity risk. However, only 40.2% of women were aware of the term BMI, 48% knew goals of weight gain during pregnancy, and 51% were aware that obesity increases the risk of stillbirth. Obese patients were more aware of the risk for pregnancy complications compared to normal and overweight. But only 29.7% of them correctly identified themselves as obese, 53.1% classify themselves as overweight, 15.6% normal and 1.6% report being underweight. Maternal weight, educational status and daily exercise were consistently associated with good and broad knowledge of maternal risks. Overall, most women have limited knowledge of BMI, goals of weight gain during pregnancy and risks of maternal obesity on them and their unborn child. The perception of most overweight and obese women about their current weight was imprecise. Our findings underscore the need for healthcare providers to make pregnant women more aware of the increased risks associated with overweight and obesity.

Keywords: Obesity; BMI knowledge; Maternal risk; Overweight perception; Rural population

Introduction

Maternal Obesity, defined as having a BMI greater than or equal to 30, continues to be a huge concern amongst Obstetricians [1-4]. Currently the prevalence of maternal obesity in the US is 10-36% [4]. Maternal obesity is associated with complications during pregnancy such as first and third trimester miscarriages, preeclampsia, gestational diabetes, failed inductions of labor, and increased rates of cesarean sections [5,6-9]. Antepartum care, intrapartum, normal vaginal deliveries and operative deliveries in obese patients require more resources for care [10]. Furthermore, maternal obesity has been shown to adversely affect the health of the offspring including congenital anomalies, growth abnormalities, stillbirths and childhood obesity [4]. Further risks of maternal obesity include the development of hypertension and heart disease in the mother. While several studies have explored obesity as a risk factor in pregnancy, there is little data that specifically investigates racial differences in women's knowledge and assessment of the risk of obesity in pregnancy [7]. Maternal perceptions and beliefs about their health status during pregnancy can provide valuable information regarding future prevention strategies to address this current healthcare problem [6]. Studies about prevalence and trends in obesity among US adults have shown that African American women have the highest rates of obesity [10]. While all women are at risk of obesity, African American women, and women who live in certain geographic regions, are twice as likely as their Caucasian counterparts to be overweight or obese [11]. To our knowledge, only two published studies [7,12] have assessed awareness of the effects of obesity on reproductive outcomes in a predominantly African American urban population. The study performed by Cardozo et al. [12] took place in the south side of Chicago and found that while women in an urban community are aware of the cardiometabolic risks associated with obesity, they demonstrate limited knowledge of the effects of obesity on reproductive outcomes. Kominiarek et al. also found that women required more knowledge about risks of obesity

during pregnancy regardless of body mass index [7]. When considering a plan of care, clinicians must also take into account the demographics of their population. Middle Georgia has been an under-represented population in the medical literature and this unique demographic deserve further evaluation.

The primary objective of this study was to evaluate the knowledge and perception of the risks of maternal obesity during pregnancy in pregnant and non-pregnant patients. The goal is to obtain data regarding knowledge of the risks associated with maternal obesity to help obese pregnant women understand the risks obesity poses to themselves and their baby during pregnancy.

Material and Methods

Subjects and data collection

A brief face to face survey regarding the perception and knowledge of obesity in pregnancy was administered by a resident physician to women attending the Anderson Women's Health Clinic at the Medical Center, Navicent Health a large tertiary-care public hospital located in middle Georgia. Informed consents were obtained prior to completing the survey with assurance of confidentiality of the participant's responses. All patients were consented over a period from September 2012 through June 2014. The inclusion criteria included all women

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Received March 17, 2015; Accepted September 23, 2015; Published September 30, 2015

Citation: Okeh NO, Hawkins KC, Butler W, Younis A (2015) Knowledge and Perception of Risks and Complications of Maternal Obesity during Pregnancy. Gynecol Obstet (Sunnyvale) 5: 323. doi:[10.4172/2161-0932.1000323](http://dx.doi.org/10.4172/2161-0932.1000323)

