

## Neonatal Morbidity and Outcome in a Medical College Hospital

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Understanding the pattern and causes of neonatal morbidities is the key for identifying appropriate interventions and programme priorities for improvement of neonatal health. To identify pattern and causes of neonatal morbidities, and their short term outcome, a prospective observational study was conducted in the neonatal care unit of Sir Salimullah Medical College & Mitford Hospital, Dhaka, Bangladesh, over a period of 7 month from January to July 2015. All neonates admitted during this period were included. Detail informations, morbidities and outcome were recorded in neonatal history sheet at admission and till stay in the unit. Out of 284 neonates 54.9% male, 69.4% term, 30.6% preterm, 59.8% normal birth weight, 37.6% low birth weight. Majority (81.3%) were admitted during first 24 hours of age. Major morbidities were perinatal asphyxia (52.1%), hypoxic ischemic encephalopathy (15.5%), low birth weight(37.6%), prematurity (30.6%), sepsis (15.8%), neonatal jaundice (23.6%), congenital malformation (2.8%), birth trauma (2.8%). Most of neonates (70.4%) were discharged after improvement, 13.7% left against medical advice. Hospital stay less than 7 days in majority (84.2%) of cases. Total death was 24, term (13/24) and preterm(11/24) were almost equal, mostly of LBW (14/24). Causes of death were perinatal asphyxia (11/24), prematurity (11/24), jaundice with kernicterus (1), congenital anomalies (1), sepsis (3). Most of morbidities like perinatal asphyxia, low birth weight and prematurity could have been prevented by good obstetric care and essential newborn care at birth and in immediate postnatal period.

[Dinajpur Med Col J 2016 Jan; 9 (1):38-44]

**Key words:** Neonates, morbidity, outcome, essential newborn care

### Introduction

**N**eonatal period, first 28 days of life is a crucial time when the newborn has to adapt to a new environment. During this time, a neonate is susceptible to many problems ranging from mild morbidity to life threatening condition.

Each year globally 3.6 million neonate die in the first 28 days after birth, majority of these deaths occur within 7 days of birth. Of the 3.6 million neonatal deaths per year, 98% occur in low and middle income countries.<sup>1</sup> The leading causes of death globally were preterm birth (35.7%), intrapartum complications

(23.4%) and sepsis (15.6%).<sup>2</sup> In early period preterm birth (40.8%) and intrapartum complications (27.0%) accounted for majority of deaths while in the late neonatal period almost half of all deaths occurred from infectious causes(47.6%).<sup>2</sup>

Neonatal mortality rate across all birth 27.3 per 1000 deliveries (range 8 to 41) in low and middle income countries. More than half of all deaths occur within 24 hours of birth and 81% within first week of life.<sup>3</sup> Of the Estimated 8.7 million death in under five children worldwide 41% occurred in

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neonates.<sup>1</sup> In Bangladesh the current Neonatal Mortality Rate is 28 per 1000 live births, Infant Mortality Rate is 38/1000 live birth and Under-five mortality is 46 /1000 live birth<sup>4</sup>. This shows 73.7% of infant deaths and 60.8 % of under-five child deaths contributed by neonatal mortality.

Neonatal disease pattern is a sensitive indicator of the availability, utilization and effectiveness of mother and child health services in the community. Understanding the pattern and causes of morbidities and mortality is the key to minimize the burden of neonatal death.

It has been estimated that majority of neonatal death could be saved with low cost-effective interventions by The World Health Organization's Essential Newborn Care (ENC) services to provide neonatal care at birth and during the first days after birth. The components of ENC are universal precautions and cleanliness, routine neonatal care, resuscitation, thermal care, early breastfeeding, skin-to-skin care, care of the small neonates, danger signs, and common illnesses.<sup>5</sup> This study was aimed to identify the general characteristics, pattern of morbidities and short term outcome in neonatal care unit of a Medical College Hospital, Bangladesh.

### Methods

This is a prospective observational study conducted in neonatal care unit (NCU -2) of Sir Salimullah Medical College & Mitford Hospital, Dhaka over a period of 7 month from January 2015 to July 2015. The NCU consisted of a level two NCU, with limited equipment and nursing staff. All neonates admitted during this period were included. The diagnosis of birth asphyxia is based on history of delayed cry after birth, required resuscitation, Apgar score below 7 at five minutes, HIE categorized by Levene,s clinical

scoring.<sup>6</sup> Diagnosis of sepsis is based on risk factors, clinical correlation and laboratory findings with existing facilities of hospital according to possible criterias adopted from European Medicines Agency.<sup>7</sup> For all babies clinical diagnosis was made and managed accordingly, followed for subsequent clinical course, morbidities and outcome. Details information, morbidities and outcomes were documented in neonatal history sheet at admission, during hospital stay till stay in the unit. Data were analyzed with SPSS 17.0

