MATERNAL OBESITY AND OBSTETRIC OUTCOME IN PREGNANT WOMEN ATTENDING PNS SHIFA KARACHI

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ABSTRACT

Objective: To evaluate the impact of obesity on maternal and neonatal outcome.

Study Design: Comparative cross sectional study.

Place and Duration of Study: Department of Gynaecology and Obstetrics, Pakistan Naval Ship, Shifa Hospital Karachi, from Nov 2016 to Oct 2017.

Methodology: All singleton pregnant women of normal prepregnancy body mass index (BMI) and obese women having ≥30 body mass index, delivering newborn at 28-42 weeks of gestation were included. Comparison of antenatal complications and neonatal outcomes was done among both groups.

Results: Obese women significantly developed gestational hypertension (OR=7.4 95% CI, 4.84-11.4), preeclampsia (OR=2.22 95% CI, 1.36-3.6), gestational diabetes mellitus (OR=5.2; 95% CI, 3.57-7.58), labor induction (OR= 2.79 95% CI, 2.03-3.84), failed induction of labor (OR = 5.3 95% CI, 8.05-29.38), cesarean delivery (OR=1.89 95% CI, 1.41-2.5), large for gestational age newborn (OR=3.97 95% CI, 2.87-5.50). But there was no statistically significant difference in small for gestational age newborn (OR=0.91 95% CI, 0.42-1.98), new born with APGAR score ≤7after 5 min after delivery (OR=2.168 95% CI, 0.97-4.82) among obese and normal weight pregnant women.

Conclusion: There is increased risk of gestational hypertension, preeclampsia, gestational diabetes, failed induction of labor, dystocia, cesarean delivery and large for gestational age newborns in obese women.

Keywords: Cesarean delivery, Gestational hypertension, Gestational diabetes, Large for gestational age newborns, Obesity, Pregnancy.

INTRODUCTION

It is well recognized that obesity is becoming an epidemic throughout the world. It is also common in women of reproductive age[1]. According to WHO, in 2016 >1.9 billion adults aged 18 and older were overweight, of these over 600 million were obese with approximately 15% of women in the world considered obese[2]. Overweight and obese are defined as abnormal or excessive fat accumulation that may impair health, and are measured by BMI of >25 and 30 kg/m^{2} respectively[2]. The BMI is calculated as weight in kilograms divided by height in meters squared[2]. Obesity is a major risk factor for many health problems such as cardiovascular disease (CVD), diabetes mellitus, musculoskeletal and some cancers[2]. It is also a risk factor for subfertility and is responsible for various adverse pregnancy outcome[3]. Overweight and obese women have increased maternal & neonatal morbidity imposing burden on health care system. That is why it is important to indentify at risk group and intervention should be targeted on population that need them. The purpose of this study, therefore, was to review pregnancy outcome in obese women. Analysis of adverse pregnancy outcomes caused by obesity allows a better understanding of the risks. This will help us in making policies and preventive strategies & guidelines against obesity in our population. Interventions can be focused on obese women for better maternal and fetal outcome.

METHODOLGY

The study was done in department of Gynae /Obs PNS Shifa Karachi, from Nov 2016 to Oct 2017. PNS Shifa Karachi is a referral institute and a tertiary care hospital catering for large number of army and civilian personnel. The study was approved by ethical committee of the hospital

(copy submitted). Informed consent was taken from all the participants and confidentiality of all of them was maintained. This cross sectional comparative survey utilized simple, consecutive sampling technique for recruitment. A total of 3677 women who delivered singleton newborn at 28-42 weeks of gestation during a period from 1st Nov 2016 to 31st Oct 2017 were studied. Sample size was calculated by using WHO sample size calculator and taking prevalence of obesity to 14.8%[4].

