



MATERNAL BMI WITH PERINATAL OUTCOME

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ABSTRACT

Background: Maternal obesity has been associated with adverse pregnancy outcomes, such as pre-eclampsia, eclampsia, pre- and post-term delivery, induction of labor, macrosomia, increased rate of caesarean section, and post-partum hemorrhage. **Objective:** To find out any relationship between maternal BMI with perinatal outcome. **Methodology:** It was cross sectional observational study carried out Department of Obstetrics and Gynaecology, Institute of Child and Mother health, Matuail (ICMH), Dhaka. Patient attending inpatient department of Obstetrics and Gynaecology in Institute of Child and Mother Health, Matuail of woman was enrolled for the study. After selection of the study subject according to inclusion and exclusion criteria, objectives, nature and potential risk of all procedures were used for the study was explained in details and written informed consent was taken. A detailed general, systematic, obstetric examination and medical history was taken. **Results:** This study found maximum (34%) were age group 21-25 years followed by 28% were ≤ 20 years, 26% were 26-30 years, 8% were 31-35 years and only 4% were 36-40 years. The average age was 25 years. Among these 145 pregnant women, 12% were underweight, 28% were normal weight, 38% were over weight and 22% were obese. Fetal outcome was good in majority (72%) of the cases and 15 perinatal death of which 6% NNDs and 4% still birth. It also found that good fetal outcome was more in normal weight mother (85.7%), 72.7% in over weight mother and less in obese. Asphyxiated baby was delivered mostly in obese (28.1%) and in underweight mother (17.6%). Neonatal sepsis mostly seen in obese (9.1%). Neonatal death mostly seen in obese (9.4%). The difference was statistically significant ($P < 0.05$). **Conclusion:** This study shows maternal weight has emerged as maternal factors influencing the birth weight of the baby. Maternal weight should continue to be given importance in monitoring the health of pregnancies and bioelectrical impedance analysis and arm measurements should be further investigated as another simple way to track appropriate body composition changes across gestation, especially in resource-limited settings.

KEYWORD: BMI, birth weight, prenatal, birth asphyxia.

INTRODUCTION

Pre-pregnancy body mass index (BMI) is an important predictor of birth weight. It is therefore important to combine maternal weight gain and pre-pregnancy BMI in analyzing the association between weight gain and infant birth weight. The American Institute of Medicine (IOM) have classified the weight of individual according to BMI in the following way. 1. Underweight (BMI less than 19.8 kg/m²), 2. normal weight (19.8–26.0 kg/m²), 3. overweight (26.1–29.0 kg/m²), 4. Obese women (BMI more than 29.0 kg/m²).^[1] High maternal body mass index (BMI) is related to adverse maternal pregnancy outcomes such as pre-eclampsia, eclampsia, gestational diabetes and post-term delivery, delivery of increased incidence of macrosomic baby, caesarean section, still birth and post-partum hemorrhage.^[2]

Birth weight (BW) is an important determinant of infant's wellbeing. Several factors such as mothers' genetic characteristics, socio-cultural, demographic factors, behavioral factors, pre-pregnancy body mass index (BMI), gestational weight gain (GWG) etc. contribute to birth weight. BW is important as low birth weight is known to increase the risk of adult-onset diseases like type -2 diabetes and ischemic heart disease.^[3]

According to the guidelines of *American Gynecological & Obstetrical Society* on the clinical status of pregnant women, it is recommended that BMI should be calculated in all these women during their first prenatal visit.^[4,5]

Several studies have been conducted on maternal BMI, weight gain during pregnancy, and pregnancy complications. Liu in China (2009) claimed that pregnant women with high BMI were at an increased risk of preeclampsia, GDM, premature rupture of membranes (PROM), placental abruption and stillbirths.^[6]

On the other hand, Sheiner's study in the United States was indicative of no correlations between maternal obesity and cesarean delivery.^[7] Zhong et al. (2010) conducted a study in the U.S to evaluate the association between BMI and premature birth and PROM.^[8]

The present study was designed to determine the association of maternal body mass index (BMI) with perinatal outcome. This will help the planner of the hospital to distribute the resources where it is needed.

OBJECTIVE

General

To find out any relationship between maternal BMI and perinatal outcome.

Specific

- To determine maternal BMI
- To find out association between BMI and newborn birth weight.
- To determine the association between fetal out come and maternal BMI
- To determine the association between mode of delivery and BMI.

METHODOLOGY

Study type

- It was cross sectional analytic study.

