

Original Article



Maternal Risk Factors, Clinical Profile and Short-Term Outcome of Pre-Term Low Birth Weight Babies

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Abstract

Background: Preterm Low Birth Weight babies carry relatively higher risk of perinatal and neonatal mortality, retarded growth and development subsequently. In this study, some maternal risk factors were investigated as it seems to be important to study these factors on regional basis. **Objective:** To find out the maternal risk factors, clinical profile and short term outcome of pre-term low birth weight neonates by gestational age, birth weight, Occipitofrontal Circumference, length, different presentation (asphyxia, hypothermia, feeding difficulties, signs of infection) on admission and the morbidity and mortality of preterm LBW. **Materials and Methods:** A descriptive type of cross sectional study was done in neonatal ward of Jalalabad Ragib Rabeya Medical College Hospital, Sylhet from May, 2015 to April, 2016. Hundred cases were selected from neonatal ward and 100 controls were selected from obstetrics ward. **Results:** Among 100 pre-term LBW neonates, 52 were male and 48 were female. Only 22% mother took regular antenatal check up in case group and 55% in control group. Mean gestational age of neonates were 33.3±2.1 weeks. Important risk factors were primi parity (58% in cases vs 34% in control), hypertension (19% vs 5%), pre-eclampsia (26% vs 12%), prolonged rupture of membrane (33% vs 7%), APH (22% vs 0%), acute infection (8% vs 1%), multiple birth (17% vs 2%). Common clinical presentations were prematurity and LBW. Commonest morbidity was feeding problem (70%). The overall survival rate was 87%. Most common cause of death was septicemia (30%). **Conclusion:** all the identified risk factors were significantly higher in pre-term LBW babies than those of control.

Key words: Low Birth Weight, Neonates, Apnea, Pre-Maturity.

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Introduction

Weight below 2500 gm at birth irrespective of age of gestation is considered as low birth weight (LBW). LBW is due to prematurity, intra uterine growth retardation (IUGR) or both.¹ The weight at birth is an important reliable parameter which guides the state of maturity in a newborn. The state of maturity on the other hand is very closely related to the morbidity and mortality of newborn infants. Birth weight is an important parameter in predicting the susceptibility of disease, future growth and development.² Perinatal and neonatal mortality are increasingly important public health issue in many developing countries as postnatal mortality rate falls. In Bangladesh, for example, the infant mortality rate appears to have fallen in this

century from over 200 death per thousand live birth to approximately 47 death per thousand live birth.³ In Bangladesh Neonatal Mortality Rate (NMR) is 36%.³ LBW infants have a much greater risk of dying in the new born period which is about 15% of total neonatal death in our country.^{4,5} The level of low birth weight in developing countries (17%) is more than double the level in industrialized countries (7%). In fact more than 96% of LBW babies are born in the developing world.⁶ More than 20 million infants are born with LBW in the developing world. More than half these infants live in South Asia. In South Asia (exclude India) it is 3.6 million and in India 7.8 million. South Asia has the highest incidence with nearly one third (31%) of all infants born with

