ORIGINAL ARTICLE

Effect of Raised Maternal Body Mass Index on Neonatal Outcome

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ABSTRACT

Aim: To assess the effect of raised maternal body mass index (BMI) on neonatal outcome.
Methods: This cohort study was carried out in the Department of Obstetrics and Gynecology District Hospital Dera Ghazi Khan, from March 2011 to September 2011. Total of 240 primigravida at 24 to 36 weeks pregnant women (120 with raised BMI and 120 with normal BMI were included in this study). Pregnant ladies with raised BMI and normal BMI were followed by regular antenatal visits and neonatal outcome was observed after delivery.
Results: Mean age was found to be 26.3±7.1 and 26.9±6.3 in exposed and non-exposed group. In exposed 23 neonates (19.1%) and 7 neonates (5.9%), in non-exposed group found to be macrocosmic Relative Ratio (RR=3.29, P =.001). Congenital birth defects were developed in 9 neonates (7.5%) of exposed group and 2 neonates (1.7%) of non-exposed group (RR=4.50, P= 0.30). In exposed group 10 neonates (8.3%) and in non- exposed group 3 neonates (2.5%) were delivered preterm (RR=3.33. P= 0.045) Still birth took place in 6 neonates (5.0%) of exposed group and in 1 neonate (0.8%) of non-exposed (RR =6.00, P= .0.055). In exposed group 8 neonates (6.7%) and in non- exposed group 2 neonates (1.7%) died (RR = 4.00, P=0.052). 12 Neonates 10.0% of exposed group and 3 neonates 2.5% of non- exposed group were admitted to NICU (RR = 4.00, P = 0.016).
Conclusion: Our study confirmed the previously established association between raised maternal BMI and macrosomia, birth defect, preterm birth, still birth, neonatal death and admission to NICU.
Keywords: Raised BMI, primigravida, neonatal outcome

INTRODUCTION

Elevated maternal body mass index has an important impact on neonatal outcome and is calculated as, Maternal Body Mass Index (Quetlet Index) = Weight in Kilogram/Height in meter^2. According WHO the definition normal BMI is 20-24kg/m^2, overweight is BMI of 25-29.9kg/m^2 and Obesity is BMI of >30kg/m^2. Maternal weight gaining in pregnancy offers a good means of assessing the well being of the pregnant mother and baby. Inadequate prenatal weight gain is significant risk for intrauterine growth restriction, preterm delivery and low birth weight in infants.[1]Obesity and excessive weight gain on the other hand can lead to adverse maternal and fetal outcome[2].

Maternal obesity, a reflection on obesity in general population, is emerging as a public health problem in developed as well as developing countries .Worldwide, obesity (BMI >30kg/m^2 exists at a prevalence of 15-20% and accounts for 2-7% of total health care cost.[3] In developing countries the paucity of research on weight gain in pregnancy and obstetric and neonatal outcomes gives cause for concern. In United Kingdom, 28% pregnant women are overweight BMI is 25-29.5kg/m^2 and 11% are obese[4]. Changing lifestyles increasing urbanization high calorie food consumption and reduced physical activities are responsible for increasing obesity in developing countries[5].

In the setting of DHQ Hospital DG Khan, we come across number of patients with obesity. The studies conducted so far are from western developed countries and there is a paucity of data from developing countries[6]. Therefore, I want to conduct this study so that this will add to body of evidence which suggests that raised BMI, predisposes women to complicated pregnancies and increased obstetric interventions. This study will add in the facts that timely intervention minting BMI within normal values can prevent from dangerous neonatal outcome.

PATIENTS AND METHODS

This cohort study was carried out in the Department of Obstetrics and Gynaecology District Hospital Dera Ghazi Khan, from March 2011 to September 2011. Total of 240 primigravida at 24 to 36 weeks pregnant women (120 with raised BMI and 120 with normal BMI were included in this study). Pregnant ladies with raised BMI and normal BMI were followed by regular antenatal visits and neonatal outcome was observed after delivery.

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RESULTS

During the six months of this study (14th March 2011 to 13th september2011), total 240 patients were analyzed in 2 groups (Exposed Group and Non-Exposed Group); each group was consist of 120 patients. As the age cataloging, between the 25-30 years old patients were analyzed such as 82 patients (68.3%) were in exposed group and 79 patients (65.8%) were in non- exposed group. Similarly, between the 31-35 years old patients were analyzed such as 38 patients (31.7%) were in exposed group and 41 patients (34.2%) were in non-exposed group. In the exposed and non-exposed group, mean age was found to be 26.3±7.1 and 26.9±6.3 as shown in Table 1. As the shown in Table 2, 10 patients (8.3%) of exposed group and 3 patients (2.5%) of non-exposed group had <37 weeks gestational age.110 patient (91.7%) of exposed group and 117 patient (97.5%) of non-exposed group had 37-40 weeks gestation. As the socioeconomic category, 82 patients (68.3%) of exposed group and 79 patients (65.8%) of non- exposed group were belong to poor class (<Rs.5000). As the 27 patient (22.5%) of exposed group and 31 patients (25.9%) of non-exposed group, were belong to the middle class (Rs.5000-15000), meanwhile, 11 patient (9.2%) of exposed group and 10 patients (8.3%) from non-exposed group were belong to upper class [>Rs .15000] (Table 3). As the exposed group, 23 neonates (19.1%) and 7 neonates (5.9%) from non-exposed group found to be macrosomic (RR= 3.29, P = 0.001).Congenital birth defects were developed in 9 neonates (7.5%) of exposed group and in 2 neonates (7.5%) of non-exposed group (RR = 3.29, P = 0.30).From the exposed group ,10 neonates (8.3%) and 3 neonates (2.5%) from non-exposed group were delivered preterm (RR=3.33,P= 0.045). Stillbirth took place in 6 neonates (5.0%) from exposed group and in 1 neonate ((0.8%) from none-exposed group (RR=6.00, P=0.055).As the 8 neonates (6.7%) from exposed group, 2 neonates (1.7%) from none-exposed group died (RR =4.00, P=0.052). As the 12 neonates (10%) of exposed group, 3 neonates from non-exposed group were admitted to NICU [RR=4.00, P=0.016] (Table 4).