Height and weight of lady before pregnancy and weight gain during pregnancy was taken from antenatal records. Body mass index (BMI) was calculated as weight in kilograms divided by height in meter squared (kg/m^2). The women included were those who were obese before pregnancy (BMI ≥30 kg/m^2, n=196), who had normal weight at time of conception (BMI 18.5-24.9 kg/m^2, n=3215), had singleton pregnancy with cephalic presentation and booked during first trimester. Under weight (<18.5 BMI), over weight (25-29.9 BMI) women, delayed antenatal booking, women with known medical disorder, multifetal pregnancy, malpresentation and previous history of cesarean section were excluded to control confounding factors. Demographic characteristics of women, any medical and obstetrical complication developing during pregnancy and pregnancy outcomes were noted in predesigned proforma by the principal author and her team.

Gestational weight gain (GWG) was noted at time of delivery by self report data or calculated by subtracting weight at time of labor suit entry from weight before pregnancy. We compared demographic characteristics (including age, parity, level of education), weight gain during pregnancy, antenatal complications and neonatal outcomes between obese and normal weight women. Antenatal complications observed were gestational hypertension, preeclampsia, gestational diabetes mellitus, induction of labor, labor augmentation, failed induction, dystocia and rate of cesarean delivery. Outcomes observed in neonates were gestational age at delivery, preterm delivery, birth weight, stillbirth and APGAR score at 5 min.

Gestational hypertension was defined as systolic blood pressure of ≥140 mmHg or diastolic blood pressure ≥90 mmHg on two occasions 6 hr apart after ≥20 weeks of gestation in women who previously had normal blood pressure. Diagnosis of preeclampsia was made when women with gestational hypertension developed proteinuria of ≥ 300 mg in a 24 hr urinary specimen. At initial antenatal visit, for screening purpose, fasting blood glucose level was checked. Oral glucose tolerance test (OGTT) was done in all pre pregnancy obese women. It was also done in normal BMI ladies if age ≥35 years, prior history of gestational diabetes, previously delivery of large for gestational age (LGA) newborn, history of unexplained stillbirth and family history of DM. For OGTT, orally 75g glucose was given between 24th and 28th weeks of gestation and blood sugar level was checked 2 hr after glucose dose. If plasma glucose level was ≥7.8 mmol/l, diagnosis of GDM was made. For vaginal delivery purpose, if regular uterine contractions could not be generated by pharmacological and physical methods, diagnosis of failed induction of labor was made. If labor failed to progress either because of uterine dysfunction, contracted pelvis or disproportion between the head of fetus and the birth canal, dystocia was diagnosed.

Gestational age at delivery was determined by last menstrual period and early ultrasound. APGAR score of ≤7 at 5 min after delivery was defined as low. Delivery of dead fetus after 24 completed weeks of gestation was defined as stillbirth. Newborns were weighted immediately after delivery. Birthweight more than the 90th percentile adjusted for newborn gender and gestational age was considered as large for gestational age (LGA) newborn or fetal macrosomia. Small for gestational age neonates were those who had weight less than the 10th percentile at birth adjusted for newborn gender and gestational age. Data was analyzed using statistical software SPSS version 19.

Descriptive statistics were used to calculate Mean ± SD for age. The pearson chi-squared test was used for analysis of categorical variables. Odd ratios (OR) and 95% confidence intervals (95% CI) were calculated. The value of $p \leq 0.05$ was considered significant.

RESULTS

Out of 3677 delivered women during study period, 18 (0.48%) were underweight, 3215 (87.43%) were normal weight, 248 (6.74%) were overweight, and 196 (5.33%) were obese pregnant women. We compared obstetric outcomes among normal weight and obese women. Underweight and overweight women were excluded. Table-I shows maternal characteristics of our studied groups. The mean age of obese pregnant women (30.7 ± 5.9) was significantly greater than that of normal weight pregnant women (28.7 ± 5.2). In obese women, mean parity was 1.29 ± 1.14 whereas in normal weight women, it was 1.51 ± 1.44. In both groups, mean gestation at delivery was 39 weeks. Obese women had 6-28 kg weight gain during pregnancy whereas females of normal BMI had 7-24 kg weight gain. Education level was significantly high in normal weight women

eclampsia, and GDM were more likely to develop in obese women. It also shows that induction of labor, failed induction of labor, dystocia and cesarean section rate was significantly higher in obese women.