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(pregnant and not pregnant) presenting to the Anderson Women's Health Clinic for care (prenatal, postpartum, well-woman, and follow-up visits). Exclusion criteria included minors. Demographic information such as education level, race, age, weight, marital status, and parity, social behaviors such as tobacco abuse, exercise practices, and gestational age were obtained at time of the survey. Day of survey weight was collected by nurses in the clinic using a standard digital scale, and BMI defined as (mass kg/ (height) m²) was calculated using Cerner Powerchart medical software and self-reported height. Pre-pregnancy BMI was not available because of the referral center status of the clinic and/or late presentation to the clinic for prenatal care. BMI was classified according to the guidelines from the U.S. Institute of Medicine classifying underweight as <18.5, normal weight <25.0, overweight 25.0-29.9 and obese as ≥ 30. Further classifications of obesity were not used for simplicity of data. Participants were asked to rate their knowledge and perception of the risk of a pre-specified list of five maternal obesity complications; cesarean sections, anesthesia, preeclampsia, stillbirth, and gestational diabetes. A number of obstetric history questions were included in the questionnaire. We explored factors that could affect the overall knowledge and that might be useful in determining which groups of women should be specifically targeted to increase knowledge. The factors considered in these analyses were: gestational age and pregnancy status, smoking during pregnancy (yes versus no), highest educational attainment (classified as no high school, high school or completed a college), frequency of exercise per week, and if they have ever been counseled about weight during pregnancy. Participants were also asked specific question about their perception of their current weight whether it is 'underweight', 'normal/average weight' or 'obese'. Upon completion of the survey, the patient's survey was reviewed with the patient. Educational pamphlets regarding maternal obesity, exercise, and nutrition were given to the patient.

Definition of knowledge about the risks of maternal obesity

Correct answers were scored and reported as an aggregate correct response. After completion of the survey, each patient was given the correct answers and helpful resources for maintaining a healthy pregnancy. Women who score below 60% were categorized as having a minimal knowledge of the risks of maternal obesity. While those who got 60%-80% correct answers were categorized as having moderate/good knowledge of maternal obesity complications. Women who had 81-100% score were categorized as having broad knowledge about the risks of maternal obesity during pregnancy.

Statistical analysis

Descriptive statistics described the entire sample. A sample size of 102 participants was calculated to be sufficient to result in survey responses having a 95% confidence interval of ± 10%. Multiple regression analysis was used to assess the Knowledge for Maternal Obesity as dependent variable controlling for potential confounding factors such age, education, parity and pregnancy status and comparing differences between normal weight, overweight, and obese women. P <0.05 was considered statistically significant. All statistical evaluation was performed using SPSS statistical software vs22 (SPSS Inc, Chicago, IL).

Results

Demographics characteristics and factors associated with level of knowledge

The total number of women recruited to participate in the study was 102. Detailed demographic characteristics and factors associated with level of knowledge of the participating women are summarized

in (Table 1). The study population ranged in age from 18 to 69 years (mean 31.8 ± 12.6 years) with a median age of 27 and >70% of the patients surveyed ranged between the ages of 20-39. BMI range was 19 to 55 (mean 33.8 ± 8.8) and 85.3% of study participants identified themselves as African American and 12.7% as Caucasian. The highest level of education of 67.6% of participants was high school diploma and 27.5% of them have 4 years of college education. Twenty five percent admitted tobacco use. Seventy-two percent of the subjects were not married, 37.3% were pregnant and 90.2% nulliparous. Gestational ages ranged from 7.0 weeks to 39.0 weeks. About 68% say they exercise at least once every week and more than 65% indicated that they would like to lose weight. Of note, only 33.7 to 36.6% report any previous discussion with an MD regarding risks of obesity or counseled about weight gain during pregnancy.

Knowledge of BMI and the effect of maternal obesity on reproductive outcomes

Data summarized in (Table 2) describe the knowledge of participants about BMI and the risks of maternal obesity on maternal and neonatal outcomes. Results showed only 40.2% of women were aware of BMI, 48.0% knew of weight gain guidelines during pregnancy and 51% identified that obesity increases the risk of stillbirth. The majority of participants can differentiate between the term overweight and obesity (68.6%), and were aware that obesity increases the risk of preeclampsia (89.2%), cesarean section (73.5%), gestational diabetes (87.3%), and anesthesia complications (70.8%). Overall knowledge evaluation revealed 18.6% had poor knowledge, 62.7% had moderately good knowledge, and only 18.6% had broad knowledge about maternal obesity risk.

Correlation analysis showed significant (p<0.05) positive correlation between knowledge of maternal obesity and educational levels (r=0.179), marital status (r=0.194) and BMI (r=0.156). A negative correlation was found with tobacco use (r=0.189, P<0.05). No significant association was found between knowledge and age (r=0.040), Gestational Status at time of visit (r=0.036), parity (r=0.003), and race (0.080).

