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PREVALENCE OF HYPOGLYCEMIA IN LOW BIRTH WEIGHT NEWBORN ADMITTED IN RAJSHAHI MEDICAL COLLEGE HOSPITAL IN 1ST 72 HOURS OF LIFE

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ABSTRACT

Introduction: Neonatal hypoglycemia is a common metabolic problem which often goes unnoticed due to lack of specific symptoms. It is a common abnormality in low birth weight neonates. It is associated with neurological damage and death when it occurs in the first few days of life. **Objective:** Other objectives were to describe the presence of other clinically associated risk factors and to identify relationship between development of hypoglycemia and associated risk factors in these low birth weight newborns. **Methods:** This descriptive, cross sectional hospital based study was aimed to describe the prevalence of hypoglycemia in low birth weight newborn admitted in Rajshahi medical college hospital in 1st 72 hours of life. A total of 264 neonates were enrolled in the study during the period of July 2015 to June 2017. Written informed consent was obtained. Clinical assessment and 72 hours blood glucose were recorded. Serial determination of blood glucose were recorded using glucometer at 1,2,6,12, 18, 24, 36, 48, 60 and 72 hours of age. Any abnormal result was immediately confirmed by the laboratory. **Results:** In our study we found 9.5% (n=25) Low Birth Weight newborn had hypoglycemia. The occurrence of hypoglycemia was within 1st 0-24 hours in 60% cases (n=15), >24-48 hours in 32% cases (n=8) and >48-72 hours in 8% cases (n=2). In this study male female ratio was 1.1:1. Mean±SD birth weight was 1681.82±301.69 grams and mean gestational age was 31.70±3.60 weeks. In this study majority of mother were <20 years of age and primiparous. Mean±SD maternal age was 19.86±5.960 years and mean± SD maternal weight was 48.23±3.592 kg. There was no significant relationship between increased incidence of hypoglycemia and sex, birth weight, gestational age of the baby and maternal age, maternal weight and parity of the mother. Regarding associated risk factors we found some factors related to newborn and some factors related to the mothers. We found most important factors associated with newborn were septicaemia in 42.4% cases (p=0.022) and PNA in 33% cases (p=00.010). Septicaemia and PNA were significantly associated with hypoglycemia in low birth weight newborn. Regarding mother various risk factors were found significant. Maternal anaemia (p=0.033), PET (p=0.004), APH (p=0.011), PROM (p=0.024), prolonged labour (p=0.033) and mode of delivery (p=0.009) were found significantly associated with increased incidence of hypoglycemia in low birth weight neonate. **Conclusion:** So, from this study it can be inferred that hypoglycemia is more common in low birth weight newborn within 1st 24 hours of life and several associated risk factors are related to hypoglycemia. So low birth weight newborn should be kept under close observation and periodic monitoring of blood glucose should be done to avoid risk of hypoglycemia.

KEYWORDS: Hypoglycemia, Low birth weight, Septicaemia, RDS, Apnoea, Maternal Anaemia, PET, APH, PROM.

I INTRODUCTION

Low birth weight has been defined by the World Health Organization (WHO) as weight at birth of less than 2500 gram (5.5 pounds) (WHO, 1992). This is based on epidemiological observations that newborn weighing less than 2500 gram are approximately 20 times more likely to die than heavier babies.[1] More common in developing than developed countries a birth weight below 2500 gram contributes to a range of poor health outcomes. The prevalence of LBW in Bangladesh is believed to be amongst the highest in the world. However the extent of LBW in the country has not been well surveyed or documented (BBS, 2004).LBW is a major public health concern and one of the strongest single risk factors for early neonatal mortality and morbidity. According to WHO, the prevalance of LBW is 15.5% globally and

