



Risk Factors for Low Birth Weight Babies in Women Delivered in a Tertiary Referral Hospital

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Abstract

Background: Low birth weight is an important indicator of reproductive health and general health status of population. LBW is considered as the single most important predictor of infant mortality, especially of deaths within the first month of life. It is also a significant determinant of infant and childhood morbidity, particularly of neurodevelopmental impairments such as mental retardation and learning disabilities. This study aimed to determine the risk factors associated with low birth weight. **Material & Methods:** It was a prospective cross sectional observational study carried out in the Department of Obstetrics & Gynaecology, Dhaka Medical College, Dhaka, during the period of January 2012 to June 2012. Total 308 samples were included in this study. All women ≥ 28 weeks of pregnancy who delivered a LBW baby during six months of study period were selected. The database was processed by the application of statistical package SPSS for windows version 24. **Results:** This study shows most frequent maternal age group was 20-25 years. The mean maternal age was 23.86 ± 4.82 years. Fifty three percent (53%) were female and 46.76% were male babies. Low birth weight was associated with inadequate antenatal care, pre-delivery weight < 55 kg, height < 145 cm, low socio-economic status, and anemia. In LBW babies' mother having regular antenatal care (23.8%). The incidence of mild anemia was 10.71%, moderate anemia 32.79% and there were 2.60% cases of severe anemia. Maternal factors including maternal height (27.92%), maternal weight (36.36%), anaemia (43.50%), placenta praevia (12.18%), eclampsia (20.29%), PROM (24.35%), preterm labour (15.42%), severe PET (8.12%), twin pregnancy (17.86%), heart disease (2.44%) and DM (1.620/o) were associated with low birth weight. 62.01% mothers had average food intake, 37.99% had poor food intake. **Conclusion:** The incidence of low birth weight is 19.05%. Maternal height, maternal weight, ANC, anemia, eclampsia, preeclampsia, PROM, preterm labor, severe PET, twin pregnancy and heart disease were associated with low birth weight. There is a need for national prospective research project to study the low birth weight problem at the national level. There is also a need to discourage teenage pregnancies and to encourage utilization of mother and child health services, and treat concomitant illnesses during pregnancy. Maternal malnutrition, inadequate antenatal care and poor weight gain during pregnancy are significant predictors for delivery of a low birth weight neonate.

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INTRODUCTION

Low birth weight (LBW) has been defined by the World Health Organization (WHO) as birth weight of less than 2500 grams irrespective of the gestational age.^[1] There are in fact only two ways in which birth weight can be influenced, LBW may be due to prematurity (constitutes about 2/3rd of LBW babies) or intrauterine growth retardation (constitutes about 1/3rd of LBW babies) or combination of both.^[2] More than 20 million infants worldwide, representing 15.5 percent of all births are born with low birth-weight (LBW), 95.6 percent of them are in the developing countries.^[3] Half of all low birth-weight babies are born in South-central Asia, where more than a quarter (27 per cent), 30% in Bangladesh and in India, 21% in Nepal and 19% in Pakistan.^[4]

The causes of LBW babies in women are multifactorial including poor nutritional status & low socio-economic condition of the mother, short maternal stature, chronic maternal disease, multiple gestation, fetal genetic & chromosomal anomalies, low pregnancy body mass index (BMI), primiparity high level of alcohol consumption, smoking (passive smoking).^[5] In developing countries like Bangladesh most common cause are under nutrition. Poor nutritional status of the mother at conception & inadequate energy & protein intake during pregnancy can result intrauterine growth retardation (IUGR).^[6]

LBW has been associated with higher probabilities of infection, malnutrition and handicapped conditions during childhood, mental deficiencies and problems related to behavior and learning during childhood.^[7] Children who survive LBW have a higher

incidence of diseases, retardation in cognitive development and undernourishment. There is also evidence that LBW or its determinant factors are associated with a predisposition to higher rates of diabetes, cardiac diseases and other future chronic health problems.^[8]