Comparison between different weight groups

Demographics characteristics of our study population stratified by weight category are presented in (Table 3a). There was no difference in

Age, mean ±SD (range)	31.7 ± 12.6 (18-69)
BMI (kg/m²) Mean ±SD (range)	33.6 ± 8.8 (19-55)
Pregnant (%)	38 (37.3%)
Not-Pregnant (%)	64 (62.7%)
Nulliparous (%)	93 (92.2%)
Smoking (%)	26 (25.5%)
Married (%)	28 (27.5%)
Not-Married (%)	74 (72.5%)
No High school (%)	5 (4.9%)
High school (%)	69 (67.6%)
College (%)	28 (27.5%)
Ever counseled about weight during pregnancy (%)	37 (36.3%)
Ever MD discussion about obesity risks (%)	34 (33.3%)
Would like to lose weight (%)	67 (65.7%)
African American (%)	87 (85.3%)
Caucasian (%)	13 (12.7%)
Others (%)	2 (2/102)

Table 1: Demographic characteristics and factors associated with level of knowledge of all participating women (n=102).

Participants Knowledge	%
BMI	40.2% (41/102)
Differentiate Overweight from Obesity	68.6% (70/102)
Obesity risk of Pregnancy	89.2 (91/102)
Risk of weight gain during pregnancy	48.0%(49/102)
Risk of Cesarean section	73.5%(75/102)
Hypertension/Preeclampsia	89.2 (91/102)
Risk of Gestational diabetes	87.3 (89/102)
Risk of Still birth	51.0%(52/102)
Risk of Anesthesia complication	70.6%(72/102)
Poor, Overall	18.6%(19/102)
Moderate, Overall	62.7%(64/102)
Broad, overall	18.6%(19/102)

Table 2: Percentage of participants who have knowledge about BMI and specific health outcomes.

	Normal Weight (BMI <25)	Overweight (BMI 25-29.9)	Obese (BMI >30)	P value
Age	28.8 + 11.4 (19-59)	30.7 + 12.8 (18-60)	33.1 + 13.0 (18-69)	ns
BMI (kg/m ²)	22.0 + 1.9 (19-24)	26.9 + 1.6 (25-29)	39.0 + 6.2 (30-55)	<0.05
Pregnant (%)	21.1%	42.1%	40.6%	<0.05
Not-Pregnant (%)	78.9%	57.9%	59.4%	<0.05
Nulliparous (%)	26.1%	29.4%	44.4%	ns
Smoking (%)	31.6%	26.3%	23.4%	ns
Married (%)	15.8%	47.4%	25.0%	<0.5
Not-Married (%)	84.2%	52.6%	75.0%	<0.5
No High school	5.3%	0.0%	6.3%	ns
High school	84.2%	73.7%	60.9%	ns
College	10.5%	26.3%	32.8%	ns
Ever counseled about weight during pregnancy	32.6%	36.8%	38.1%	ns
Ever MD discussion about obesity risks	40.0%	31.6%	32.8%	ns
African American (%)	15 (78.9%)	15 (78.9%)	57 (89.1%)	ns
Caucasian	3 (15.8%)	3 (15.8%)	7 (10.9%)	ns
Others	1 (5.3%)	1 (5.3%)	0 (0%)	ns

Table 3a: Demographic characteristics and factors associated with level of knowledge of normal weight, overweight, and obese woman.

the baseline characteristics and educational status between the three weight groups. Data comparing normal weight, overweight, and obese woman on knowledge about BMI and obesity risk during pregnancy is presented in (Table 3b). There were significant differences in the responses of women with different BMI. Obese patients were more aware of BMI and obesity risks compared to normal and overweight. Being obese was associated with highest overall knowledge of risk of maternal obesity. No significant difference in multiple linear regressions analysis of the knowledge for maternal obesity based on model controlling for gestational status at time of visit, education level, parity, and age.

Knowledge and self-perception of current weight

In (Table 4) data is presented regarding how participants perceive their current weight. Overall weight categories found a statistically significant correlation ($R^2 = -0.65$, $p < 0.001$) between the self-

perception of current weight and actual weight. Although there was no underweight patient in this study population, still 15.8% of normal weight ($n=19$) identified themselves as underweight, 73.7% correctly as normal weight and 5.3% as overweight or obese. Of those who were actually overweight ($n=28$), 73.7% identified themselves as normal weight, 21.1% correctly as overweight, and 5.3% as obese. Of those who were actually obese ($n=64$), one (1.6%) actually thought she was underweight, 15.6% as normal weight, 53.1% as overweight and only 29.7% correctly identified themselves as obese.

