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Original Research Article

Fetomaternal outcome in overweight and obese pregnant women in tertiary care hospital in Northeast India

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ABSTRACT

Background: The global prevalence of overweight and obesity in 2014 was 39% and 13% respectively. Underweight is defined as BMI less than 18.5, normal weight as BMI from 18.5 to 24.9, overweight from 25 to 29.5 and obese as BMI of 30 or greater. Obesity is critically important to maternal and fetal health during the perinatal period. Obesity increases the risks of gestational diabetes mellitus, overt diabetes, pregnancy induced hypertension including gestational hypertension, pre-eclampsia, eclampsia, thrombo-embolic phenomena, infections, miscarriage.
Methods: A prospective cohort study was carried out in the Department of Obstetrics and Gynaecology, RIMS, Imphal, Manipur for duration of two years beginning from July, 2019 to August, 2021. Consecutive sampling method was followed to include 38 cases and 38 controls and analysis was done.
Results: Comparison of pre-eclampsia among the study groups showed 8 (21.1%) of exposed group and 1 (2.6%) of the non-exposed group developed preeclampsia. The association between overweight and obesity with GDM. 9 (23.7%) of overweight and obese women while 1 (2.6%) of non-obese women developed GDM. The distribution of neonates requiring neonatal resuscitation among the two study groups showed that 14 (36.84%) of neonates born by overweight and obese women required resuscitation as against 5 (13.16%) of neonates born by non-obese women.
Conclusions: It was evident from the study that maternal obesity has adverse maternal and fetal outcomes. Maternal obesity was strongly associated with antenatal complications like gestational diabetes mellitus, preeclampsia and increase in need for newborn resuscitation.

Keywords: Fetal outcome, Maternal outcome, Obese women

INTRODUCTION

Obesity is a global health concern. The global prevalence of overweight and obesity in 2014 was 39% and 13% respectively.[1] Underweight is defined as a BMI less than 18.5, normal weight as a BMI from 18.5 to 24.9, overweight from 25 to 29.5 and obese as a BMI of 30 or greater.[2] This worldwide rise in prevalence of obesity has led to the World Health Organization (WHO) declaration that obesity is a major killer disease of the millennium on par with the HIV and malnutrition. Excess weight gain in pregnancy can be difficult to shed postpartum and is an additional contributing factor to obesity in parous women. Obese women have a higher prevalence of infertility as compared with normal weight women and once they conceive, they are associated with many complications.

Obesity increases the risks of gestational diabetes mellitus, overt diabetes, pregnancy induced hypertension including gestational hypertension, pre-eclampsia, eclampsia, thrombo-embolic phenomena, infections, pregnancy loss or miscarriage. Obese women are more likely to undergo induction of labour, failed induction, operative vaginal delivery, third and fourth degree perineal tear, caesarean section.[3-5] Pre-eclampsia and gestational hypertension are found in 5-10% of pregnancies in the world. Increase in caesarean section, abruption of premature placenta, preterm delivery, low birthweight, stillbirth, acute renal

failure and intravascular coagulation were more frequently observed in women who developed hypertensive disorders of pregnancy.[5] Offsprings of obese women have increased risk of congenital fetal anomalies including neural tube defects, macrosomia and large for gestational age babies, stillbirth and intrauterine fetal demises, intrauterine growth restriction, shoulder dystocia and preterm delivery.[6-8]

As most of the adverse outcomes of obese pregnancies show strong associations with pre-pregnancy BMI, it is reasonable to assume that the ideal intervention would be to reduce obesity prior to pregnancy. The changing environmental, economic and lifestyle conditions in Manipur have resulted in increased prevalence of obesity related health issues. The study aims to determine the impacts of overweight and obesity in the maternal and perinatal outcomes among pregnant women receiving antenatal care at RIMS.

METHODS

Study place

The study was conducted in Department of Obstetrics and Gynaecology, Regional Institute of Medical Sciences, Imphal, Manipur, India.

Prospective cohort study was designed. The Cohort was the antenatal women who were registered in their first trimester during October 2019 to September 2021. The study population constituted of antenatal women of 38 cases and 38 controls attending antenatal outpatient department. The study population fulfilling inclusion criteria willing to participate were included in the study.

Inclusion criteria

Inclusion criteria included any pregnant women with a documented BMI equal to or higher than 25 in the pre-pregnant state and in early pregnancy who visit in the Department of Obstetrics and Gynaecology, RIMS, Imphal.

Exclusion criteria

Exclusion criteria included patients with twin pregnancy or with any systemic diseases like diabetes, chronic hypertension, heart diseases, autoimmune diseases or any chronic illness and patients who refuse to give informed written consent. Sampling method consecutive sampling method was used. Pre-tested and pre-designed standardized questionnaire including clinical history of the patient, baby details, examination and investigations was used.