96.5% of LBW newborn are born in developing countries (WHO, 2016).Prevalence of LBW is 35.1% in Pakistan and 29.7% in Nepal.[3] Study among Bangladesh has shown prevalence of low birth weight babies 25.49% in a tertiary care hospital.[4] According to World Bank the prevalence of low birth weight in Bangladesh is 22% (The World Bank, 2016). A baby's low weight at birth is either the result of preterm birth (before 37 weeks of gestation) or of restricted fetal (intrauterine) growth.[2] Low birth weight is closely associated with fetal and neonatal mortality and morbidity, inhibited growth and cognitive development and chronic diseases later in life.[2] Hypoglycaemia in newborn is described usually as blood glucose concentration below 1.1 mmol/L for term babies (WHO, 1997). Other investigators have reported levels below 1.7 mmol/L[5, 6], for term babies and an average of below 2.2 mmol/L.[13] Low birth weight newborn are further grouped based on weight at birth. Thus 1.5 kg– 2.5 kg is considered low birth weight, 1.0 kg–1.49 kg is considered very low birth weight and less than 1.0 kg is considered extremely low birth weight.[7] This study is focused on all the above groups for prevalence of early hypoglycemia in low birth weight newborn admitted in Rajshahi medical college hospital. Disturbances of metabolic and endocrine system may frequently occur in low birth weight newborn because of developmental immaturity. The blood sugar value is influenced by birth weight, gestational age, feeding method, and postnatal age. In LBW babies the liver weight is much reduced whereas the brain weight remains within normal limit. This along with several other factors related to intrauterine growth retardation (IUGR) and prematurity result in hypoglycemia with its potential complications.[8] Hypoglycaemia is the most common metabolic abnormality in newborn and is associated with neurological damage and death especially when it occurs during the first few days of life. This is more pronounced in rural set up that do not have the knowledge and facilities for the detection and management of the condition. However, when promptly diagnosed and supplemented these conditions can be prevented or minimized. LBW newborn are affected more by hypoglycaemia and hence they are chosen for this study. Studies have shown that severe hypoglycaemia (Plasma glucose <1.6 mmol/L) occurs in 28% of LBW newborn.[9] Mortality rate upto 51.3% has been reported in LBW newborn less than 1500 gram and hypoglycaemia has been reported to account for up to 32% in newborn with glucose level 0.9 mmol/L and 15% for those with glucose level 1.0 – 1.9 mmol/L.[9] Peripheral blood glucose forms the main substrate for brain metabolism and is essential for normal neurological function. According to the pediatric endocrine society the use of glucose by brain starts to be limited when the plasma glucose level falls to 55-65 mg/dl. Neurogenic symptoms are seen when the plasma glucose is <55 mg/dl and deterioration in cognitive function is seen when plasma glucose is <50 mg/dl.[14] Inborn error of metabolism and congenital defects like glycogen storage diseases, congenital hypopituitarism, defects of amino acids metabolism, defects of gluconeogenesis and defects of β-oxidation of fatty acids result in hyperinsulinism and neonatal hypoglycemia.[15] These other causes of hypoglycaemia should be investigated if hypoglycaemia persists after the first three days of birth. Complications resulting from hypoglycaemia can be prevented by prompt detection and treatment when it occurs. In addition to its high prevalence in the neonatal period hypoglycaemia is of particular importance to the paediatrician because when it is prolonged or recurrent, it results in mental retardation and permanent neurological damage.[13] The study was aimed to find out prevalence of hypoglycemia in LBW newborn and to find out other risk factors that potentiate the increased occurance of hypoglycemia in low birth weight newborn in 1st 72 hours of life. Preventive management strategies should be formulated to reduce the occurrence of hypoglycemia in LBW newborn and to minimize complications. Low birthweight newborn are most vulnerable to changes in blood glucose level, changes in blood glucose level renders them at increased risk for hypoglycemia and it's associated morbidity and mortality. In the recent years Bangladesh achieved success in reducing maternal and child mortality.[16] However, neonatal mortality in Bangladesh still remains high and a challenge for the health system.[17] Bangladesh has a high prevalence of Low-Birth Weight (LBW) and small for gestational age (SGA) babies which might cause neonatal hypoglycemia and other worse health outcome.[18] A study in Bangladesh among SGA babies showed that 25% newborn developed hypoglycemia of which 24% babies died and all the symptomatic cases were <2000 gm at birth.[18] However, data on glycemic status of newborn is scarce in Bangladesh and other countries in Southeast Asia. I, therefore, wish to conduct this study to assess the glycemic status in low birth weight newborn and identify the relationship between hypoglycaemia and other risk factors like septicaemia, PNA, RDS, apnoea, hypothermia, convulsion and jaundice. This study will help to assess the relationship between maternal risk factors like anaemia, HTN, PET, PROM, APH and occurrance of hypoglycemia in LBW newborn. The findings of this study will help clinicians and the health policy makers to determine the strategy for improving the neonatal care programme that might eventually help to reduce the infant mortality rate in Bangladesh.

II Study Objectives

General Objective

1. To find out the prevalence of hypoglycemia in low birth weight newborn in 1st 72 hours of life.

Specific Objectives

1. To find out the prevalence of hypoglycemia in low birth weight newborns during 1st 72 hours of life.
2. To find out other clinically associated maternal and newborn risk factors.
3. To find out relationship between development of hypoglycemia and associated risk factors in these low birth weight newborn.

III METHODOLOGY

Study Design:Cross sectional descriptive study.
Study Place:Paediatrics inpatient department, Rajshahi Medical College Hospital.
Study Period:2 years (July-2015 to June-2017).
Study Population:The study subjects were low birth weight newborn admitted for whatever reason in paediatric inpatient department.
Sampling Procedure:Purposive sampling method.
Sample Size: The sample was two hundred sixty four low birth newborn (264).

Inclusion Criteria

- Any newborn infant less than 2500gram was included in the study.

Exclusion Criteria

- Infants of parents who refused to be enrolled in the study.
- Infants who died within the first six hours from admission.
- Infants of diabetic mother.

Procedure of Data collection:Patients parents were taken to a separate room where PI introduced herself and explained nature of study. A questionnaire and a written informed consent form both in Bangla and English were prepared. Those who agreed to participate were recruited and detailed consent obtained. Data was obtained by PI from patient's parent using the following methods.

Clinical Methodology

1) Socio demographic data was obtained and a full history was taken.
2) A general physical examination was performed.
3) Gestational age of the newborn were determined by New Ballard Score and LMP of mother.
4) A general physical examination of the mother was also done and full medical history of the mother was taken.
5) Blood was collected by heel prick of the newborn and blood glucose recorded in the glucometer.
6) Serial determinations of blood glucose were recorded using glucometer at 1,2,6, 12,18, 24, 36, 48, 60 and 72 hours of age. In an average 5-7 samples were collected. Night samples were often missed in some cases. Any abnormal results warranted immediate confirmation by the laboratory to measure the random blood glucose. Reports were collected.
7) Venous blood was drawn aseptically and sent for complete blood count, S.bilirubin in all LBW newborn.
8) Parents were asked to perform x-ray chest AP view of the baby.