Knowledge and willingness to lose weight

Participants were also asked “How often you exercise” and “If they would like to lose weight before pregnancy”. Eight of nineteen normal weight patients indicated that they would like to lose weight and the same percentage (42.1%, 8/19) exercise at least once a week. Percentage of overweight ($n=19$) and obese women ($n=64$) who would like to lose weight listed by knowledge score and whether they exercise is shown in (Table 5). Data show that overweight and obese women with moderate or broad knowledge on obesity risks are more willing to lose weight than obese women with poor knowledge. There was significantly higher ($P < 0.05$) obese patient with moderate or broad knowledge who

	Normal Weight (BMI <25)	Overweight (BMI 25-29.9)	Obese (BMI >30)	P value
Age	28.8 + 11.4 (19-59)	30.7 + 12.8 (18-60)	33.1 + 13.0 (18-69)	ns
BMI (kg/m ²)	22.0 + 1.9 (19-24)	26.9 + 1.6 (25-29)	39.0 + 6.2 (30-55)	<0.05
Pregnant (%)	21.1%	42.1%	40.6%	<0.05
Not-Pregnant (%)	78.9%	57.9%	59.4%	<0.05
Nulliparous (%)	26.1%	29.4%	44.4%	ns
Smoking (%)	31.6%	26.3%	23.4%	ns
Married (%)	15.8%	47.4%	25.0%	<0.5
Not-Married (%)	84.2%	52.6%	75.0%	<0.5
No High school	5.3%	0.0%	6.3%	ns
High school	84.2%	73.7%	60.9%	ns
College	10.5%	26.3%	32.8%	ns
Ever counseled about weight during pregnancy	32.6%	36.8%	38.1%	ns
Ever MD discussion about obesity risks	40.0%	31.6%	32.8%	ns
African American (%)	15 (78.9%)	15 (78.9%)	57 (89.1%)	ns
Caucasian	3 (15.8%)	3 (15.8%)	7 (10.9%)	ns
Others	1 (5.3%)	1 (5.3%)	0 (0%)	ns

Table 3b: Demographic characteristics and factors associated with level of knowledge of normal weight, overweight, and obese woman.

Perception	Normal Weight (BMI <25)	Overweight (BMI 25-29.9)	Obese (BMI >30)	P value
Under weight	3 (15.8%)	0 (0%)	1 (1.6%)	<0.001
Average weight	14 (73.7%)	14 (73.7%)	10 (15.6%)	<0.001
Overweight	1 (5.3%)	4 (21.1%)	34 (53.1%)	<0.001
Obese	1 (5.3%)	10 (5.3%)	14 (29.7%)	<0.001

Table 4: Participant self-perception of current weight stratified by BMI < 25.0, 25-30, or > 30.0.

Patient	Overweight	Obese	P value
Poor knowledge	21.1% (4/19)	14.1% (9/64)	NS
Moderate knowledge	31.6% (6/19)	57.8% (37/64)	<0.05
Broad knowledge	5.3% (1/19)	18.8% (12/64)	<0.05
No Exercise	5.3% (1/19)	28.1% (18/64)	<0.05
Exercise > 1 time a week	42.1% (8/19)	62.5% (40/64)	<0.05

Table 5: Percentage of overweight and obese women who would like to lose weight.

would like to lose weight and exercise at least once a week compared to overweight.