In a literature Survey, De Onis et al. found that IUGR babies are in increased risk of prenatal mortality & morbidity, i.e., sudden infant death syndrome, poor cognitive development & neurological impairment, cardiovascular disease' strokes, high blood pressure, obstructive lung disease, diabetes, high cholesterol concentrations and renal damage in adulthood.^[9] Finally long-term consequences neurodevelopmental handicaps constitute additional cost both to social & medical resources & to the family involved.^[10] In other study Jepka & Zupan showed that the global burden of LBW infants was 16% of all birth. LBW is probably the most crucial factor in perinatal death throughout the world & to reduce the incidence of LBW babies is one of the major challenges for Bangladesh.

This prospective study was done to find out the modifiable risk factors (ensure proper ANC, improve socio-economic condition & nutritional status, adequate Rx of chronic diseases) that would help to reduce the incidence of LBW babies.

Dhaka Medical College is a tertiary referral centre where most of the high-risk cases are either admitted or referred with a high prevalence of delivery of low birth weight babies. Last year statistics showed incidence of LBW was 38.1%.

MATERIAL AND METHODS

This is a descriptive type of cross-sectional observational study. This study was carried out on 308 patients to find out about the population including female patients in the Department of Obstetrics & Gynaecology, Dhaka Medical College, Bangladesh. The duration of the period from January 2012 to June 2012. After collection, the data were checked and cleaned, followed by editing, compiling, coding and categorizing according to the objectives and variable to detect errors and to maintain consistency, relevancy and quality control. The choice of treatment was made by the patient after a full discussion with the multidisciplinary team consisting of Transfusionists. The data for this study about had been accumulated from patients' medical information. Statistical evaluation of the results used to be got via the use of a window-based computer software program devised with Statistical Packages for Social Sciences (SPSS-24).

RESULTS

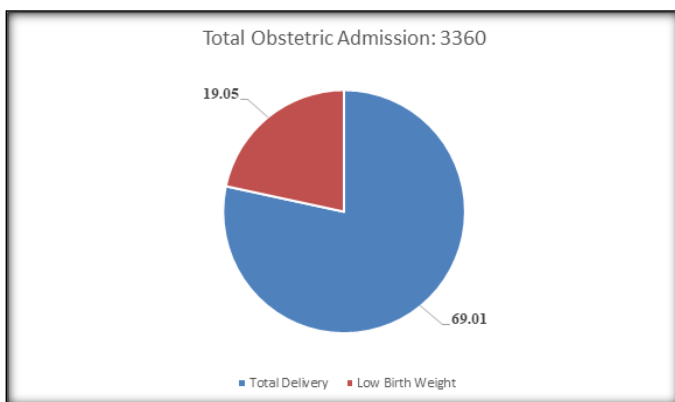


Figure 1: Total obstetric admission during the study period.

[Figure 1] shows incidence of low birth weight was 19.05%.

[Table 1] shows maximum (49.35%) patients belonged to age group 20-25 years followed by 17.86% in age group 26-30 years, 22.08% in age group <20 years, 7.14% in age group 31-35 years. The mean±SD was 23.80±4.82.

According to weight of the pregnant mother at the time of delivery, majority of the patient weighted 50 kg or less (36%) and only 16.88% patient weighted >60 kg. And height of the mother, in majority of cases (60%) weight ranged between 145 -150 cm. A significant portion (28o/o) had maternal height below145 cm.

Based on education, most of the patients (45.78%) were illiterate and only 9.09% completed higher secondary level of education. And according to occupational status, majority (76.62%) were house wife, 14.61% were service holder and 8.77% were day labourer.

This [Table 2] shows that maximum (43.18%) patient had irregular antenatal checkup followed by 33.44% patients who had no antenatal checkup and only 23.38% had regular antenatal checkup.

[Table 3] shows distribution of the patients' parity. 32.79% patients were primigravida, 60% patients were multiparous and 7.14% were grand multipara.

[Table 4] shows low birth weight found 7.79%, 37.99% and 54.22% among the good, medium and poor food intake status respectively.