Procedure Of Data Analysis: The numerical data obtained from the study was analyzed and the significance of differences was estimated by using statistical methods. After processing of all available information, statistical analysis was performed by using computer based SPSS-16 (Statistical Package for Social Science). Data was expressed in percentage, frequencies, mean and standard deviation. Continuous data was expressed as mean ±standard deviation (SD) and dichotomous data was represented as percentage. For the categorical variables the chi-square test was applied.

IV RESULTS

In this study 115(43.6%) newborn had birth weight <1500 gram, 125 (47.3%) had birth weight within 1500-2000 gram and 24(9.1%) had birth weight more than 2000 gram. Among study population, 151 (57.2%) had gestational age <32 weeks, 112 (42.4%) had gestational age within 32-37 weeks and only 1(0.4%) had gestational age >37 weeks. Among study population 139 (52.7%) were male and 125(47.3%) were female [Table-1].

Table 1: Demographic distribution of low birth weight newborn (n=264).

	Frequency	%
Birth weight (gram)*		
<1500	115	43.6
1500-2000	125	47.3
>2000-2500	24	9.1
Gestational age (weeks)**		
<32	151	57.2
32-37	112	42.4
>37	01	0.4
Sex		
Male	139	52.7
Female	125	47.3

* $\overline{X}$ ±SD=1681.82±301.69 gram.** $\overline{X}$ ±SD = 31.70±3.60 weeks.

Table 2: Demographic distribution of mother of low birth weight newborn (n=264).

	Frequency	%
Maternal age (years)*		
<20	211	79.9
20-30	23	8.7
>30	30	11.4
Maternal weight (Kg)**		
<45	52	19.7
45-50	16	61.7
>50	49	18.6
Parity of mother		
Primiparous	215	81.4
Multiparous	49	18.6
Antenatal checkup		
Yes	177	67
No	87	33

* $\overline{X}$ ±SD =19.86±5.960 years, ** $\overline{X}$ ±SD =48.23±3.592 Kg

In this study majority of the mother of newborn were under 20 years of age. 211 (79.9%) mother were below 20 years of age, 23(8.7%) were within 20-30 years of age

and 30(11.4%) mother had age more than 30 years.52 (19.7%) mother had weight below 45 kg and 163(61.7%) mother had weight within 45-50 Kg. 49(18.6%) mother had maternal weight >50 Kg. Majority of the mother were primiparous 215(81.4%) and only 49(18.6%) were multiparous. 177(67%) mother took antenatal checkup and 87(33%) had no antenatal checkup [Table-2].

Table 3: Occupation of parents of low birth weight newborn (n=264).

	Frequency	%
Mother's occupation		
Housewife	223	84.5
Service holder	25	9.5
Day labourer	16	6.0
Father's occupation		
Day labourer	109	41.3
Service holder	87	33.0
Businessman	68	25.7

In this study, regarding occupation of mother of low birth weight newborn majority 223(84.5%) were housewife, 25(9.5%) were service holder and 16(6%) were day labourer. Regarding father 109(41.3%) were day labourer, 87(33.0%) were service holder and 68(25.7%) were businessman [Table-3].

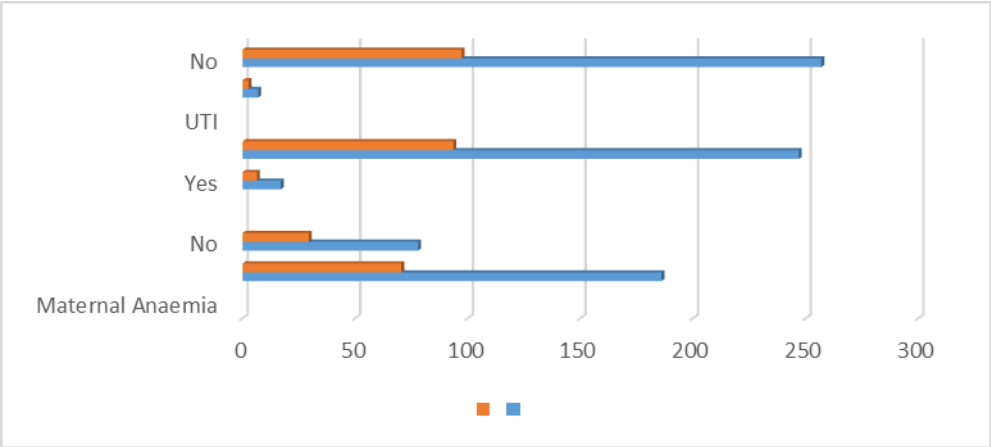

Figure-1: Distribution of medical conditions of mother of low birth weight newborn (n=264)

In this study, 186(70.5%) mother of low birth weight newborn had anaemia, 17(6.4%) mother were hypertensive and only 7(2.7%) mother had UTI [Figure-1].

Table 4: Medical events associated with current pregnancy of the mother of low birth weight newborn (n=264).