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LBW while the lowest incidence is found in East Asia and the Pacific (7%). Nearly 40% of the total LBW infants of the developing world are born in India alone.⁶ In China the incidence of LBW in 2003 was 4%.⁷ In India, the incidence of LBW in 1999 was 30%.⁸ In Nepal, incidence of LBW in 2001 was 21%.⁹ Incidence of LBW in Pakistan in 1991 was 19%,⁹ in Sri Lanka in 2000 it was 22%.⁹ In the United Kingdom in 2000 the incidence of LBW was 8%⁹ and in the USA in 2002 it was 8%.⁹ In Bangladesh, the incidence of LBW in 2003-04 was 36%.⁸ It is difficult to determine completely separate factors associated with prematurity from those associated with IUGR. A strong positive correlation exists between both preterm and IUGR and low socio economic status. In general, the health and nutrition of mother are key factors. Maternal factors such as age (under 16 or over 35 years), weight and height, socio economic and nutritional status, physical work, smoking, alcohol consumption, drugs, acute or chronic medical illness and some foetal factors such as fetal distress, multiple gestation has been related to the birth weight outcome.¹⁰ Certain obstetric complications such as premature rupture of membrane, placenta previa, abruptio placenta, incompetent cervix are important cause of LBW.¹¹ It is well recognized that LBW babies are more susceptible to conditions like perinatal asphyxia, hypothermia, feeding difficulties, infection, hyperbilirubinaemia, respiratory distress, intraventricular haemorrhage, necrotising enterocolitis, hypoglycaemia and several other conditions that contribute to their high perinatal and neonatal mortality and morbidity.¹¹ The aim of this study is to identify the clinical profile related to LBW and also to find out the short term outcome of hospitalized LBW babies in the context of present hospital care standard in Bangladesh. It might help to recommend the intervention strategies to reduce the mortality and morbidity by prompt recognition and effective management of high risk neonate at birth.

Materials and Methods

A descriptive type of cross sectional study was done in neonatal ward of Jalalabad Ragib Rabeya Medical College Hospital (JRRMCH) from May2015 to April2016. Hundred cases were selected from neonatal ward and 100 controls were selected from obstetrics ward. For each newborn, history was taken and physical examinations were done as per set questionnaire. Gestational age of the infant was determined by the date of the mother's last menstrual period and or by Ballard Scoring system. The necessary laboratory investigations were CBC, Hb% PBF, C - reactive protein (CRP), Blood culture, S. Bilirubin, electrolytes, urinalysis, CSF study, X-ray and USG that were indicated in clinical assessment. Informed written consent was taken from mother/ guardian. Approval was taken from Ethical Review Committee (ERC) of (JRRMCH) Sylhet. Data were analyzed using computer based program statistical package for social science (SPSS) for windows version 20. Results were presented graphically and by using table and data were expressed as number and percentage.

Results

From May 2015 to April 2016 a total 2890 neonates were admitted at neonatal unit of Jalalabad Ragib Rabeya Medical College Hospital Sylhet. Among them 380 babies were low birth weights. Study population was included by consecutive sampling. Five babies were excluded as not fulfill the criteria and 4 babies were excluded as did not give consent. Finally 100 babies were included.

Total 100 LBW babies were included in this study. Out of 100 babies, 52% were male and 48% infants were female (Figure-1). The ratio was 1.08:1.

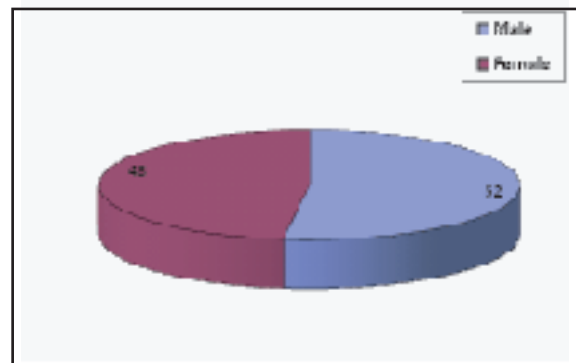


Figure 1: Number and percentage of LBW babies by sex

Table I : Number and percentage of LBW babies by weight

Weight in gram	Number	Percent
< 1000	5	5%
1000-1499	24	24%
1500-1999	54	54%
2000- <2500	17	17%
Total	100	100%

Table I shows that out of 100 LBW babies 5 (5%) were less than 1000 gm, 24 (24%) had weight in the range between 1000-1499 gm, 54 (54%) babies from 1500-1999 gm and 17 (17%) babies from 2000 to <2500 gm.