[Table 5] shows 10.71% had mild anaemia, 32.79% had moderate anaemia and 2.60% had severe anaemia.

[Table 6] shows 23.05% patients were below 37 weeks of gestation and 76.95% were at 37- 40 weeks of gestation.

[Table 7] shows demographic & obstetrics risk factors of the patient delivered LBW babies. Among the demographic profile maternal height and weight had significant contribution. Among the obstetrics risk factors anaemia, premature rupture of membrane, eclampsia, multiple pregnancy had significant influence.

[Table 8] shows 53.24% were female babies and 46.76% were male babies. So, female babies had more susceptible to have low birth weight.

[Table 9] shows low birth weight was more in <37 weeks gestational age significant difference between <37 weeks gestational age and ≥37-week gestational age (P<0.05).

[Table 10] shows maximum (68.83%) had Apgar score ≥7 and 31.17% had Apgar score <7. Only 8.76% needed ICU support and 15.25% needed resuscitation. Majority (89.62%) survived and only 10.38% had early perinatal death.

Table 1: Socio demographic distribution of the mother (n=308).

	n=308	%	Mean±SD
Age groups			
<20	68	22.08	23.86±4.82
20-25	152	49.35	
26-30	55	17.86	
31-35	22	7.14	
36-40	8	2.60	
>40	3	0.97	
Weight			
≤50 kg	112	36.36	
50-55 kg	69	22.40	
56-60 kg	75	24.35	
Above 60 kg	52	16.88	
Height			
<145 cm	86	27.92	
145-150 cm	186	60.39	
>150 cm	36	11.69	
Total	308	100	
Education status			
Illiterate	141	45.78	
Primary	85	27.60	
Secondary	54	17.53	
Higher Secondary	28	9.09	
Occupational Status			
House wife	236	76.62	



Service holder	45	14.61	
Day labourer	27	8.77	
Total	308	100	

Table 2: Pattern of antenatal care of the mothers delivered LBW babies

Antenatal care	n=308	%
Regular	72	23.38
Irregular	133	43.18
None	103	33.44

Table 3: Distribution of the parity in mothers

Parity	n=308	%
0	101	32.79
1-2	131	42.53
3-4	54	17.53
5 and above	22	7.14
Total	308	100.00

Table 4: Average calorie intake by the pregnant mothers delivered LBW babies

Calorie Intake	n=308	%
Good (>2500 kcal/day)	24	7.79
Medium (>2200 kcal/day)	117	37.99
Poor (<1800 cal/day)	167	54.22
Total	308	100.00

Table 5: Hemoglobin status of the mother delivered LBW babies

Anaemia	n=308	%
Normal (≥ 11 gm/dl)	166	53.90
Mild (9.5-<11 gm/d)	33	10.71
Moderate (<9.5 gm/dl)	101	32.79
Severe (<8 gm/dl)	8	2.60
Total	308	100.00

Table 6: Distribution of patients according to gestational age

Gestational period	n=308	%
Below 37 weeks	71	23.05
37- 40 week	237	76.95
Total	308	100.00

Table 7: Maternal risk factors associated with low birth weight

Risk factors	n=308	%
Maternal height (<145 cm)	86	27.92
Maternal weight (<45 kg)	112	36.36
Placenta praevia	15	12.18
Eclampsia	25	20.29
Anaemia (Mild, moderate, severe)	134	43.50
Premature rupture of membrane (PROM)	30	24.35
Preterm labour	19	15.42
Severe PET	10	8.12
Twin pregnancy	22	17.86
Bronchial asthma	1	0.81
Heart disease	3	2.44
DM	2	1.62

Table 8: Distribution of the sex of the newborn with LBW

Sex	n=308	%
Female	164	53.24
Male	144	46.76
Total	308	100

Table 9: Birth weight and gestational age

Birth Weight	Gestational age				Total		P value
	≥37 week (n=237)		<37 weeks (n=71)		No	%	
	No	%	No	%			
1-<1.5 kg	23	9.70	35	49.30	76	24.68	0.001
1.5-<2 kg	32	13.50	19	26.76	41	13.31	
2-<2.5 kg	182	76.79	17	23.94	191	62.01	
Total	237	100.00	71	100.00	308	100.00	