Table-I: Demographic characteristics of obese and normal weight ladies.

Characteristics	Obese women n=196 n (%)	Normal weight women n=3215 , n (%)	p-value
Parity			
Nulliiparous	70 (35)	1163 (36.17)	0.921
Multiparous	126 (64.2)	2052 (63.83)	
Education level			
Primary-secondary	144 (73.6)	1903 (59.1)	<0.001
Higher education	52 (26.4)	1312 (40.8)	
Mean Age (years)			
Mean ± SD	30.7 ± 5.9	28.7 ± 5.2	<0.001
Weight Gain During Pregnancy (Kg)			
Mean ± SD	11.6 ± 6.5	14.3 ± 4.7	<0.001
Prepregnancy Body Mass Index (kg/m²)			
Mean ± SD	32.8 ± 2.2	22.8 ± 0.9	<0.001

Table-III: Showed neonatal outcomes. In both groups, mean birth weight and newborn

Table-II: Obstetrical complications in obese and normal weight ladies.

Obstetrical Complications	Maternal BMI ≥30 kg/m² n=196	Normal weight women (18.5-24.9) kg/m² n=3215	OR (95% CI)	p-value
Gestational Diabetes Mellitus	42 (21.4%)	160 (4.97%)	5.20 (3.57-7.58)	<0.001
Gestational Hypertension	33 (16.83%)	85 (2.64%)	7.4 (4.84-11.4)	<0.001
Preeclampsia	20 (10.2%)	156 (4.85%)	2.22 (1.36-3.63)	0.0013
Dystocia	34 (17.3%)	260 (8.08%)	2.385 (1.61-3.52)	<0.001
Induced Labor	62 (31.63%)	456 (14.1%)	2.79 (2.03-3.84)	<0.001
Failed Induction of labor	18 (9.18%)	21 (0.65%)	15.3 (8.05-29.38)	<0.001
Augmentation of labor	72 (36.73%)	986 (30.66%)	1.31 (0.97-1.77)	0.0754
Cesarean Delivery	84 (42.8%)	912 (28.3%)	1.89 (1.41-2.53)	<0.001

Table-III: Neonatal outcomes.

Outcome	Obese women ≥30 kg/m², n (%)	Normal weight women 18.5-24.9 kg/m², n (%)	OR (95% CI)	p-value
Large for gestational age	60 (30.6)	321 (9.98)	3.97 (2.87-5.50)	<0.001
Small for gestational age	7 (3.57)	125 (3.88)	0.91 (0.42-1.98)	0.82
APGAR score ≤7 after 5 min	7 (3.57)	54 (1.67)	2.16 (0.97-4.82)	0.0583

in comparison with obese women.

Table-II: Showed that obstetrical complications such as gestational hypertension, pre-

gender was same. LGA neonates were significantly more in obese women. But in both groups, there was not significantly difference in preterm

delivery, small for gestational age babies, Low APGAR score at 5 minute, and stillbirth rates.

DISCUSSION

Worldwide obesity is one of the biggest health challenges having direct impact on woman's life throughout their reproductive years and thereafter[5]. An increased BMI is associated with increase in pregnancy related complications such as gestational hypertension, preeclampsia, gestational diabetes, macrosomia and other neonatal morbidities[6], imposing financial and burden on health care system.

Obesity is a recognized factor for development of type 2 diabetes mellitus and gestational diabetes[6]. It has been estimated that up to 6-7% of pregnancies are complicated by DM and that approximately 90% of these cases are of GDM[7]. GDM was observed in 21.4% of obese women in our study, with OR of 5.2. In a study done by Ubel *et al* similar increased risk of developing gestational diabetes found[8]. Other studies also show 3-8 fold higher risk of GDM in obese women as compared to normal weight pregnant women[9,10]. Indian studies by Nishu[11], and John[4], also suggested increased occurrence of developing gestational diabetes mellitus in obese as compared to normal weight pregnant women.