Table 1: Distribution of neonates by age (n= 240)

Age (years)	Exposed (BMI >25 kg/m^2)		Non–exposed (BMI=20-24 kg/m^2)	
25-30	82	68.3	79	65.8
31-35	38	31.7	41	34.2
Total	120	100.0	120	100.0
Mean±SD	26.3±7.1		26.9±6.3	

Table 2: Distribution of neonates by gestational age (n=240)

Gestational age (weeks)	Exposed (BMI >25 kg/m^2)		Non–exposed (BMI=20-24 kg/m^2)	
< 37	10	08.3	03	02.3
37-40	110	91.7	117	97.5

Table 3: Distribution of neonates by socio-economic status (n=240)

Socioeconomic status	Exposed (BMI >25 kg/m^2)		Non–exposed (BMI=20-24 kg/m^2)	
Poor	82	68.3	79	65.8
Middle	27	22.5	31	25.9
Upper	11	09.2	10	08.3

Table 4: Distribution of neonates by neonatal outcome (n=240)

Neonatal outcome	Exposed (BMI >25 kg/m^2)		Non–exposed (BMI= 20-24kg/m^2)		RR/P Value
	No.	%	No.	%	
Macrosomia	23	19.1	7	5.9	3.29/0.001
Congenital birth defects	9	7.5	2	1.7	4.50/0.030
Preterm birth	10	5.0	3	2.5	3.33/0.045
Still birth	6	5.0	1	0.8	6.00/0.55
Neonatal death	8	6.7	2	1.7	4.00/0.052
Admission to NICU	12	10.0	3	2.5	4.00/0.016

RR = Relative risk

DISCUSSION

The core discovery of this study is that fatness in pregnancy is linked with an increased risk of poor neonatal outcome. Maternal obesity is linked with abnormal fetal growth. Heavier women are less likely to have a pregnancy complicated by a small-for-gestational age infant or intrauterine growth restriction, but this protective effect appears to dissipate once the maternal BMI reaches the level of obesity (>30kg/m^2). The main concern in obese pregnant woman is fetal macrosomia (defined as estimated fetal weight of greater than or equal to 4500g), which appears to be increased 2 to 3 fold in obese parturient[7].

In a meta analysis by Chu et al[8], the prevalence rate of fetal macrosomia were 14.6% for obese and morbidly obese women, compared with 8.3% for the normal weight group. In present study, macrosomia was found to be 19.1% vs. 5.9% in exposed and non-exposed group, respectively. Fetal macrosomia in obese women is linked not only with an increase in the absolute size of the fetus, but also in a change in body composition[9]. Sewell et al[10] found that the average fat mass of infants born to mothers with a normal BMI (25kh/m^2) was 334g, giving a body fat composition of 9.7%. The offspring of women with a BMI> 25kg/m^2, on the other hand, had mean fat mass of 416g, or a body fat composition of 11.6%. Of note,

the majority of the effect appears to be a result of weight gain during pregnancy .Indeed, pre-pregnancy BMI appears to account only 6.6% of the observed variation in infantile fat mass and only 7.2% of body fat composition.[11] Obese women are more likely than average weight women to have an infant with birth defects[12].

In present study, exposed group women (BMI>25) were significantly more likely than non-exposed women (BMI=20-24) to have children with a congenital birth defects i.e.7.5% (P=0.030). Our results are comparable with the study of Mills et al[13] who demonstrated that there was a highly significant trend of increasing odds ratio for congenital birth defects with increasing maternal obesity (P<0.0001).

Maternal obesity is known to be associated with increased rates of preterm deliveries and stillbirth.[14] Rate of preterm deliveries in our study was 8.3% in raised BMI group. This result is consistent with previous US studies have reported overall preterm rates of 10% to 15%[15,16]. Our study shows that stillbirth is increased among mothers having raised BMI as compared to mothers normal BMI (P= 0.055). In a study by Salihu[17] also reported that mothers with increased BMI strongly provide sufficient evidence that there is a relationship between maternal obesity and stillbirth.

Changes in inter-pregnancy body mass index (BMI) influence subsequent fetal survival and obese women that normalize their BMI values experience enhanced fetal survival in future pregnancies. The elevated risks of stillbirth among obese mothers affect all gestations regardless of fetal number[18].

Lucas et al[19] reported increased risk of mortality up to 18 months in preterm babies born to obese mothers, but the study was limited to babies with birth weights of <1850g. Beaten et al[20] found the risk of infant death doubled in obese women compared with lean women (BMI <20kg/m^2). In this study, increasing maternal BMI was significantly linked with the neonatal admission to NICU (P=0.016). These results are similar to advocated by Roman et al[21].

CONCLUSION

Our study confirmed the previously established association between the raised maternal body mass index and macrosomia, birth defects, preterm birth, stillbirth, neonatal death and admission to NICU. Obesity prevention efforts are needed to increase the number of women who are of healthy weight before pregnancy.

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