Table 10: Condition of the LBW babies at birth in terms of Apgar score

Outcome	n=308	%
Apgar score		
<7	96	31.17
≥7	212	68.83
Needs resuscitation	47	15.25
Need ICU supports	27	8.76
Survive	276	89.62
Early perinatal death	32	10.38

Table 11: Complication

Outcome	n=308	%
Birth asphyxia	96	31.17
RDS	69	22.40
Neonatal jaundice	29	9.41
Feeding deformity	21	6.81
Septicemia	23	7.41

[Table 11] shows 31.17% had birth asphyxia, 22.40% had RDS, 9.41% had neonatal jaundice, 6.81% had feeding deformity and 7.41% had septicemia.

DISCUSSION

The importance of low birth weight (LBW) as a public health problem and its impact on infant and child morbidity and mortality is not yet well understood or recognized in most developing countries. More than 60% of low birth weight babies are born preterm, and in recent years, there has been a rise in the number of premature infants in the population.^[11] Also low birth weight accounts for 85% of neonatal deaths and 50% of infant deaths.

In Bangladesh, most deliveries take place at home and are mostly attended by relatives or traditional birth attendants. These people are not aware of the importance of weight-recording at birth. Even the trained traditional birth attendants (dais) have no weighing scale in their delivery-kits. Also, in most health complexes, babies are not weighed routinely due to paucity of a suitable weighing scale at the centre. To overcome this problem, a number of alternative anthropometric measurements have been proposed as surrogate for birth-weight.^[12]

In this study an attempt was made to identify the risk factors associated with low birth

weight. We studied 308 newborns with low birth weight.

Among studied mothers delivered LBW the most frequent age group was 20-25 years. The mean maternal age among the LBW group was 23.86±4.82 years. This finding consisted with Singh et al,^[13] study where the mean age was 23.1±4.1 years.

Maternal age is an important risk factor related to birth weight of the neonate. Mothers less than 25 years of age and especially those less than 20 years had increased proportion of LBW babies. This result supports previous studies mentioning teenage pregnancy as a risk factor. So female babies are more susceptible to develop LBW.

This study shows out of 308 low birth weight babies, 53.24% were female and 46.76% were male babies. Singh et al,^[13] study found 58.9% were female and 41.1% were male babies.

This study has shown that low birth weight was associated with inadequate antenatal care, maternal pre-delivery weight <45 kg, maternal height <145 cm, low socio-economic status, and anemia. Other studies conducted in developing countries have identified maternal weight (<45kg), maternal height (<145cm) as potential risk factors for LBW babies. The findings of association of low socioeconomic status and

LBW babies shown by this study is consistent with previous studies.^[14,15]

The findings of this study illustrate that illiterate mother, belonging to poor socio-economic status with close birth spacing to give birth to LBW babies.

This study observed that illiterate mothers were more likely to give birth to LBW babies. This result also supports the pervious available data. Literature review shows that poor socio-economic conditions are often related to LBW births. Family income also affects birth weight.^[16]

Primigravida mothers are more prone to deliver LBW babies. It has been shown that the birth weight increases with parity (up to 4 - 5 births) but declines thereafter. This finding is consistent with the findings of Mavalankar,^[17] Fikree,^[18] in Pakistan and Acharya, et al.^[16]

Antenatal visits of the pregnant mothers are very important as they provide chances for monitoring the fetal well being and allow timely intervention for feto-maternal protection. In this study, only 23.8% had mother's regular antenatal care. This result was similar to that shown by Malik S et al where they found the incidence of LBW was 25% in mothers who received more than 4 ANC visit.^[19] Similarly another study done in India, also showed that the birth weight of newborns was influenced significantly by the number of ANC visits made by the mother. This study also shown that mothers with irregular antenatal visit had higher risk of having a LBW baby.