Table II: Outcome of LBW babies by gestational age

Gestation age (in weeks)	Total number	Survived		Died		DORB	
		No	%	No	%	No	%
28 and below	8	2	25%	5	62.5%	1	12.5%
29-32	30	24	80%	3	10%	3	10%
33-36	38	35	92%	3	8%		
37 & above	24	22	91.6%	2	8.3%		
Total	100	83	83%	13	13%	4	4%

Table II shows the outcome of 100 studied LBW babies in different gestational age group. Babies whose gestational age 28 weeks and below, the mortality is high (62.5%) in comparison to those whose gestational age >28 weeks like in 29-32 weeks of gestational age, mortality is 10%, in 33-36 weeks, it is 8% and in 37 weeks and above gestational age, mortality is 8.3%.

Table III: Mortality of LBW babies by birth weight

Weight in Grams	LBW babies in Number	Death in number	Percentage of Mortality
< 1000	5	4	80%
1000-1499	24	4	16.6%
1500-1999	54	4	7.4%
2000-<2500	17	1	5.8%
Total	100	13	13%

Table III shows the outcome of 100 studied infants in different weight group. Babies whose birth weight <1000 gm, the mortality is high (80%) in comparison to those whose birth weight >1000 gm i.e. in (1000-1499) gm weight group mortality is 16.6%, in 1500-1999 gm weight group 7.4% and in 2000-<25000 g weight group mortality is 5.8%.

Table IV: Outcome of LBW babies by place of delivery

Place of delivery	Number	Survived		Died		DORB	
		No	%	No	%	No	%
Hospital	89	73	82%	12	13.4	4	4.4
Home	11	10	90%	1	9%		

Table IV depicted that 89 babies were delivered in hospital of which 73 (82%) survived, 12 (13.4) died and 4 (4.4) obtained DORB. 11 babies were delivered at home of which 10 (91%) survived, 1 (9%) died.

Table V: Outcome of LBW babies by mode of delivery

Mode of delivery	Number	Survived		Died		DORB	
		No	%	No	%	No	%
LUCS	47	42	89.6%	3	6.4%	2	4.3%
Vaginal	53	45	84.9%	7	13.2%	1	1.9%

Table V shows that of the studied cases 53 babies were delivered by spontaneous vaginal delivery of which 45 (84%) survived, 7 (13%) died, 1 (2%) obtained DORB. 47 babies were delivered by LUCS of which 42(89%) survived, 53(6%) died and none obtained DORB.

Table VI: Presenting complains of LBW babies on admission

Presenting complaints	Number	Percentage
Perinatal Asphyxia	14	14%
Respiratory distress Syndrome (RDS)	4	4%
Congenital Malformation	2	2%
Amniotic fluid ingestion	4	4%
Preterm/LBW babies	76	76%

Table VI shows that perinatal asphyxia was the main presenting complains of LBW babies on admission.

Table VII: Problems of LBW babies that subsequently developed after admission

Problems	Number	Percentage
Infection (CRP +ve/Blood culture +ve)	21	21%
Poor feeding	70	70%
Jaundice	38	38%
Apneic Spell	27	27%
Convulsion	10	10%
Bleeding manifestation	10	10%
Temp instability	54	54%
Hypoglycaemia	3	3%
Scleroma	4	4%
Skin ulcer	1	1%

It is obvious from Table VII that poor feeding was found to be the major presenting problem. It was found in (70%) cases. Temperature instability was the second most problem 54%. Infection of which comprise probable septicaemia, meningitis, pneumonia, umbilical sepsis, conjunctivitis, oral thrush and diarrhea was found in 21% cases. Other problems those were observed include convulsion in (10%) cases, jaundice in (38%) cases, bleeding manifestation in 10 (10%) cases and apneic spell in 27 (27%) cases.. Two cases with congenital malformation in this study consist of cleft lip and palate, Ventricular Septal Defect. The bleeding manifestations found among the studied infants were subaponeurotic haemorrhage, cephal haematoma, DIC, haemorrhagic disease of newborn (HDN) and probable intracranial haemorrhage.