For measuring weight, a standardised weighing machine was used. For measuring height stadiometer was used. BMI was calculated using the formula weight (in kg)/ height (m^2). The criteria used for BMI is ACOG BMI 14 classification of maternal weight and optimal weight gain during pregnancy BMI ≥30-obese, 25 to 29.9 overweight, 18 to 24.9 - normal and <17.9-underweight. During antenatal period, development of gestational diabetes mellitus, gestational hypertension, pre-eclampsia,

malpresentation, abruption placenta and placenta previa were observed. Labour induction and their indication, mode of delivery (vaginal/caesarean delivery), shoulder dystocia and instrumental delivery detailed were collected. Development of any complication in postpartum period deep vein thrombosis, postoperative wound infection, postoperative wound dehiscence and duration of hospital stay. Neonatal outcomes were - gestational age at birth, birth weight (in kg), admission in neonatal intensive care unit (NICU) and indications for admission. The study participants were followed up to delivery and postpartum period till they get discharged from the hospital.

Ethical approval

Ethical permission was obtained from Institutional Ethical Committee before conducting the study.

Statistical analysis

Data analysis was done with statistical package for social sciences (SPSS IBM) version 21.0. The qualitative variables are described in the form of proportions and quantitative variables are described in the terms of mean, median, range and standard deviation. Data was checked for normality before applying appropriate tests of significance. Significance of difference in proportions (qualitative variables) was calculated using chi square test. Significance of p value was taken as $p<0.05$.

RESULTS

Maximum participants i.e., 39.47% of the exposed group and 44.74% of the non-exposed group were in the age group 25-30 years. Chi square test was used for analysis. P value is 0.295 which is insignificant (Table 1). Based on socio-economic status according to modified Kuppuswamy scale, the upper middle and lower middle has been grouped into middle class while upper lower and lower has been grouped into lower class. Majority of participants i,e., 57.9% of the exposed group and 63.2% of the non-exposed group belonged to middle class. Pearson chi-square test was applied, p value is 0.058 which is insignificant (Table 1).

Distribution of study population according to gravida shows maximum participants were multigravidas as 81.58% of exposed group and 68.42% of non-exposed group were multigravidas. P value is 0.185 which is insignificant. Distribution of study population according to the number of abortions showed that 42.11% and 39.47% of the exposed group while 47.37% and 21.05% of the non-exposed group had one and two or more abortion

respectively. Chi square test was applied. p-value is 0.168 which is insignificant (Table 1).

Comparison of gestational hypertension among the two study groups showed that 15.8% of exposed group and 5.3% of non-exposed group were found to have Gestational hypertension. Fischer' square test was used to find out the association. P value is 0.26 which is not significant (Table 2).

The comparison of pre-eclampsia among the study groups showed that 21.1% of exposed group and 2.6% of the non-exposed group developed preeclampsia. P-value is 0.028 after applying Fischer' exact test which suggests that there is significant association between overweight & obesity and pre-eclampsia (Table 2). The association between overweight and obesity with GDM. 23.7% of overweight and obese women while 2.6% of non-obese women developed GDM. Fischer' Exact test was applied; p value is 0.014 which is significant (Table 2). Distribution of population based on mode of delivery showed that 44.7% and 13.2% of overweight and obese women while 26.3% and 5.3% of non-obese women required cesarean section and instrumental delivery respectively. P value is 0.065 which is insignificant (Table 2). 13.2% of overweight and obese women while 2.6% of non-obese women developed post-partum hemorrhage. Fischer's Exact test was used for analysis, p value was found to be 0.2 which was insignificant (Table 2). 15.8% of overweight and obese women while 7.9% of non-obese women had preterm delivery. Fischer's Exact test was used. P value is 0.287 which is insignificant (Table 2).

Table 1: Profile of the study participants (n=38).

Profile	Cases (n=38)	Control (n=38)
Age group (in years)		
<25	6 (15.8%)	9 (23.7%)
25-30	15 (39.5%)	17 (44.7%)
30-35	14 (10.5%)	6 (15.8%)
≥35	3 (34.2%)	6 (15.8%)
Socio-economic status		
Upper	7 (18.4%)	4 (10.5%)
Middle	22 (57%)	24 (63.2%)
Lower	9 (23%)	10 (26.3%)
Gravida		
Primigravida	7 (18.4%)	12 (31.6%)
Multigravida	31 (81.6%)	26 (68.4%)
Number of abortions		
0	7 (18.4%)	12 (31.6%)
1	16 (42.1%)	18 (47.4%)
≥2	15 (39.5%)	8 (21.1%)

Table 2: Association of maternal obesity with antepartum complications and neonatal outcomes (n=38).