Place and period of study

- Department of Obstetrics and Gynaecology, Institute of Child and Mother health, (ICMH), Matuail, Dhaka. Total study period was 2 years from January' 2016 to December' 2017. During the 1st year of total study duration protocol development, submission, approval of protocol, research instrument development, pretesting of research instruments, literature review were done. Data were collected during the period January'2017 to September'2017. Last three month of the total study period were spent for data analysis, report writing & through the study period literature review were done.

Study population

- All pregnant women who were admitted for delivery after completion of 37 weeks of gestation at in patient department of Obstetrics and Gynaecology, Institute of Child and Mother health (ICMH), Matuail, Dhaka fulfil the study eligible criteria during the study period was the study population. The eligible criteria were as

Inclusion criteria

- a. Women who had completed 37 week of gestation
- b. Patient who had first trimester antenatal care with recorded body weight.

Exclusion criteria

- Pregnant women suffering from hypertension, pre- eclampsia, eclamsia, diabetes mellitus, thyroid dysfunction, nephritis.

Sampling method

- The present study was convenient sampling technique.

Study procedure

Patient attending inpatient department of Obstetrics and Gynaecology in Institute of Child and Mother Health, Matuail was enrolled for the study. 1st trimester weight is measured in this study. After selection of the study subject according to inclusion and exclusion criteria, objectives, nature were explained in details and written informed consent was taken. Weight was collected from antenatal record and height was measured in meter scale in standing position with bared foot. BMI was calculated. Fetal outcome were assessed by birth weight of neonates, birth asphyxia and referral to neonatal unit.

Data collection

Relevant clinical data were recorded in a predesigned data collection sheet. A copy of such data collection sheet is given in Appendix.

Data analysis

Statistical analyses were carried out by using the Statistical Package for Social Sciences version 20.0 for Windows (SPSS Inc., Chicago, Illinois, USA). A descriptive analysis was performed for all data. The mean values were calculated for continuous variables. The quantitative and qualitative observations were indicating by frequencies, percentages with 95% CI. Chi square test and odds ratio with 95% CI was used to analyze the categorical variables shown with cross tabulation and unpaired t-test was used to analyze the continuous variable expressed as mean (\pm SD). A P-value was considered to be statistically non-significant if >0.05 and statistically significant if ≤ 0.05 .

RESULTS

Table I: Demographic characteristics of the patients (N=145).

Characteristics	Frequency	Percent
Age in years		
≤20	41	28.3
21-25	49	33.8
26-30	38	26.2
31-35	11	7.6
36-40	6	4.1
Mean±SD	25.02±5.46	
Educational status		
Illiterate	11	7.59
Can sign only	52	35.9
Primary education	24	16.55
Secondary education	31	21.4
Higher secondary	27	18.6
Graduate		
Monthly income		
Poor (<5000 taka)	34	23.4
Lower middle class (5000-10000 tk)	78	53.8
Middle middle class (10000-25000 tk)	18	12.4
Upper middle class (25000-50000 tk)	13	9.0
Upper class (>50000 tk)	2	1.4

Table shows most (33.8%) were in age group 21-25 years followed by 28.3% in ≤20 years. Regarding educational status 7.59% were illiterate, 35.9% were

could sign only. More than half (53.8%) women belonged to lower middle class family.

Table II: BMI of the patients (N=145).

BMI	Frequency	Percent
Under weight (<18.5 kg/m ²)	17	11.7
Normal (18.5-24.9 kg/m ²)	41	28.3
Overweight (25-29.9 kg/m ²)	55	37.9
Obese (>30 kg/m ²)	32	22.1
Total	145	100

Table shows 11.7% were underweight, 28.3% were normal weight, 37.9% were overweight and 22.1% were obese.

Table III: Association between BMI and mode of delivery (N=145).

BMI	Frequency	Mode of delivery			P value
		Vaginal delivery (n=55)	Instrumental (n=6)	LUCS (n=84)	
Under weight (<18.5 kg/m ²)	17	8(35.3)	0(0)	9(52.9%)	0.001
Normal (18.5-24.9 kg/m ²)	41	27(65.9%)	0(0)	14(34.1)	
Overweight(25-29.9 kg/m ²)	55	14(25.5%)	6(10.9%)	35(63.6)	
Obese(>30 kg/m ²)	32	6(18.2%)	0(0)	26(81.3%)	

Table shows that majority of the normal weight mother delivered their baby vaginally (65.9%). Caesarean section is mostly done in obese (81.3%), over weight (63.6%) and underweight (52.9%) women.