Table VIII: Causes of death of LBW babies

Causes of death	Number	Percentage
Perinatal Asphyxia	3	23%
Septicaemia	6	46%
Pneumonia	1	7.6%
RDS	2	15.3%
Apneic spell	1	7.6%
Total	13	100%

In Table VIII Out of 13 (13%) LBW babies who died, perinatal asphyxia 23%, probable septicaemia 46% pneumonia 7.6%, RDS 15.3%, apneic spell 7.6% were the main causes of death.

Table IX: Maternal risk factors, as were present among cases and controls

Factor	Cases(n=100)	Control(n=100)	P value *
BMI 20	48%	22%	0.0006**
Smoking/Tobacco	45%	43%	0.3897
Prolonged rupture of membrane	33%	7%	0**
Preeclamsia	26%	12%	0.00604**
APH	22%	0%	0**
Hypertension	19%	5%	0.0018**
DM	18%	2%	0.00008**
Multiple birth	17%	2%	0.0004**
Fever	15%	13%	0.3409**
BOH or Neonatal death	14%	2%	0.0009**
Acute infection	8%	1%	0.00866**
Renal disease	2%	0%	0.07983

*x2 test, **Statistically significant.

Accdng to Table IX-Statistically significant maternal risk factors are, Malnutrition of mother, Prolonged rupture of membrane, Pre-eclamsia, APH, Hypertension, DM, Multiple birth, Acute infection etc.

Discussion

Birth weight is probably one of the most sensitive and precise indicators of the health status of population. Both preterm and LBW have long been identified as the most critical risk factors for mortality and morbidity. There is slight preponderance of male babies over female babies in this study comprising 52% male and 48% female. This is conformity with some studies.^{12,13,14} It is not worthy that 62% of LBW infants are AGA and 36% are SGA. This is in similarity with the study by Tabib et al.¹² who found in his series 53.6% were Appropriate for Gestational Age (AGA) against 46.4% babies of Small for Gestational Age (SGA). It is obvious from this study and other studies that among LBW percentage of preterm babies are more and the incidence of Very Low Birth Weight (VLBW) is more among preterm babies. So reduction of preterm birth alone may help to a large extent to bring down the incidence of LBW babies. The goal should be to reduce the incidence of prematurity in the future management of LBW infants. The percentage of SGA (36%) is also significant in this study. As maternal malnutrition and sickness is the main etiology of SGA, so the incidence of LBW can also be reduced by regular antenatal checkup (ANC) and proper treatment of maternal sickness.

It is remarkable that (14%) babies presented with perinatal asphyxia with or without other problems in this study. This is consistent with the study of Gurav et al.¹³ Tabib et al.¹² who found 34% and 32% respectively in their series of LBW. Another one found a higher incidence (46.5%) of perinatal asphyxia in their study.¹⁵ Whereas a study found 9.8% incidence of birth asphyxia.¹⁶ High incidence of perinatal asphyxia in this study may possibly be related to high risk delivery associated with preterm and LBW babies, poor antenatal care, delay in seeking care. In this study 26 (26%) babies presented with infection of various type. This is also consistent with two studies.^{12,17} One found an incidence of 41.6%, 56.1% and 46.4% of major infections respectively in LBW babies.¹⁸ High incidence of severe infection in these cases was due to poor resistance to infection, prolong labour with leaking membrane, lack of proper hygiene of mother and delivery conducted with poor aseptic measures. Similar finding were observed previously.¹⁹ Begum et al.¹⁵ who found 16.42% and 19.8% incidence of septicaemia respectively. Among other infections pneumonia, umbilical sepsis, conjunctivitis diarrhoea were common in LBW babies which is consistent with finding by other workers.^{12,15,18}