	Frequency	%
PET		
Yes	99	37.5
No	165	62.5
PROM		
Yes	113	42.8
No	151	57.2
APH		
Yes	70	26.5
No	194	73.5
Eclampsia		
Yes	12	4.5
No	252	95.5

In this study, regarding medical events associated with current pregnancy of mother of low birth weight newborn, 113(42.8%) mother had history of PROM, 99(37.5%) mother had history of PET. APH was present in 70(26.5%) mother and only 12(4.5%) mother had history of eclampsia in current pregnancy [Table-4].

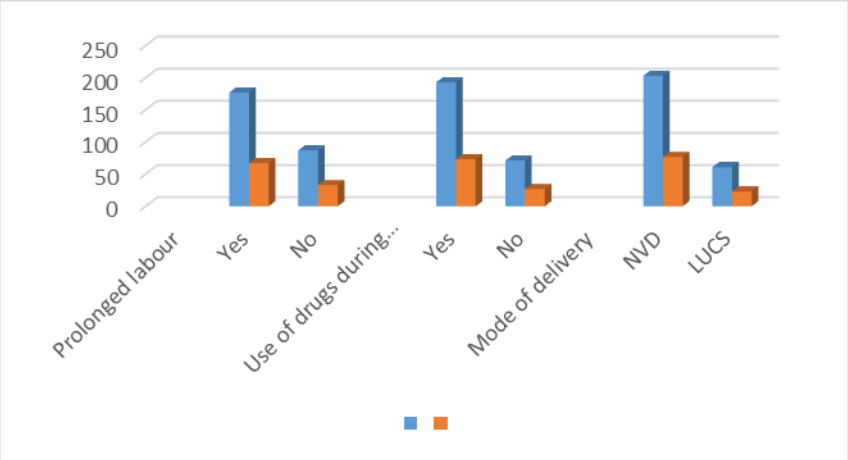

Figure 2: Events associated with delivery of mother of low birth weight newborn (n=264).

In this study, in case of delivery of mother of low birth weight newborn 177(67%) mother had history of prolonged labour, 193(73.1%) mother had history of use of drugs during labour. 203 (76.9%) mother gave birth by NVD and 61(23.1%) mother had undergone LUCS [Figure-2].

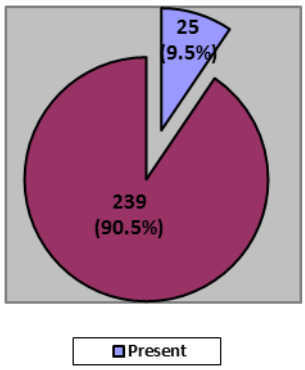

Figure-3: Prevalence of hypoglycemia in low birth weight newborn in 1st 72 hours of life (n=264).

In this study, hypoglycemia was present in 25 newborn. So, prevalence of hypoglycemia was 9.5% in low birth weight newborn in 1st 72 hours of life [Figure-3].

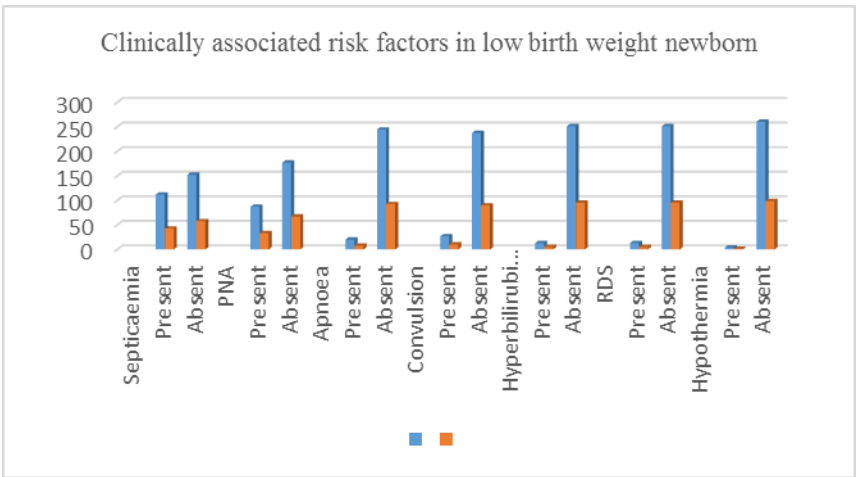

Figure 4: Presence of other clinically associated risk factors in low birth weight newborn (n=264).

In this study 112(42.5%) low birth weight newborn had septicaemia, 87(33%) had PNA, 27(10.2%) had convulsion. Apnoea was present in 20(7.6%) low birth weight newborn. RDS and hyperbilirubinaemia were present in 13(4.9%) low birth weight newborn in each case. Only low birth weight newborn 4(1.5%) had hypothermia and 13(4.9%) had RDS [Figure-4].

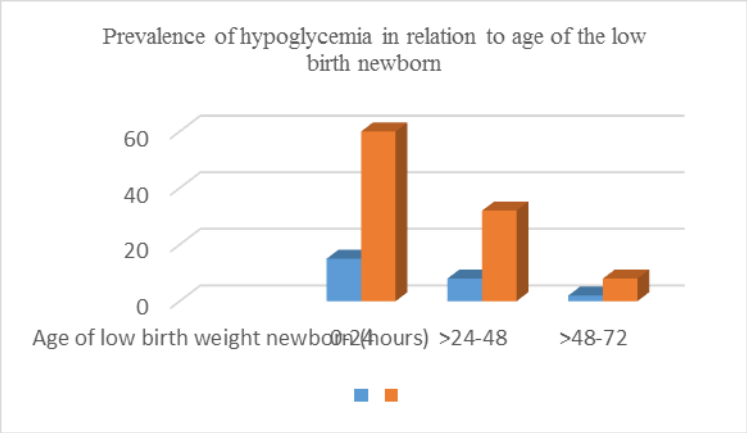

Figure-5: Prevalence of hypoglycemia in relation to age of the low birth newborn (n=25).