Table IV: Association between BMI and birth weight (N=145).

BMI	Number	Birth weight		P value
		Mean	SD	
Under weight (<18.5 kg/m ²)	17	2.20	0.11	0.001
Normal (18.5-24.9 kg/m ²)	41	2.56	0.35	
Overweight (25-29.9 kg/m ²)	55	2.84	0.24	
Obese (>30 kg/m ²)	32	3.00	0.19	

Table shows that underweight mother had significantly lower birth weight babies and overweight and obese

mother had significantly higher birth weight babies. This finding was statistically significant.

Table V: Association between BMI and fetal outcome (N=145).

Fetal outcome	BMI				P value
	Under weight (n=17)	Normal (n=41)	Overweight (n=55)	Obese (n=32)	
Healthy outcome	9(52.9%)	35(85.4%)	43(78%)	17(53.0%)	0.001
Asphyxia	3(17.6%)	2(4.8%)	7(12.73%)	9(28.1%)	
Neonatal death	0(0)	3(7.3%)	3(5.5%)	3(9.4%)	
Still birth	3(17.65%)	0(0)	0(0)	3(9.4%)	

Table shows good fetal outcome was more in normal weight mother (85.4%). Asphyxiated baby was delivered mostly in obese (28.1%) and in underweight mother (17.6%). Neonatal death was mostly seen in obese (9.4%). The difference was statistically significant (P<0.05).

(9.4%). Neonatal death mostly seen in obese (9.4%). The difference was statistically significant (P<0.05).

DISCUSSION

This study found maximum (33.8%) were age group 21-25 years followed by 28.3% were ≤20 years, 26.2% were 26-30 years, 7.6% were 31-35 years and only 4.1% were 36-40 years. The average age was 25 years. This finding consisted with Kumari *et al.* (2014) study they found 25.2 years.^[9]

Among these 145 pregnant women 1.7% had BMI <18.5, 28.3% had a BMI 18.5-24.9, 37.9% had a BMI 25-29.9 and 22.1% had a BMI ≥ 30. These women were categorized in BMI underweight, normal, overweight and obese. Yazdani *et al.* (2012) study shows among these 1000 pregnant women; 128 cases (12.8%) had BMI <19.9, 412 cases (41.2%) had a BMI 20-24.9, 356 cases (35.6%) had a BMI 25-29.9, 98 cases (9.8%) had a BMI 30-34.9 and 6 cases (0.6%) had a BMI ≥ 35.^[10]

This study shows that majority of the normal BMI mother delivered their baby per vaginally (65.9%) then caesarean section (34.1%). Caesarean section is seen in obese (81.3%) then over weight (63.6%) and underweight (52.9.7%). The association was statistically significant (P<0.05). Part *et al.* show that overweight with excessive weight gain during pregnancy had a increased risk of caesarean section and instrumental delivery.^[11]

This study shows good fetal outcome was more in normal weight mother (85.4%), 78% in over weight mother and less in obese. Asphyxiated baby was delivered mostly in obese (28.1%) and in underweight mother (17.6%). Neonatal sepsis mostly seen in obese

In this study, we observed that there was a significant correlation between maternal weight and fetal outcome. It is indicated that with an increase in maternal weight during pregnancy there was a corresponding increase in mean birth weight and this increase was statistically significant (P<0.05).

This finding consisted with Moreira *et al.* (2007) and they found significant correlation between maternal weight during pregnancy and birth weight of the new born. Another study Hymphreys (2004) reported maternal weight gain during gestation is positively correlated with birth weight.^[12] A population-based study conducted in the United States has shown that maternal weight gain during pregnancy correlates with birth weight.^[13] Rao *et al.* (2001) evaluated the relationship between various factors such as multiparity, pregestational overweight or obesity, advanced maternal age, prolonged gestational age and excessive gestational weight gain with the manifestation of fetal macrosomia.¹⁴ Many studies conducted in India (Martin *et al.* 2008; Decherney 2007) and in different parts of the world (Bhattachary *et al.* 2007; Garg *et al.* 2010) have proved the positive relationship between weight during pregnancy and birth weight.^[15,16,17,18]

CONCLUSION

It was found that both the extremes of maternal BMI groups are associated with adverse perinatal outcome. Most of the normal BMI mothers delivered their babies vaginally where caesarian section is mostly done in obese, overweight and underweight mother. Study shows good fetal outcome was more in normal BMI mother. Asphyxiated babies were delivered mostly in obese and underweight mother. So, pre-pregnancy normal BMI should be ensured.

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