Poor feeding is one of important separate problems (68%) cases in this study which is not consistent with the study of Tabib et al who found (16%) cases with poor feeding. Though precise data regarding convulsion are not available but it has been mentioned here separately because it was one of important separate problems comprising 6% in this study. Perinatal asphyxia, infection, hypoglycemia, hypocalcemia are supposed to be the main causes of convulsion. Jaundice is a common problem in newborn. In this series (38%) cases of

LBW babies developed jaundice which is consistent with finding by other workers.^{12,15} Infection and prematurity were supposed to be the main cause of jaundice in this study. In this series no infant developed kernicterus due to early treatment with phototherapy and exchange transfusion when needed. Apnoea of preterm babies were found in 27 cases which is consistent with a study who showed that apnoea of prematurity occurs in at least 25% of infant less than 2500 gm. 4(4%) preterm LBW babies with weight less than 1500 gm presented with RDS in this study which is similar with the study of Tabib et al, who found in their study an incidence of 4 (12.5%). But Banu et al.¹⁹ an incidence 13.43% RDS which is higher than this study.²⁰ RDS occurs in all parts of the world and its incidence is of the order of 10-15% in infants less than 2.5 Kg at birth with varying mortality rate. This incidence being highest in lowest weight group which was also observed in this study. Though congenital anomalies are supposed to be more prevalent in SGA babies, in this study only 2 (2%) babies presented with congenital anomalies. This is consistent with other studies.²¹ In the present study, 13% of LBW babies expired. There was only 1 baby survived among babies with birth weight less than 1000 gm. 16.6% and 7.4% of babies died in the weight range of 1000-1499 gm and 1500-1999 gm respectively. 5.8% baby expired among babies weighing more than 2000-2500 gm in this series. This study is in similarity with other studies that increasing birth weight has a marked influence towards better survival of these babies.^{12,13,14,21,22} Neonatal mortality bears inverse relationship with birth weight and gestational age. Neonatal mortality decreased with increased gestational age and birth weight observed in this and also in other studies. The major causes of death in the present study has been recorded as septicaemia found in (30%) cases out of 13 deaths. 23% of death was caused by probable perinatal asphyxia alone or in combination with other problem in this study. Tabib,¹⁹ Banu found 43.75% and 14.82% of death due to asphyxia respectively and 25% and 22.2% of death due to possible septicaemia respectively. 2(15.3%) death was due to RDS in this study which is consistent with finding by other workers. One preterm baby with birth weight less than 1500 gm died due to apnoeic spell. A study found apnoeic spell as one of the major cause of death in preterm babies.²² The mode of delivery was found to influence the outcome in the preterm study. It is to be accounted more deaths were associated with per vaginal than LUCS delivery. Another 3 series have also found better outcome of small sick preterm infants delivered by LUCS than pervaginal deliveries.^{23,24,25} In this study 4(4%) obtained DORB unfavourable hospital environment, communication gap between doctors and the patients relatives, prolonged hospital stay and sometimes unavoidable home situations lead them to get discharge with own risk. The overall survival and mortality were 83% and 13% respectively in the present study. Perinatal asphyxia and septicaemia are the major cause of death, most of which are preventable to a certain extent and priority in the thought and management should be given in this regard. Proper ANC should be stressed throughout the country to prevent the neonatal mortality and

morbidity associated with LBW infants. Management of labour is of importance and facilities for management of high risk pregnancy should be made available widely.

The development and implementation of maternal foetal transport, pharmacologic inhibition of premature labour, foetal monitoring and preparation for prompt resuscitation facilities are essential to reduce the mortality and morbidity of LBW infants. Present hospital care for the LBW babies is very inadequate due to lack of intensive care unit and nursing care services. These services should be developed in near future. Co-ordination between obstetric and neonatal services, improvement of nursing care and further improvement of the LBW care within the available resources are essential to prevent complication and death.

Conclusion

Findings of this study suggest the need of population based interventions in terms of improving maternal education and socioeconomic status. Also, adolescence, elderly and primi gravid mothers should be given special care and they should be imparted health education for adopting contraception and proper ANC for reducing preterm LBW.