Discussion

Obesity is one of the biggest challenges facing maternity services today. Assessing knowledge of these risks in a central Georgia population is a medical imperative, as obesity disproportionately affects certain demographic groups that live in rural Georgia; which has been a medically under-represented population in the literature. The unique aspect of this study was the direct comparison of the knowledge of risks factors and adverse health outcomes in pregnant patients secondary to obesity amongst a predominantly African American population in rural Georgia as well as a separate assessment of self-perception of current weight and willingness of the participant to lose weight. In this study we found that >70% of the participants were knowledgeable about the association of maternal obesity and risks of preeclampsia, diabetes, cesarean section, and complications with anesthesia however, women were poorly informed about the term BMI, weight gain recommendations during pregnancy and risks of stillbirth. Only 40.8% of women were aware of the term BMI, and 48.0% knew of weight gain recommendations during pregnancy, and about 50% were aware that obesity increases the risk of stillbirth. The lack of knowledge is likely to the consequence of low education level and paucity of counseling by medical professionals about weight during pregnancy. As our data showed that having at least a high school education and satisfactory primary care counseling about obesity were strongly associated with having good knowledge of the risk of maternal obesity. This result can be compared to Dekker et al. [13] whose study comprised of only pregnant participants but found that higher education status was associated with more knowledge of risks of obesity in pregnancy. Successful public educations about obesity complications necessitate women to understand BMI classifications and to be able to identify themselves as overweight or obese. If women do not understand their own BMI, they may not recognize the need for weight loss intervention. Our 40% poor BMI knowledge amongst this Georgia population was lower than those reported in other survey research carried out amongst women in Chicago [11,12], Australia [13] and Scotland [14]. These studies found 48.1% of the women in Chicago, 57% in Australia, and 60% in Scotland knew of BMI or recommended weight gain during pregnancy. Nonetheless, when we compared the results between normal weight, overweight, and obese woman groups, 58% of the obese women were knowledgeable about BMI and that was comparable to those reported in Chicago [11,12] and Australia [13]. This finding may be a result of medical intervention due to their obesity that gave them preferential counseling by their physician. The Scotland study performed by Leslie et al. [14], assessed patient awareness of gestational weight gain and showed a lack of awareness amongst overweight and obese women, however attributed this to poor delivery of lifestyle counseling by the healthcare professionals. Although only 33-36.6% of our patients reported receiving some form of counseling regarding weight gain and obesity, interestingly, we still found a positive correlation between being overweight or obese and good knowledge of the risks of obesity.

We also found that most normal and overweight patients did not know that obesity increases risk of stillbirth. Our findings are consistent with the study performed by Cardozo et al. [12] which noted a lack of awareness of the effects of obesity in reproductive outcomes verses knowledge of cardiometabolic consequences of obesity in a predominantly African American population. Although not officially analyzed in the study, many patients voiced the belief that the baby is likely to be 'healthier' in a woman with a greater BMI because of the perception that fat equates to good nutrition for the growing fetus. This voiced perception underscore the importance of educating women of all weight ranges through public education and physician-patient counseling about obesity risk.

When we looked at self-perception of current weight compared to actual weight, there was a statistically significant negative correlation between the self-perception of current weight and the actual weight. Most normal weight individuals were able to actually identify themselves but some believe that they were underweight. Overweight and obese patients had significantly higher percentage of error in self identity. Again, this may reiterate the importance of health education and awareness.

This study was also aimed at assessing whether those overweight and obese participants would like to lose weight before pregnancy and if they were willing to maintain the recommended daily exercise. In this regard, our data show that poor knowledge have negative influence on patients willing to lose weight and physical inactivity. Only twenty-one percent of overweight and fourteen of obese women with poor knowledge indicated their willingness to lose weight. Moderate knowledge increases proportion of overweight and obese women who would like to lose weight to 31.6% and 57.8% respectively. Most moderately knowledgeable obese (62.5%) and average number of overweight (42.1%) patients do exercise at least once a week. These data clearly show that poor knowledge patient population needed to be engaged to undertake major dietary and lifestyle changes to achieve the recommended amount of daily exercise. Published studies provide evidence that regardless of culture, race, or gestational status, instituting successful weight management and weight loss programs, presents a huge challenge and is met with variable results. Recently in 2014, ACOG Committee Opinion addressing obesity and lifestyle behavior of pregnant women recommended multiple steps during every prenatal care visit to help facilitate personalize weight loss strategies [15].

This study is unique in that it directly compared knowledge of the risks related to maternal obesity in rural area of Southeastern part of USA. The knowledge of the effects of obesity on pregnancy and the neonate vary by region of the country and urban vs. rural area. In this regard, we have to acknowledge the main limitation of this study was the fact that majority (>85%) of study participants was African American and thus, the results may not be extrapolated to all women in central Georgia. We also note the limitation of the availability of pre-pregnancy BMI secondary to referral center status of the clinic and late presentation of the patient for prenatal care [16]. More research in diverse locations nationwide would be needed to clarify this. We believe that our data will provide useful information to help develop public health interventions for optimizing reduction of preconception weight well as providing a baseline against which to measure changes in knowledge after future interventions [17].

Summary

Women, especially in rural areas required more knowledge and counseling about the risks of maternal obesity during pregnancy and needed additional information about their actual BMI and weight

gain and management during prenatal care visits. The questions for intervention are, how can we achieve pre-pregnancy or inter-pregnancy weight loss in obese and overweight women? Can we reverse the risks associated with adverse outcome in pregnancy associated with obesity in achieving weight loss? We believe education and awareness is essential for all women of child-bearing age regarding the risk of adverse outcome associated with obesity in pregnancy.

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