In this study among low birth weight newborn who were hypoglycemic, 15(60%) study population were found hypoglycemic within 0-24 hours. 8(32%) were found hypoglycemic within >24-48 hours. Only 2(8%) were found hypoglycemic within >48-72 hours. Thus majority of newborn were found to be hypoglycemic within 1st 24 hours of life [Figure-5].

Table 5: Relationship between hypoglycemia and maternal hypertension of low birth weight newborn (n=264).

	Hypoglycemia		χ^2, df (p)
	Present No (%)	Absent No (%)	
Maternal Hypertension			
Present	3(17.6)	14(82.4)	1.417, 1
Absent	22(8.9)	225(91.1)	(0.234)

In this study only 3(17.6%) mother of hypoglycemic low birth weight newborn had hypertension and 22(8.9%) mother had no hypertension. So hypertension of mother was not significantly associated with hypoglycemia in low birth weight newborn (χ^2=1.417, df=1, p=0.234) [Table-5].

Table 6: Relationship between hypoglycemia of low birth weight newborn and PROM of mother in current pregnancy (n=264)

	Hypoglycemia		χ^2, df (p)
	Present No (%)	Absent No (%)	
PROM			
Yes	16(14.2)	97(85.8)	5.068, 1
No	9(6.0)	142(94.0)	(0.024)

In this study 16(14.2%) mother of hypoglycemic low birth weight newborn had PROM and 9(6.0%) mother had no history of PROM. So PROM of mother was significantly associated with hypoglycemia in low birth weight newborn (χ^2=5.068, df=1, p<0.05) [Table-6].

Table 7: Relationship between hypoglycemia of low birth weight newborn and APH of mother in current pregnancy (n=264).

	Hypoglycemia		χ^2, df (p)
	Present No (%)	Absent No (%)	
APH			
Present	12(17.1)	58(82.9)	6.542, 1
Absent	13(6.7)	181(93.3)	(0.011)

In this study 12(17.1%) mother of hypoglycemic low birth weight newborn had APH and 13(6.7%) mother had no APH. So APH of mother was significantly associated with hypoglycemia in low birth weight newborn (χ^2=6.542, df=1, p<0.05) [Table-7].

Table 8: Relationship between hypoglycemia of low birth weight newborn and eclampsia of mother in current pregnancy (n=264).

	Hypoglycemia		χ^2, df (p)
	Present No (%)	Absent No (%)	
Eclampsia			
Present	2(16.7)	10(83.3)	0.760, 1 (0.383)
Absent	23(9.1)	229(90.9)	

In this study only 2(16.7%) mother of hypoglycemic low birth weight newborn had eclampsia and 23(9.1%) mother of hypoglycemic low birth weight newborn had no eclampsia. So eclampsia of mother was not significantly associated with hypoglycemia in low birth weight newborn (χ^2=0.760, df=1, p=0.383) [Table-8].

Table 9: Relationship between hypoglycemia and duration of labour in low birth weight newborn (n=264).

	Hypoglycemia		χ^2, df (p)
	Present No (%)	Absent No (%)	
Duration of labour			
Normal	12(6.8)	165(93.2)	4.534, 1 (0.033)
Prolonged	13(14.9)	74(85.1)	

In this study 12(6.8%) mother of hypoglycemic low birth weight newborn had normal duration of labour and 13(14.9%) mother of hypoglycemic low birth weight newborn had prolonged labour. So prolonged labour was significantly associated with hypoglycemia in low birth weight newborn (χ^2=4.534, df=1, p<0.05) [Table-9].

Table 10: Relationship between hypoglycemia in low birth weight newborn and mode of delivery of mother in current pregnancy (n=264).

	Hypoglycemia		χ^2, df (p)
	Present No (%)	Absent No (%)	
Mode of delivery			
NVD	14(6.9)	189(93.1)	6.785, 1 (0.009)
LUCS	11(18.0)	50(82.0)	

In this study 14(6.9%) mother of hypoglycemic low birth weight newborn had history of NVD in current pregnancy. 11(18.0%) mother of hypoglycemic low birth weight newborn had history of LUCS. So delivery of baby by LUCS was significantly associated with hypoglycemia in low birth weight newborn (χ^2=6.785, df=1, p<0.05) [Table-10].

Table 11: Relationship between hypoglycemia in low birth weight newborn and septicemia (n=264).

	Hypoglycemia		χ^2, df (p)
	Present No (%)	Absent No (%)	
Septicemia			
Present	16(14.3)	96(85.7)	5.263,1 (0.022)
Absent	9(5.9)	143(94.1)	

In this study 16(14.3%) hypoglycemic low birth weight newborn had septicaemia and 9(5.9%) hypoglycemic low birth weight newborn had no septicaemia. So septicaemia was significantly associated with hypoglycemia in low birth weight newborn (χ^2=5.263, df=1, p<0.05) [Table-11].

Table 12: Relationship between hypoglycemia in low birth weight newborn and PNA of newborn (n=264).

