

## Effect of Maternal BMI on Pregnancy Outcome in Adolescent Mothers: A Study in a Tertiary Care Hospital, Dhaka, Bangladesh

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### Abstract

This was an observational follow-up study conducted in the Department of Obstetrics & Gynecology, Institute of child & mother health, Matuail, Dhaka. From January, 2014 to July, 2014. After getting approval from the authority, we selected our study participants by a purposive sampling technique and maintaining inclusion criteria. Consecutive 100 patients who were admitted in the hospital, were our study participants. The study observed in group I (44%) have normal BMI, in group II (35.2%) have lean BMI, in group III (15.4%) have over weight BMI and group IV (5.5%) have obese BMI. Birth weight <2.5 in group-II. Neonate complications was highest in group -I & group-II. The new born term babies' outcome status is much higher than preterm babies in all the four groups. APGAR score were <5 in group-II, group-III and in group-IV. Mean birth weight was highest in group-IV, representing 3.76. Mean hospital stay was highest in group-II patients, representing 8 days. Maternal BMI is a potentially modifiable risk factor for adverse outcomes that can occur during pregnancy and the neonatal period.

**Keywords:** Maternal BMI, Pregnancy Outcome, Primigravida, Adolescent Mothers.

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## INTRODUCTION

Body mass index (BMI) is a good indicator of maternal health. Globally, most of the under nourished people live in developing countries like Bangladesh. Maternal BMI has got effect on pregnancy outcome in adolescent mother. For healthy pregnancy following factors are Previous nutritional status Appropriate weight gain Adequate intake of essential nutrients during pregnancy Fetus is solely dependent on mother for its growth & development. Fetus is solely dependent on mother for its growth & development. Pregnant woman needs extra 300 kcal per day to meet the demand of growing fetus. Infant's birth weights are affected more by nutrient intake during the 2nd & 3rd trimester. So it is important in 2nd & 3rd trimester of pregnancy to give special attention about the type & quality of food she takes. Poor maternal diet not only increases the complication of mother; it also increases the complication of fetus. Maternal BMI is one of the predictor of nutritional status of pregnant mother. The normal growth and development of the fetus is dependent on many factors. These factors include influence of environment, genetic predisposition and

maternal weight during pre-pregnancy state [1]. Status of maternal nutrition plays an important role in weight gain. Intake and maternal weight during pregnancy are the two modifiable factors which influence fetal outcome [2]. The low maternal BMI is associated with increased risk of abortions and intrauterine growth restriction, which may further cause low APGAR scores and increased prenatal deaths [3, 4]. Women from rural area are not aware of their Weights [5]. BMI provides a reliable indicator of body fat for most people and is used to screen for weight categories that may lead to health problems. BMI does not measure body fat directly but research has shown that BMI correlates to direct measures of body fat. Common micro-nutrients deficiencies are vitamin A deficiency and iron deficiency [9]. Pregnancy complication related to maternal nutritional status is a growing problem which carry an increased risk of adverse prenatal outcome [3]. In the world almost half of undernourished population are estimated about 170million. Malnutrition should be considered as a serious issue [9]. Malnutrition passes from one generation to next. A malnourished mother gives birth to undernourished infant who struggle to