Our study shows that increased prepregnancy BMI has an association with hypertensive disorder. The OR for gestational hypertension was 7.4 and for preeclampsia was 2.2 in our obese patients. Whereas, study done by Madi in Brazil shows 7.6 (6.1-9.5) OR for hypertensive disorder in women with prepregnancy BMI >30 kg/m²[10]. The higher incidence of both preeclampsia and gestational hypertension in obese pregnant women is also found in studies done in Sweden and India[9,11]. Whereas study done by John in India shows gestational hypertension developed in 38% obese pregnant[4].

Spontaneous onset of labor at term is less likely in obese women. They require induction of labor and failure of induction of labor mostly occur in these women[11,4]. In our study, we observed that 31.63% obese women required induction of labor and the OR for failed induction in these women was 15.3. Study done in Linthuanian university of health science shows 32.8% obese women require labor induction and 18.06 was OR for failed induction of labor[9]. Our results are similar to other studies[9,10,11,4]. The increased induction rate in obese women was partly due to higher incidence of diabetes and preeclampsia.

Obese women are at increased risk of delivery by cesarean section because of failed induction of labor and narrow birth canal due to increased pelvic soft tissue. Dystocia and cephalo-pelvic disproportion are also causative factors of increased cesarean rate in obese women[3,6]. In our study, cesarean section rate in obese women was 42.8% and it was similar to cesarean rate reported in other studies done in obese pregnant women[5,9,10,11]. Even after controlling other factors, a nearly two-fold increase in cesarean section rate in obese women has been observed[12-14].

Fetal macrosomia is a common complication in obese pregnant women both with and without diabetes mellitus. Fetal macrosomia is a consequence of change in body composition in neonate with an increase in both percentage fat and fat mass. Macrosomia is more than 2 times likely in women with BMI greater than 30 kg/m² [5] and severity of macrosomia increases linearly with increasing maternal BMI [3]. In our study, we observed 30.6% risk of LGA newborn in obese ladies. The OR of LGA newborns in obese women were 3.97 as compared to newborns of normal weight pregnant women. These findings are similar to other studies done on obese pregnant women in Brazil [10] and Lithuania [9] that show OR for fetal macrosomia 2.9 and 3.68 respectively. But a study conducted in Spain shows no statically significant increased incidence of masrosomia in obese women[15]. Macrosomic newborns have increased risk of meconium aspiration syndrome, shoulder dystocia and birth trauma[10]. Low APGAR score have been observed in neonates of obese women and these neonates require neonatal intensive care unit (NICU) admission[3]. In our study, we observed APGAR score of <7 at 5 minute in newborn of obese women. 3.57% babies of obese

women and 1.67% newborns of normal weight women had APGAR score of <7 with OR of 2.168 and p=0.058 in our study. Although it is not statistically significant but obese women had more newborns with low APGAR score than normal weight women. These and findings are similar to other studies[10,11,16].

Our study has limitation that it is tertiary care hospital based where about 2/3rd of patients are of high risk pregnancy. Thus obstetric complications rate due to obesity may be higher in study population as compared to general. However, we want to evaluate the effect of obesity on pregnancy. We observed that in obese women all pregnancy and labor associated complications are common. It is said, weight control during pregnancy is effective in reducing these complications[17]. But it is better that obese women who are planning to conceive should be encouraged to reduce their weight through diet, exercise and behavioural modification because women who can modestly lower prepregnancy BMI have decrease risk of gestational hypertension, preeclampsia, GDM, macrosomia and risk of cesarean section[6].

CONCLUSION

In conclusion, obese women are at increased risk of antenatal complications (gestational hyp ertension, gestational diabetes mellitus), intrapartum complication (induction and augmentation of labor, dystocia, emergency and elective cesarean section) and poor neonatal outcome (low APGAR, macrosomia, NICU admission) imposing burden on health care system. Concrete and comprehensive efforts are needed to create awareness in general population about type of diet and exercise.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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