	Hypoglycemia		χ^2, df (p)
	Present No (%)	Absent No (%)	
PNA			
Present	14(16.1)	73(83.9)	6.638,1
Absent	11(6.2)	166(93.8)	(0.010)

In this study 14(16.1%) hypoglycemic low birth weight newborn had PNA and 11(6.2%) hypoglycemic low birth weight newborn had no PNA. So PNA was significantly associated with hypoglycemia in low birth weight newborn (χ^2=6.638, df=1, p<0.05) [Table-12].

Table 13: Relationship between hypoglycemia in low birth weight newborn and Apnoea, RDS, Hypothermia, Hyperbilirubinaemia and convulsion of newborn (n=264).

	Hypoglycemia		χ^2, df (p)
	Present No (%)	Absent No (%)	
Apnoea			
Present	2(10)	18(90)	0.007,1
Absent	23(9.4)	221(90.6)	(0.9332)
RDS			
Present	2(15.4)	11(84.6)	0.558, 1
Absent	23(9.2)	228(90.8)	(0.455)
Hypothermia			
Present	1(25)	3(75)	1.143, 1
Absent	24(9.2)	236(90.8)	(0.285)
Hyperbilirubinaemia			
Present	3(23.1)	10(76.9)	2.953, 1
Absent	22(8.8)	229(91.2)	(0.086)
Convulsion			
Present	2(7.4)	25(92.6)	0.149, 1
Absent	23(9.7)	214(90.3)	(0.699)

In this study Apnoea was present in only 2(10%) hypoglycemic low birth weight newborn and absent in 23(9.4%) low birth weight newborn. RDS was present in 2(15.4%) hypoglycemic low birth weight newborn and absent in 23(9.2%) hypoglycemic low birth weight newborn. Only 1(25%) hypoglycemic low birth weight newborn had hypothermia and 24(9.2%) had no hypothermia. 3(23.1%) hypoglycemic low birth weight newborn had hyperbilirubinaemia and 22(8.8%) had no hyperbilirubinaemia [Table-13]. Convulsion was present in 2(7.4%) hypoglycemic low birth weight newborn and absent in 23(9.7%) hypoglycemic newborn. So no significant relationship was seen between of hypoglycemia in low birth weight newborn and apnoea, RDS, hypothermia, hyperbilirubinaemia and convulsion of newborn (p=0.933, p=0.455, p=0.285, p=0.086 and p=0.699 respectively).

V DISCUSSION

Hypoglycemia is one of the most frequent metabolic problems in neonatal period. It is not a disease but a symptom of other diseases or lack of metabolic adaptation postnatally. Menifestations of hypoglycemia are non-specific. Hypoglycemia is often unexplained by other diagnoses and corrected with the provision of glucose. However when the low blood glucose level are prolonged or recurrent, they may result in acute systemic effects and neurological sequelae. The LBW newborn are at a greater risk because of their inability to mount a ketogenic response in cases of hypoglycemia at birth. It is due to their reduced glycogen storage, their immaturedgluconeogenic pathways and their high brain body mass ratio. In low birth weight newborn there is increase in glucose consumption and they are prone to hyperinsulinismspecially in SGA newborn.[19] Their fat content compared to the term and AGA newborn is less. Although fat itself is not convertible to glucose, mobilization and oxidation of fat reduces glucose uptake and oxidation. Low birth weight newborn are at a greater risk of sequelae because of metabolic immaturity.[20] It seems likely that newborn who developed symptomatic hypoglycemia were hypoglycemic but asymptomatic at an earlier stage of their clinical course. We must try to diagnose hypoglycemia at this stage to prevent further complications.There are few data regarding prevalence of hypoglycemia in LBW newborn and their associated risk factors. We therefore tried to determine the prevalence of hypoglycemia in these low birth weight newborn and to find out if there was any significant association of these risk factors to hypoglycemia in the study population. In this study birth weight of study population was in between 1500-2500 gms and most