In this study, the incidence of mild anemia was 10.71% moderate anemia 32.79% and there were 2.60% cases of severe anemia. The DHS showed

that the incidence of mild anaemia was higher (29.6%) than the present study. A study in Yemen in 2002 also showed the significant association of anemia with low birth weight, where incidence of anemia was 25.5% in pregnant women.^[20]

In this study, associated illnesses & obstetrics complications namely anaemia (43.50%), placenta praevia (12.18%), eclampsia (20.29%), PROM (24.35%), preterm labour (15.42%), severe PET (8.12%), twin pregnancy (17.86%), heart disease (2.44%) and DM (1.62%) were associated with low birth weight. Mothers with these complications were more likely to have low birth weight babies. These findings are consistent with the findings of various studies.^[21]

Siza reported hypertension, pre-eclampsia and eclampsia disease complex had the highest prevalence (46.67%) and population attributable fraction of low birth weight. Other complications and diseases which contributed to high prevalence of LBW included anaemia (25%), thromboembolic diseases (20%), tuberculosis (17%) and malaria (14.8%).^[22]

One of the major health factors affecting the outcome of a pregnancy is the occurrence of proteinuria in combination with hypertension. This condition is one of the major causes of disease for both an expectant mother and her fetus, and one that significantly affects the incidence of prenatal morbidity and mortality. While the prognosis of isolated hypertension is good, the combination of hypertension and proteinuria leading to pre-eclampsia is a primary cause of maternal death, being responsible for 20-25% of prenatal mortalities. The most dangerous complication of pre-

eclampsia is eclampsia, which is characterized by general tonic-clonic convulsions.^[23] In addition, preeclampsia is also associated with stillbirth, the risk of which in late pregnancy is related to the function of the placenta in early pregnancy. All of these factors could be strongly related to the serious consequences of ignorance about proper care, and inadequate nutrition during pregnancy.

The results of this study, in relation to the health and nutritional knowledge of the mother, showed association between those factors and the infant's birth weight. An understanding of appropriate nutrition and good eating habits during pregnancy is considered to be a significant element of prenatal nutritional education. Nutritional factors were also related to LBW in the preterm delivery group. Women who delivered LBW infants were more likely to have had a history of frequent pregnancies, previous LBW infants, lower weight at the time of delivery, and lower gestational weight gain. Previous research has also shown that maternal energy deficiency, possibly exacerbated by very low-fat intakes (<15% of energy), is one key determinant in the etiology of low birth.^[24]

Thus, findings of this study emphasize the need for improving the quality and utilization of antenatal care, nutritional education to improve the weight gain during pregnancy and proper management of risk factors like anemia. This study supports that birth weight of the babies born to healthy mothers is different from birth weight of the babies born to mothers with sub-optimal socio-economic conditions, health and

nutritional status. Despite these potential limitations, consistency in the direction and strength of the relationship between low birth weight and infant mortality suggests that the following are key to improving child survival in Bangladesh: improving public health at the community level, specifically screening for high-risk pregnancy and premature birth, and making referral services for these conditions more available and accessible to the rural population; and improving social services, such as provision of safe drinking-water and hygienic waste disposal.

CONCLUSIONS

This study shows several factors interplaying which lead to LBW babies. Socio-demographic factors (maternal age, maternal height, maternal weight, educational level and economic status) and antenatal care are more important. The concomitant mother illnesses such as anaemia, placenta praevia, eclampsia, PROM, preterm labour, Severe PET, twin pregnancy, heart disease and DM were associated with low birth weight. The present study suggests that improvements in maternal nutrition during pregnancy, avoiding close birth spacing, delayed child bearing in young females (<19 years), universal coverage of adequate antenatal care, early recognition of maternal illness and complications are essential for reducing the LBW in newborns. Health education, socioeconomic development, maternal nutrition, and increasing the use of health services during pregnancy, are all important for reducing LBW.



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