thrive [3]. Today’s infants are the future of the country. This future should be healthy and well nourished. The WHO BMI classifications of overweight and obesity are intended for international use. Obesity causes or exacerbates many health problems, both independently and in association with other diseases [6]. It is associated with the development of type 2 diabetes, coronary heart disease, an increased incidence of certain forms of cancer, respiratory complications and osteoarthritis of large and small joints in later life [7]. Increasing degrees of overweight and obesity are important predictors of longevity [8]. The effect of maternal nutritional status prior to pregnancy on birth outcomes is of great public health importance. Epidemiological studies have shown a clear association between maternal primigravida weight and birth outcomes. As a marker of nutritional status, a woman's primigravida body mass index (BMI = kg/m<sup>2</sup>), if low (<19.8 BMI), may reflect chronic nutritional deficiency whereas a high BMI (>26.1 BMI) reflects an imbalance between energy intake and expenditure, and thus varying degrees of adiposity [10]. The effects of outcome variables were overweight, defined as BMI (weight in kilograms divided by the square of height in meters) greater than the age- and gender-specific 95th percentile in a national sample of US children, and at risk for overweight, ie, between the 85th and 95th percentiles [11]. For overweight analyses, we defined not overweight as BMI less than the 95<sup>th</sup> percentile; for at risk for overweight, we defined a noncase as BMI less than the 85th percentile. Although self-reports of these measures are known to be valid in adults, recent data also suggest high validity among children and adolescents. In samples ranging in age from 11 to 16 years, Shannon *et al.*, [12] and Strauss [13] reported correlation coefficients in the range 0.84 to 0.94 for self-reported versus actual weight and 0.62 to 0.91 for height. Recently, Goodman *et al.*, [14] estimated a correlation of 0.92 between BMI calculated from self-report versus measured height and weight among participants in the National Longitudinal Study of Adolescent Health. Despite the tendency for heavier children to underreport their weight, the obesity status of only 3.8% of youth in that study was misclassified. Maternal BMI is a potentially modifiable risk factor for adverse outcomes that can occur during pregnancy and the neonatal period.

## OBJECTIVES

### a) General objective:

- To assess of the efficacy of maternal BMI on pregnancy with outcome in adolescent.

### b) Specific Objectives:

- To find out the outcome of these patients.
- To observe the maternal BMI on pregnancy with outcome in adolescent.

## METHODOLOGY AND MATERIALS

This was an observational follow-up study conducted in the Department of Obstetrics & Gynecology, Institute of child & mother health, Matuail, Dhaka. From January, 2014 to July, 2014. After getting approval from the authority, we selected our study participants by a purposive sampling technique and maintaining inclusion criteria. Consecutive 100 patients who were admitted in the hospital, were our study participants. Ethical clearance was taken from ethical review committee.

### Inclusion Criteria

- Teen primigravida
- Gestational age- 37 completed weeks to 42 weeks
- Admitted in ICMH for delivery

### Exclusion Criteria

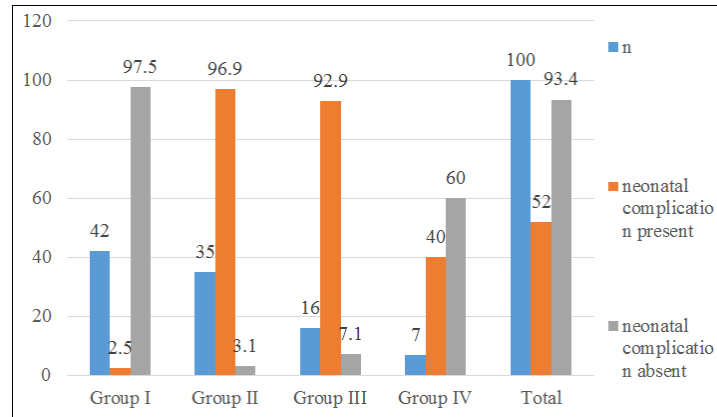
- Age more than 19 years
- Multigravida
- Patients with medical disorder like DM, renal disease, bronchial asthma, chr. Infections, TB etc.

## RESULTS

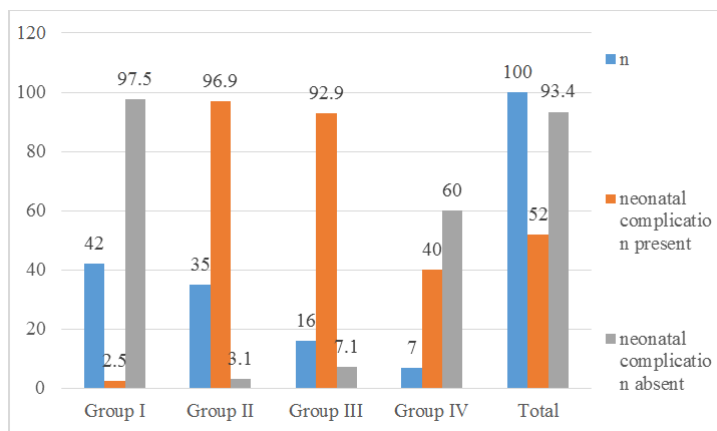
The study observed in group I (44%) have normal BMI, in group II (35.2%) have lean BMI, in group III (15.4%) have over weight BMI and group IV (5.5%) have obese BMI. The distribution of lesion between four groups was identical. Figure-1 shows the weight distribution of the studied patients. Figure-2 shows the distribution of the different groups of patients by present and absent neonatal complication. Table-2 shows the outcome of the new born term babies outcome status is much higher than preterm babies in all the four groups. Figure-3 Shows the Apgar score of all the four groups. Figure-4 Shows the birth weight of baby in different maternal groups. Table-3 shows Maternal outcome if the studied patients.