### Results

Out of 284 neonates 54.9% male, 69.4% term, 59.8% were of normal birth weight, and 37.6% were of low birth weight. Majority of LBW (78/107;72.9%) weighed between 1500gm to 2500g, 77.1% were appropriate for gestational age (Table-1). Majority of mothers (64.8%) were between 20 to 30 yrs with mean age 24.17± 4.8, 54.7% multipara, 57.7% required caesarean section. Gestational age varied between 25 weeks to < 42 weeks and birth weight 500 gm to 4100 gm with a mean 37.34± 2.71 and 2497± 625 respectively. Most of neonates (81.3%) admitted during first 24 hours of age.(Table-2) Major morbidities were perinatal asphyxia (52.1%), hypoxic ischemic encephalopathy (15.5%), low birth weight(37.6%), prematurity (30.6%), sepsis (15.8%), neonatal jaundice (23.6%). Few others were congenital malformations (8/2.8%) and birth trauma (8/2.8%) (Table III). Hospital stay was less than 7 days in majority of neonates (84.2%). (Table II)Most of neonates (70.4%) were discharged, 13.7% left against medical advice (Table IV). Total death was 24, term and preterm were almost equal, most of them were of LBW. Causes of death were perinatal asphyxia (11), prematurity (11). jaundice with kernicterus (1), congenital anomalies (1) and sepsis in 3 cases (Table V)

Table I: Clinical Characteristics of study population (n=284)

Characteristics	Number	%
Male	156	54.9
Female	128	45.1
Term ( 37 week to <42 weeks)	197	69.4
Preterm (< 37 weeks)	87	30.6
Weight		
Normal weight (>2500 to < 4000)	170	59.8
LBW (<2500)		
1500 - <2500	78	27.5
VLBW (1000 – <1500)	22	7.7
ELBW (< 1000)	7	2.5
Macrosomia >4000g	7	2.5
Weight/gestation		
Appropriate weight for gestation	219	77.1
Small for gestation	58	20.4
Large weight for gestation	7	2.5

Table II: Age at admission and duration of hospital stay (n=284)

Variable	Number	%
Age at admission		
24 hour or less	231	81.3
25- 72 hour	37	13.1
73 hour to 7 day	12	4.2
More than 7 day	4	1.4
Duration of hospital stay		
< 3 day	105	37.0
4 -7 day	134	47.2
>7 day	45	15.8

Table III: Morbidities of study population (n=284)

Characteristics	Number	%
Perinatal asphyxia	148	52.1
HIE	44	15.5
Low birth weight	107	37.6
Prematurity	87	30.6
Sepsis	45	15.8
Neonatal jaundice	67	23.6
Congenital malformations	8	2.8
Birth injury	8	2.8
Infant of diabetic mother	4	1.4
Others	9	3.1

- HIE-Hypoxaemic Ischemic Encephalopathy.
- Some of babies had more than one morbidities

Table IV: Outcome of study population (n=284)

Outcome	Number	%
Discharged	200	70.4
LAMA	39	13.7
Referred	12	4.2
Absconded	9	3.2
Death	24	8.4
Total	284	100

Table V: Characteristics and causes of death of neonates who died (n=24)

Characteristics	no (%)	no (%)	Total
Gestational age	Term	Preterm	
	13(54.2)	11(45.8)	24 (100)
Birth weight	Normal weight	LBW	
	10(41.6)	14 (58.4)	24 (100)
Causes of death			
PNA	11	45.8	
Prematurity	11	45.8	
Sepsis	3	12.5	
Jaundice with kernicterus	1	4.1	
Multiple congenital anomalies	1	4.1	

\*Some of babies had more than one morbidity

## Discussion

Total 284 babies were prospectively observed during study period. Age at admission though varies on cause, place of delivery and available health care facility, but most of newborn problems occur during the first 24 hours of life.

In this study age of admission of neonates observed were 81.3 % by 24 hours of age, 94.4% by 72 hours of age and 98.6% during first week of age. This finding is higher in comparison to other studies where 62% of neonates admitted during first 24 hours of life<sup>8</sup>, 79% within 72 hours<sup>9</sup> and 83.2% during first week of life.<sup>10</sup>

Majority of mother (64.8%) aged between 21 to 30 years, 57.7% needed caesarean section. Male predominance in this study is consistent with other studies.<sup>8-11</sup> Low birth weight & preterm babies are supposed to have more complication requiring admission. But in the present study majority were of term (69.4%) and of normal birth weight (59.8%) which are

consistent with studies from Nepal (65.1%), Pakistan (89.5%) and India (65.8%).<sup>9,10,12</sup> This may reflect inadequate care around the time of birth.

Preterm neonates comprised 30.6% of total admission in present study. This is similar in figure reported from Nepal.<sup>13</sup> The incidence varies in countries and regions as reported higher incidence of 34.5% to 50%<sup>12,14</sup> and lower incidence of 22 % to 27.9%<sup>15,16</sup> in different studies. Preterm birth rate is much higher in developing world (11.9%) than developed world 5-7%,<sup>17</sup> so preventive measures should be taken into consideration besides establishment of facility based neonatal care in these regions.