study subjects were in between 1500-2000 gms. Mean±SD birth weight was 1681.82±301.69 gms. In this study gestational age of study population was in between 28-38 weeks. Most of the study population had gestational age between 32-37 weeks. Mean±SD gestational age was 31.70±3.60 weeks. Almost similar mean birth weight and gestational age was found by.[12] Higher gestational age and birth weight was found by Samyan et al.[21], De et al.[22] Whereas lower mean and gestational age was found by Carolis et al.[10] Among 264 newborn 139 were male and 125 were female. Male female ratio was 1.1:1. In this study maternal age range was 15-38 years. 211 (79.9%) mother were<20 years, 23(8.7%) mother were within 20-30 years and 30(11.4%) were more than 30 years. Mean±SD maternal age was 19.86±5.960 years.In this study 163 (61.7%) mother had body weight between 45-50 kg. While 52(19.7%) mother had body weight <45 kg and >50 kg was seen in 49 (18.6%) mother. Mean±SD maternal weight was 48.23±3.592 kg. In this study majority of the mothers were primiparous 215(81.4%) and only 49(18.6%) were multiparous. 177(67%) mother took antenatal checkup and 87(33%) had no antenatal checkup. In this study regarding occupation, 223(84.5%) mother were housewives, 25(9.5%) were service holder and 16(6.0%) were day labourer. Regarding father 109(41.3%) were day labourer, 87(33%) were service holder and 68 (25.7%) were businessman. 186(70.5%) mother were anaemic, 17(6.4%) had HTN and 7(2.7%) had UTI. Regarding medical events associated with current pregnancy 113 (42.8%) mother had history of PROM, 99(37.5%) mother had history of PET. APH was present in 70(26.5%) mother and only 12(4.5%) mother had history of eclampsia. In this study considering events associated with delivery of mother of LBW newborn, 177(67%) had history of prolonged labour, 193(73.1%) had history of use of drugs during labour. We found 203(76.9%) mother gave birth by NVD and 61(23.1%) mother had undergone LUCS.In this study 25 low birth weight newborn out of 264 found to be hypoglycemic. The prevalence of hypoglycemia in low birth weight newborn in first 72 hours of life was 9.5%. Almost similar prevalence was found by Samyam et al,[21] and Carolis et al.[10] Which were 9.4% and 9.8% respectively. Dhananjaya and Kiran[23], found 14.75%, Shaikh et al.[11], found 19%, Lodhi, Shah and Shakir[24], found 29.1%, Osler et al.[25], found 23% and Masakha[26], found 14.7% hypoglycemia in low birth newborn in 1st 72 hours of life. This wide variation may be due to no uniformity of sample under study. These differences may also be due to variable definition of hypoglycemia, inclusion criteria, sample size, nutritional status of the mother in different population, assay method used. Use of reagent strips wrongly diagnose hypoglycemia in one out of four neonate and result is also influenced by type of feeding. Study showed breast feeding in full term newborn have higher blood glucose concentration in the first week of life than formula fed newborn.[27] VSS and Ran[28], and De et al.[22] found initiation of early exclusive breast feeding in low birth weight newborn shows very low incidence of hypoglycemia. In this study 112 (42.5%) low birth weight newborn had septicemia, 87(33%) had PNA, 27(10.2%) had convulsion, Apnoea was present in 20(7.6%) low birth weight newborn, RDS and hyperbilirubinaemia were present in 13(4.9%) in each case. Only 4(1.5%) had hypothermia and 13(4.9%) had RDS.In this study among low birth weight newborn who were hypoglycemic, majority 15(60%) study population were found hypoglycemic within 0-24 hours. 8(32%) were found hypoglycemic within >24-48 hours. Only 2(8%) were found to be hypoglycemic within >48-72 hours. In a study done by Bhat[29], in low birth weight newborn, 98% babies were found to be hypoglycemic in first 24 hours of age. Sing et al.[30], conducted a study in which they found incidence of hypoglycemia was highest in 0-24 hours of age (63.15%) which was similar to our study. Shaikh et al.[11], also found the same result. But Dhananjayaand Kiran[23], found highest incidence of hypoglycemia within >24-48 hours that is second day of life, which is dissimilar to this study.In this study no significant relationship was found between hypoglycemia and birth weight, gestational age and sex of low birth weight newborn (p=0.251, p=0.574 and p=0.624 respectively). However Afzal et al.[9], found birth weight as a significant factor for hypoglycemia. Carolis et al.[10], Shaikh et al.[11], found gestational age to be significantly associated with hypoglycemia. However stomnaroska et al.[12], found no significant relationship between birth weight and gestational age of the low birth weight newborn which is similar to our study. Maheswari and Behera[31], Bhand et al.[32], Dhananjaya and Kiran[23], found hypoglycemia to be significantly associated with sex. They found hypoglycemia were more in male babies. But Stomnaroska et al.[12], De et al.[22], did not find significant relationship between hypoglycemia and sex of the baby. In this study no significant relationship was found between hypoglycemia in low birth weight newborn and age, weight and parity of mother (p=0.225, p=0.831 and p=0.729 respectively). However Maheswari and Behera[31], found low maternal weight and multiparity as a significant factor for hypoglycemia. Others did not find any relationship. The optimum age of child bearing is 20-30 years. Maximum mother of our study population was under 20 years. Lower socioeconomic and educational status and lack of health consciousness lead to lower nutritional status of the mother. In this study hypertension of mother was not significantly associated with hypoglycemia in low birth weight newborn (p=0.234). Maheswari and Behera[31], Bhand et al.[32], Sasidharan, Gokul and Sabitha[33], also did not find any relationship between HTN of mother and hypoglycemia in low birth weight newborn.In this study presence of maternal anaemia was significantly associated with hypoglycemia in low birth weight newborn (χ^2=4.554, df=1, p=0.033). Maheswari and Behra[31], found anaemia as a significant risk factor for hypoglycemia. Whereas Bhand et al.[32], Sasidharan, Gokul and Sabitha[33], did not find significant relationship between hypoglycemia and maternal anaemia.In this study presence of PET was