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References

1. Defo BK, Partion M. Determinants of LBW: A comparative study. *J. Biosci.* 1993; 25: 87-100.
2. Stoll BJ, Kliegman RM. The High Risk Infant. In: Bhraman RE, Kliegman RM, Jenson HB, (editors). *Nelson Text Book of Paediatrics*. 17th ed. Philadelphia: WB Saunders; 2004: chap 86:550-558.
3. National Institute of Population Research and Training. *Bangladesh Demographic & Health survey 2007*.
4. Haines A, Cassels A. Can the millennium development goals be attained *BMJ* 2004; 329:394-397.
5. *World Health Statistics 2010*; World Health Organization. 102.
6. National Institute of Population Research and Training. *Bangladesh Demographic Health Survey 2004*. Dhaka: National Institute of Population Research and Training, 2005:339.
7. UNICEF Analysis of the number of low birth weight infants in the developing world, 2006, <http://childinfo.org/areas/birth weight/index>, May 2006.
8. An analysis Report of the third National Health Services Survey 2003; Ministry of Health, China. UNICEF Global data base on LBW <http://childinfo.org/areas/birth weight/index>. September 2004.
9. DHS 2001. UNICEF Global Data base on LBW. <http://childinfo.org/areas/birth weight/index>. June 2004.
10. Bangladesh Maternal Health Services and Maternal Mortality Survey 2001.
11. Chowdhury Azad AKC, Begum HA, Azad K, Khatun S, Afroza S, Shahidullah M. Training manual on Essential Newborn Care. Institute of Child and Mother Health, Ministry of Health and Family welfare, May 2009.
12. Tabib SMSB, Nahar N, Khan MR. Clinical Profile of LBW babies. *Bangladesh Journal of Child Health*, 1987; 11(4): 114120.
13. Gurav RB, Kartikeyan S, Jape MR. Low birth weight babies - A Pilot Study. *BMJ*, 2003; 326: 911.
14. Walther FJR. Neonatal morbidity of SGA babies in relation to their nutritional status at birth. *Acta Paediatr* 1982; 71: 437-440.
15. Begum HA, Islam Y, Ali SA, Nahar N. Outcome of LBW infants. *Bangladesh J. Child Health*. 1996; 20(2): 42-46.
16. Bhakoo ON, Narang A. Neonatal mortality and morbidity in Hospital. *Indian Paediatrics* 1975; 12(6): 15.
17. Chowdhury P, Srivastava G. Bacteriological study of neonatal infection. *Indian Paediatrics* 1975; 12: 459.
18. Nolian AR. A prospective study of neonatal infection in newborn. *Indian Paediatrics* 1981; 48: 427-431.
19. Banu K, Rahman S. Disease pattern of neonatal period. *Bangladesh Paediatrics* 1982; 6: 3-4.
20. Rose JH, Richard L. Practical approach to apnoea in newborn. *World Paediatrics and child care*. 1985; 1: 13-23.
21. Godbole A, Heera P. Effect of fetal maturity on perinatal death and neonatal morbidity. *Indian Paediatrics*: 1976; 13(4): 6.
22. Punja S, Bhattacharya I, Gupta MD. LBW infants-Study of mortality. *Indian Paediatrics* 1984; 21: 194.

23. Hosain GMM, Chatterjee N, Begum A, Chandra SS. Factors associated with low birth weight in rural Bangladesh. *Journal of Tropical Pediatrics* 2006; 52(2): 87-91.
24. Paacock WG, Hiralal J. Outcome in low birth weight infants. *AM J obstet Gynecol*. 1981; 140: 165.
25. Haque KN, Anne-Maria H, Ahmed Z, Wilde R, Fong CY. Caesarean or vaginal delivery for preterm very-low-birth weight.: experience from a district general hospital in UK. *Arch Gynecol Obstet* 2008; 277: 207-212