Table-1: Distributing of the Patients by Different Categories of BMI. (n=100)

Group	BMI	Frequency	Percentage
I	19.9-24.9	42	44.0 (normal)
II	<19.8	35	35.2 (lean)
III	25-29.9	16	15.4 (over weight)
IV	>30	7	5.5 (obese)
	Total	100	100



**Fig-1: Distribution of the different groups of patients by birth weight of their baby. (n=100)**  
P value =< 0.002

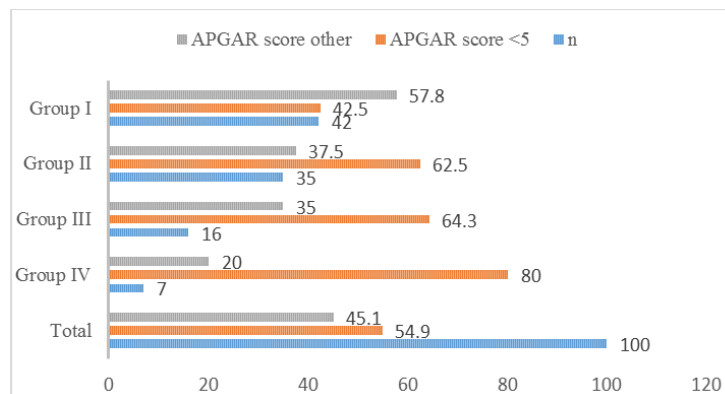


**Fig-2: Distribution of the different groups of patients by neonatal complication. (n=100)**  
P value =< 0.001

**Table-2: Obstetrical Outcome Status of the Baby. (n=100)**

Group	N	New born term	New born preterm
I	42	92.5	7.5
II	35	84.4	15.6
III	16	92.9	7.1
IV	7	100	0
Total	100	86.7	13.3

The table shows the outcome of the new born term babies' outcome status is much higher than preterm babies in all the four groups.



**Fig-3: Obstetrical outcome: Apgar Score. (n=100)**

P value =< 0.172

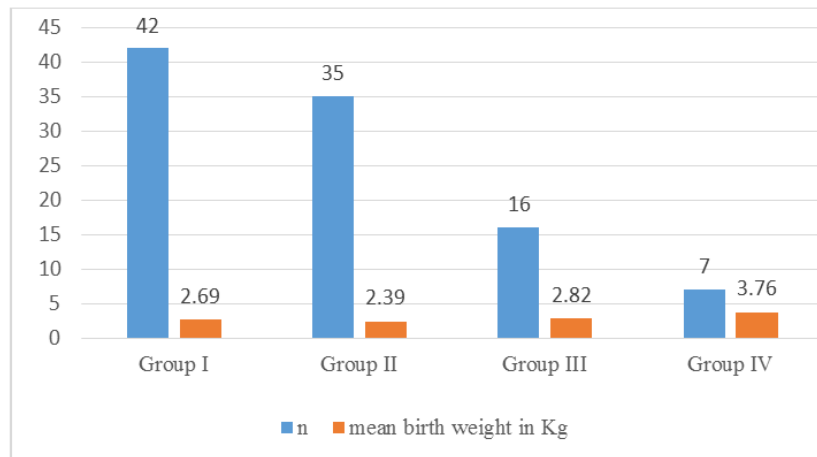


Fig-4: Birth weight of baby in different maternal groups. (n=100)

The Above chart is about the birth weight of baby in different maternal groups.