significantly associated with hypoglycemia in low birth weight newborn (p<0.05). Such hypertensive disorder of pregnancy causes vasospasm of the small vessels which causes hypoxia of surrounding tissues and damage the vessel wall. This causes chronic placental insufficiency which leads to intrauterine growth retardation. Dhananjaya and Kiran[23], found PET in 40% cases, it was significantly associated with neonatal hypoglycemia (p<0.05) and Bhatnagar[34], also found PET in 16.10% cases and was statistically significant (p<0.05) with hypoglycemia in LBW newborn. Sasidharan, Gokul and Sabitha[33], also found PET as significant risk factor but Maheswari and Behra[31], did not find any relationship between PET and hypoglycemia (p>0.05). In this study presence of eclampsia was not significantly associated with hypoglycemia (p=0.383). However Bhatnagar[34], Dhananjaya and Kiran[23], and Bhand[32], found significant relationship between hypoglycemia in newborn and eclampsia of mother (p<0.05 in all cases). In this study history of APH also found to be significantly associated with hypoglycemia of low birth weight newborns (χ^2=6.542, df=1, p=<0.05). Haemorrhages associated with pregnancy causes impaired placental function and impairs foetal growth. Maheswari K, Behra N.[31], found APH in 4% cases and it was not statistically significant whereas Bhatnagar[34], found significant relationship between hypoglycemia and APH (P<0.05).In this study presence of PROM was found significantly associated with hypoglycemia in low birth weight newborn (p<0.05). Maheswari and Behra[31], Bhatnagar[34], also found PROM in 26.5% and 35.43% mother of LBW newborn respectively and it was significantly associated with hypoglycemia (p<0.05).In this study prolonged labour was significantly associated with hypoglycemia in low birth weight new born (p<0.05). Dhananjaya and Kiran[23], found prolonged labour in 15.35% mother and if was also statistically significant (p<0.05).In this study mode of delivery by LUCS was found significantly associated with neonatal hypoglycemia (p<0.05). This showedHypoglycemia was more in newborn born by LUCS than NVD. Samyam et al.[21], also found significant relationship between hypoglycemia and mode of delivery by LUCS (p<0.05). They noticed prevalence of hypoglycemia was more in babies born by LUCS which is similar to this study.Significant relationship was found between presence of septicaemia and hypoglycemia in low birth weight newborn (p<0.05). Due to sepsis there is more utilization of glucose. A neonate having sepsis develops reluctance to feed and this can lead to hypoglycemia. Similarly increased metabolic demand and hypothermia caused by sepsis can bring down the glucose level. Stomnaroska et al.[12], Shaikah et al.[11], Ahmed and Khalid[16], Maheswari and Behara[31], Dhananjaya and Kiran[23], Bhand et al.[32], found septicaemia 26.18%, 9.7%, 9.9%, 22.5%, 15.2%, 20% cases respectively which were significantly associated with hypoglycemia in LBW newborn (p<0.05).Presence of PNA was significantly associated with hypoglycemia in LBW newborn (p<0.05). In PNA there is increased rate of anaerobic glycolysis in combination with an increased rate of glycogenolysis probably predispose to hypoglycemia. Sing et al.[30], Atrushi[35], Dhananjaya and Kiran[23], Najati and Saboktakin[36], found PNA 66.66%, 32.9%, 26.86%, 9.6% of cases respectively. They found significant association between hypoglycemia and PNA (p<0.05) in LBW newborn. Whereas stomnaroska et al.[12], found PNA as risk factor in 3.57% cases and it was not statistically significant (p>0.05). In this study no significant relationship was seen between hypoglycemia in low birth weight newborn and apnoea, RDS, hypothermia, hyperbilirubinaemia and convulsion (p=0.933, p=0.455, p=0.285, p=0.086 and p=0.699 respectively). Sing et al.[30], found significant association between hypoglycemia and apnoea (p<0.05). Atrushi[35], Dhananjaya and Kiran[23], Stomnaroska et al.[12] found significant association between hypoglycemia and RDS (p<0.05). However Najati and Saboktakin[36], Maheswari and Behra[31], did not find significant relationship between hypoglycemia and RDS (p>0.05).Shaikah et al.[11], Najati and Saboktakin[36], found significant relation between hypoglycemia and hypothermia (p<0.05). However Dhananjaya and Kiran[23], Maheswari and Behera[31], did not find significant relationship between hypoglycemia and hypothermia (p>0.05). Maheswari and Behra[31], found significant association between hypoglycemia and hyperbilirubinaemia (p<0.05). However stomnaroska et al.[12], Dhananjaya and Kiran[23], did not find significant relationship between hypoglycemia and hyperbilirubinaemia (p>0.05) which was similar to this study. Dhananjaya and Kiran[23], Atrushi[35], found significant relationship between hypoglycemia and convulsion (p<0.05). But Bhand et al.[32], did not find significant relationship between hypoglycemia and convulsion (p>0.05) which was similar to this study.So in this study, it is seen that hypoglycemia in LBW newborn and presence of maternal and neonatal risk factors and their association confer them to increased risk of mortality and morbidity.

VI CONCLUSION

Low birth weight is a burning issue in health policy making in developing countries like Bangladesh. It is an important cause of neonatal mortality and morbidity. LBW newborn are prone to develop certain fatal conditions and hypoglycemia is one of them. Hypoglycemia is a preventable condition which is often overlooked and is an important cause of death of low birth weight newborn. In this study the prevalence of hypoglycemia was found 9.5% among LBW newborn. The risk factors found significantly associated with hypoglycemia regarding LBW newborn are perinatal asphyxia and septicaemia. Maternal risk factors which were found significantly associated with hypoglycemia were anaemia, PET, PROM, prolonged labour, APH and mode of delivery. Estimation of blood sugar level offers a simple, inexpensive, quick method for detection of hypoglycemia. As many of the hypoglycemic newborn may remain asymptomatic, estimation of blood sugar

level should be a routine work in all low birth weight neonates in tertiary level hospitals.

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