Low birth weight individuals experience many health complications throughout their lives which can cause long and short term consequences. Global occurrence of LBW is 15.5%, of which 96.5% of them are in developing countries, and contributes to about 60 to 80% of all neonatal death.<sup>18</sup> In this study LBW accounted 37.6% of total admission almost similar to study by Butt et al<sup>11</sup>. Study of 16290 Bangladeshi live born singletons in rural Bangladesh reported 55.3% were of LBW<sup>15</sup>. This high rate of LBW could be attributed to low socioeconomic condition of the region.

In this study, 52.1% neonates had perinatal asphyxia, of which 61.9% (122/148) were term, 29.7% (44/148) had encephalopathy. This is higher than other studies reported from Pakistan,<sup>10,11</sup> India<sup>14</sup>, Nepal<sup>8,9,13</sup> and Nigeria.<sup>19</sup> So adequate attention has to be paid in training of health worker for intrapartum monitoring and neonatal resuscitation.

Neonatal sepsis one of the major causes of neonatal mortality and significant long-term disabilities. Diagnosis of sepsis in neonates is difficult as clinical signs and laboratory

markers are often non-specific and indistinguishable from other conditions. Out of 284 neonates 45 (15.8%) accounted for sepsis, almost all were early onset sepsis (43/45). Higher rate of sepsis (19% to 45.9%) has been shown in studies of different countries.<sup>14,13,10,8</sup>

Neonatal jaundice requiring treatment, a common morbidity in neonate found in 23.6% of neonates with 1 mortality in present study. Identification of risk factors and proper monitoring could avoid the severity and complications.

Hospital stay depends on birth weight, gestational age, morbidities encountered, quality of care among different neonatal care unit. This Study carried out in a level 2 neonatal care unit with limited facilities and skilled manpower. Mean duration of hospital stay  $4.81 \pm 3.47$  day, 84.2% stayed less than 7 days.

More than two third of babies (70.4%) were discharged with improvement, with possible care in spite of limited resources in the unit. Twelve (4.2%) babies were transferred to other hospital for better management not available in unit or surgical intervention. Thirty nine (13.7%) babies left against medical advice, compared to lower rate of 6.5%, 7.2% reported by other studies.<sup>13,16</sup> This variation may be attributed socioeconomic condition. Nine babies who were absconded, therefore under follow up till in unit.

Among the 50 countries where Neonatal mortality has been reduced significantly, of which two were of low-income countries and Bangladesh is one of them.<sup>20</sup> The proportion of neonatal mortality in this study is 8.4% during the hospital stay. It was reported to be from 1.4% to 20.5% depending on morbidity,

available facility and quality of obstetric and neonatal care.<sup>8,16,14</sup>

More death due to early preterm and VLBW in developed countries compared to term normal birth weight in developing countries,<sup>3</sup> consistent with present study where 54.2% (13/24) were term and 41.6% (10/24) were of normal birth weight.

LBW contributed 37.7% of total admission and 58.3% (14/24) of total mortality. So Low birth weight which has been a major contributing factor to neonatal morbidity and mortality especially in developing countries also consistent with the present study. Out of 14 LBW who died, 13 were less than 2 kg. Study of 770 newborn from Bangladesh showed birth weight less than 2 kg are at risk of early neonatal mortality, and more than 2 kg almost same risk or mortality as for normal birth weight.<sup>21</sup> Prematurity accounted for almost half (45.8%) of total death in this study which comparable to 52.8% and 43.2.% reported by other studies.<sup>16,19</sup>

Out of 24 death, Perinatal asphyxia was the cause of death in 11 cases (45.8%), it is higher than study in Nigeria (18%)<sup>19</sup> and Pakistan (23.3%).<sup>11</sup> The first days of life remain the most risky, with more than one third of deaths occurring on the first day, half in the first 2 days and three quarters in the first week of age.<sup>22</sup> In present study all of (24/284) death occurred during first week of life, 41.6%(10/24) within 24 hours of age, 75% (18/24) by 72 hours of age.

In developed countries most of neonatal death attributed to birth defect and extreme preterm low birth weight neonates, but in developing countries 98% of neonatal death due to perinatal asphyxia, prematurity, low birth weight and infection, it is 88% in Bangladesh.<sup>20</sup> Study showed low cost interventions with essential newborn care

training could reduce these major causes of death by 50%.<sup>23</sup>

### Conclusion

Major morbidities were perinatal asphyxia, low birth weight and prematurity. Most of them could have been prevented by good obstetric care and essential newborn care at birth and in immediate postnatal period.

### Recommendation

It is important for our country to focus and prioritising essential newborn care components, a low cost intervention to have a positive impact both on neonatal morbidity and mortality.

### Limitations

Single centre, hospital based study and short duration.

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