Table-3: The Table shows maternal outcome of the studied patients. (n=100)

Group	Anemia	PPH N=9	Wound Infection on N=11	Hospital Stay Days
Group I Normal BMI (42)	Mild to moderate	1.5 times (1)	1.25 times (2)	4
Group II lean (35)	Moderate to severe	4.28 times (5)	3.92 times (4)	8
Group III Over Weight (16)	Mild to moderate	2.21 times (1)	2.53 times (2)	6
Group IV Obese (7)	Mild to severe	2.32 times (2)	2.34 times (3)	7

Maternal outcome was Anemia, PPH, Wound Infecti and hospital stay days

## DISCUSSION

The impact of low or increased BMI in the general population has been the focus of many studies, but studies on pregnant women are few. In the USA the incidence of obesity among pregnant women ranges from 18.5% to 38.3% according to the cohort study [15], while in the present study 5.5% and in Sahu *et al.*, [3] series of india 7.9% Of pregnant women were obese. In the study of Sahu *et al.*, [3] underweight mother has 2.1 time more risk to give birth an underweight baby, 1.2 times for overweight and 0.3 times for obese mother than normal weighted mother which was comparable with our findings. Various studies have found an association of intrauterine death, low APGAR score at birth and neonatal complication among obese pregnant women [16-20]. This is not seen in the presen study the reason may be the small sample size. 3- 1N Sahu *et al.*, [3] series the proportion of low birth weight was significantly increased (p value=0.017) in the lean pregnant women. Near similar observation was seen in our study. Several studies have addressed the association between birth weight and body mass index (BMI) in childhood and early adulthood. Most of these studies have found direct associations, ie, that higher birth weight is associated with higher attained BMI [21, 22]. Observations that higher birth weight is associated with higher attained BMI have led to the hypothesis that in utero determinants of birth weight may also program the fetus

for elevated risk of later obesity. Of primary interest is altered maternal-fetal glucose metabolism. Maternal hyperglycemia leads to excess fetal insulin, itself a growth hormone for the fetus. Thus, offspring of mothers with gestational diabetes mellitus (GDM) have higher birth weights. Furthermore, animal studies suggest that fetal hyperinsulinemia can alter expression of hypothalamic neurotransmitters, leading to offspring hyperplasia and increased weight [23]. Overweight or obese women are more likely to have high birth weight babies, which increases the chances of caesarean deliveries and the babies will be born with low blood sugar, which can be associated with brain damage and seizures [24, 25]. Earlier studies show that pregnancies amongst overweight or obese women are also more likely to result in fetal distress, low APGAR scores, early infant death, and large birth weight infants [26]. Women who enter pregnancy in overweight or obese condition are more likely to have pregnancies resulting in certain birth defects which include neural tube defects such as spina bifida, heart defects, cleft palate, limb reduction defects [27]. Total 200 cases were enrolled but 90 were excluded for various reasons like abortion, PIH, DM. out of 110cases, 38cases with normal BMI. 33cases were underweight, 28cases were overweight and 11cases were obese i.e 34.5%, 30%, 25.4% &10% respectively [28]. Majority of the cases were from normal BMI group followed by underweight patients. The probable reason being most of the patients coming to our hospital were from lower and lower

middle class. In western countries 28% women are overweight and 11% are in obese category, according to RCOG press releases on 5<sup>th</sup> October 2006 [29].

## LIMITATIONS OF THE STUDY

It was an observational follow up study with small sample size, which doesn't reflect the scenario of the whole country.

## CONCLUSION AND RECOMMENDATIONS

Maternal BMI has an effect on fetal outcome. Low BMI is associated with adverse perinatal outcome in terms of birth weight while high BMI is associated in terms of overweight and macrosomia. Maternal BMI is a potentially modifiable risk factor for adverse outcomes that can occur during pregnancy and the neonatal period. There is emerging evidence to suggest that maternal BMI also has longer-lasting effects for the offspring, including increased risk of developing cardiovascular risk factors and disease. Adolescent pregnancy complications related to maternal BMI is a growing problem. All attempts should be made to maintain a normal BMI specially in adolescent women of child bearing age. Adolescent pregnancy should be avoided. Pre pregnancy counselling, health programs and appropriate multidisciplinary management may be launched to overcome this burning issue. In an age where BMI has been described as a new worldwide epidemic, further work to understand more about the effects of Maternal BMI for offspring is crucial.

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