Antenatal complications	Cases (n=38)	Control (n=38)	P value
Gestational hypertension			
Present	6 (15.8%)	2 (5.3%)	0.26
Absent	32 (84.2%)	36 (94.7%)	
Pre-eclampsia			
Present	8 (21.1%)	1 (2.6%)	0.02
Absent	30 (78.9%)	37 (97.4%)	8
Gestational diabetes mellitus			
Present	9 (23.7%)	1 (2.6%)	0.01
Absent	29 (76.3%)	37 (97.4%)	4
Mode of delivery			
Vaginal	16 (42.1%)	26 (68.4%)	0.06
Instrumental	5 (13.2%)	2 (5.3%)	5
Cesarean	17 (44.7%)	10 (26.3%)	
Post-partum hemorrhage			
Present	5 (13.2%)	1 (2.6%)	0.2
Absent	33 (86.8%)	37 (97.4%)	
Period of gestation			
Term (≥37 week)	32 (84.2%)	35 (92.1%)	0.287
Preterm (<37 week)	6 (15.8%)	3 (7.9%)	

Table 3: Association between maternal obesity and other variables (n=38).

Neonatal details	Cases (n=38)	Control (n=38)	P value
Birth weight (kg)			
<2.5	7 (18.4%)	5 (13.2%)	0.092
2.5-4	25 (65.8%)	32 (84.2%)	
>4	6 (15.8%)	1 (2.6%)	
Neonatal resuscitation			
Yes	14 (36.8%)	5 (13.2%)	0.017
No	24 (63.2%)	33 (86.8%)	
Neonatal death			
Yes	3 (7.9%)	1 (2.6%)	0.615
No	35 (92.1%)	37 (97.4%)	

Distribution of birth weight among the study groups showed that 15.8% of the exposed while 2.6%of the non-exposed neonates were found to be macrosomic. 18.4% and 13.2% babies born to exposed and non-exposed women respectively were found to have low birthweight. P value is 0.092 which is insignificant (Table 3). The distribution of neonates requiring neonatal resuscitation among the two study groups showed that 36.84% of neonates born by overweight and obese women required resuscitation as against 13.16% of neonates born by nonobese women. Chi-Square test was applied. P value is 0.017 which signifies an association between overweight and obesity with neonatal resuscitation requirement (Table 3). The comparison of neonatal death among the two study groups showed that 7.9% and 2.6% of the neonatal death belongs to the overweight and obese group and non-obese group respectively. Fischer's Exact test is applied and p value is found to be 0.615 which is insignificant (Table 3).

DISCUSSION

The body mass index (BMI) was used to divide the study population into two groups. 38 patients with BMI between 18.5-24.9 kg/m2 were included in the non-exposed group while 38 patients with BMI ≥25 kg/m2 were included in the exposed group. In this study, majority of the participants i.e., 39.47% of the exposed group and 44.74% of the non-exposed group were in the age group 25-30 years

However, it was observed that women in the overweight and obese group were slightly older when compared to women with normal BMI as 44.7% of exposed group were above 30 years as against 31.6% of the non-exposed women. This is consistent with the study by Iyoke et al where the mean age of the obese women was 26.7±5.1 years and that of the healthy-weight women was 26.6±4.9 years.[9]

In this study, modified Kuppuswamy scale was used to divide the population based on socio-economic status. However, the upper middle and lower middle has been grouped into middle class while upper lower and lower has been grouped into lower class. Majority of participants i,e., 57.9% of the exposed group and 63.2% of the non-exposed group belonged to middle class. Pearson chi-square test was applied, p value is 0.058 which is insignificant. So, there is no significant association between socio-economic status and overweight and obesity in this study though it is considered that obesity is more prevalent among the higher-class women because of their sedentary lifestyle. However, it should be remembered that more emphasis was given to the education qualification and occupation of the head of the family according to modified Kuppuswamy scale. Also, obesity depends on other factors like genetic, ethnicity, environmental factors, food habits, stress etc. It was observed in the study that 18.4 % of the overweight and obese group while 31.6 % of the non-obese group were primigravidas. Maximum participants were multigravidas as 81.58% of exposed group and 68.42% of non-exposed group were multigravidas. The association of obesity and gravida was found to be insignificant by Pearson-Chi square test.

In this study, 42.1% and 39.5% of the exposed group while 47.4% and 21.1% of the non-exposed group had one and two or more abortion respectively. Chi square test was applied. P value is 0.168 which is insignificant. However, 39.5% of the exposed group had recurrent pregnancy loss as against 21.1% of the non-exposed group. Similar observation was found in a study conducted by Lashen et al where the risk of recurrent early miscarriage was significantly higher among the obese patients with odds ratios 3.5, 95% CI 1.03-12.01.[10] In the study, 15.8% of overweight and obese women and 5.3% of non-obese women were found to have gestational hypertension. This is in concordance with the study conducted by Awan et al which shows high incidence of PIH in obesity (24% versus 8% in controls).[3] Similar results were found in the studies conducted by Lewandowska et al and Kutchi et al where pre-pregnancy obesity was associated with a higher odds ratio of gestational hypertension (AOR=4.94) and (OR 3.83) respectively.[11,12]

We observed increased risk of pre-eclampsia among overweight and obese women in this study (21.1% versus 2.6%). P value is 0.028 after applying Fischer' exact test which suggests that there is significant association

between overweight & obesity and pre-eclampsia. This is consistent with the study done by Awan et al where overweight pregnant women had significantly high frequency of pre-eclampsia (27% versus 9% in controls). Khuhro et al conducted a study which showed pre-eclampsia occurred in 15%, of obese women.[3,13]

In the exposed group, the incidence of gestational diabetes mellitus was 23.7% while it was 2.6% in the non-exposed group. Fischer' Exact test was applied; p value is 0.014 which is significant. This is consistent with the study conducted by Tosson et al where 21.8% of obese women had diabetes mellitus versus 3.6% of non -obese women. Also, the study conducted by Khuhro et al, showed that GDM developed in 15% of obese women.[13,14]

In this study, 44.7% and 13.2% of overweight and obese women while 26.3% and 5.3% of non-obese women required caesarean section and instrumental delivery respectively. This is in concordance with the study conducted by Mandal et al where the cesarean section incidence was found higher in obese women (36.72% vs 17.53%). Similar results were found in study conducted by Awan et al (44% versus 16%) and Gutierrez et al (48.8 vs 37.4%). Also, the incidence of instrumental delivery in this study is comparable to the study conducted by Mandal et al (12.32% vs 5.21%).[3,15,16]

It was also observed that 13.2% of overweight and obese women while 2.6% of non-obese women developed post-partum hemorrhage. Fischer's Exact test was used for analysis, p value was found to be 0.2 which was insignificant. However, the finding is consistent with the study conducted by Khuhro et al where PPH occurred in 13%.[13]

In this study, it was found that 15.8% of overweight and obese women while 7.9% of non-obese women had preterm delivery. This is supported by studies conducted by Mandal et al (7.58% vs 3.55%) and Avci et al, where preterm birth was significantly higher in obese cases than those in non-obese cases.[15] We observed that macrosomia was seen in 15.8% of overweight and obese women while and it was seen in 2.6% of non-obese women. This is in concordance with the study by Michilin et al, where there was significant increase in the prevalence of macrosomia in the offspring of obese women (16.8% vs 8.4%).[18]

There was significant association between overweight and obesity and their newborns requiring neonatal resuscitation. In this study, 36.84% of neonates born by overweight and obese women required resuscitation as against 13.16% of neonates born by non-obese women. This is consistent with studies stating that the incidence of neonatal resuscitation and NICU admission is higher among obese women which were- Awan et al (47% versus 10%), Khuhro et al (35% NICU admission).[3,13] The incidence of neonatal death was 7.9% among the overweight & obese group and 2.6% among the non-obese group. Out of the 3 deaths in the exposed group, one was due to pre-maturity, one due to placental abruption and one due to meconium aspiration syndrome. One death in the non-exposed group was due to meconium aspiration syndrome. There are conflicting data in the literature regarding maternal obesity and neonatal death with some studies showing increased risk Awan et al while some studies showing no change by Sheiner et al and Burstein et al.[3,19,20]

CONCLUSION

Our study concludes that maternal obesity is an important contributing factor for adverse maternal and neonatal outcomes thus, posing a considerable challenge to the obstetrical practitioner. This prospective cohort study was aimed to determine the fetomaternal outcomes in overweight and obese pregnant women. The study showed that the incidence of developing pre-eclampsia was significantly higher among the overweight and obese pregnant women. The association of increased BMI with gestational diabetes mellitus is also significant in this study. The study also shows that increased BMI is significantly associated with the requirement of neonatal resuscitation thereby increasing NICU admission rate.

However, the association with obesity and gestational hypertension, cesarean delivery, postpartum hemorrhage is not significant in this study. The possible reason could be inadequate sample size. Moreover, the cesarean delivery for non-obstetric indication i.e., cesarean delivery for maternal request is increasing. As obesity is considered to be a modifiable risk factor, preconception counselling and creating awareness regarding health risks associated with overweight and obesity should be encouraged. The ideal intervention is to encourage the obese women to achieve a normal BMI before conception.

Once they conceive, they should be classified as high-risk pregnancy and appropriate antenatal care with timely fetal surveillance is necessary with anticipation of the possible complications. Timely screening for pregnancy induced hypertension and diabetes mellitus is a must. In early pregnancy, besides being watchful about the higher association of miscarriage, obese women should be screened for congenital anomalies.

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