

Outcome of Preterm Babies and Associated Risk Factors in a Hospital

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ABSTRACT

Introduction: Preterm birth is a major problem associated with maximum perinatal mortality and morbidity in developed and developing countries. The aim of this study is to identify risk factors associated with preterm birth and to study morbidities and mortality.

Methods: A descriptive retrospective study was conducted on 164 cases of preterm babies admitted to Neonatal Intensive Care Unit from January, 2007 to December, 2009

Results: Incidence of preterm birth was 19.5%. Mean birth weight was 1670 ± 370 grams and mean gestational age was 30.02 ± 0.37 weeks. Common risk factor associated with preterm birth were inadequate antenatal checkup (52%), maternal age <20 years (34.7%), ante partum hemorrhage (23.4%) and pregnancy induced hypertension (13.1%). Common morbidities were clinical sepsis (66.7%), hyperbilirubinemia (58.8%), birth asphyxia (26.8%) and hyaline membrane disease (23.5%). Overall survival was 79.4% with minimum age of survival of 880 grams. The mortality rate in extremely low birth rate and very low birth rate was 80% and 39.5% respectively. The common causes of death were hyaline membrane disease (64.5%), sepsis (58.06%) and necrotizing enterocolitis (25.8%).

Conclusions: The main risk factors for preterm delivery were inadequate antenatal check up, maternal age <20 years, antepartum hemorrhage and pregnancy induced hypertension. The most common morbidity was clinical sepsis followed by hyperbilirubinemia. Common causes of death were hyaline membrane disease and sepsis.

Keywords: morbidity, mortality, preterm birth, risk factors

INTRODUCTION

Preterm birth is a major determinant of neonatal mortality, morbidity and childhood disability. Preterm birth is defined as gestational age at birth of less than 37 completed gestational weeks. It is further classified into three main categories- mild, very preterm and extremely preterm for birth occurring at 32-36 weeks, 28-31 weeks and less than 28 weeks.^{1,2} In 2005, World Health Organization³ (WHO) estimated 12.9 million

births, or 9.6% of all births worldwide were preterm. The etiology of preterm birth is multifactorial and involves a complex interaction between fetal, placental, uterine and maternal factors. The causes are fetal distress, multiple gestation, erythroblastosis, placental dysfunction, abruptio placenta, placenta previa, chronic medical illness, infection (listeria monocytogenes, group B streptococci and urinary tract infection).⁴

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The objective of this study was to find out the outcome of preterm babies and associated risk factors in a hospital.

METHODS

A descriptive retrospective study was conducted from January 2007 to 31st December 2009 in level III neonatal intensive care unit (NICU) of Dhulikhel Hospital, Kathmandu University Hospital. Institutional approval was taken for the study. Data were analyzed from the hospital medical records. All the inborn and out born preterm babies admitted to NICU were included into the study. There were total 164 cases of preterm babies admitted to NICU during the study period. Out of which 14(8.53%) cases had inadequate data hence was excluded from the study so the final analysis was done in 150 cases. The gestational age was assessed by using date of last menstrual period and confirmed by Modified Ballard Scoring⁵ method only if mother was not sure of her last menstrual period and antenatal ultrasound was not performed. A birth weight less than 10th percentile for gestational age was classified as small for gestational age (SGA).⁶ Inadequate antenatal check up (ANC) was defined as mother with less than three ANC visits to health care facilities. Blood sugar level <40 mg per deciliter was defined as hypoglycemia. Axillary temperature below 35.5°F was defined as severe hypothermia as per WHO Integrated Management of Childhood Illness guideline. The criteria for diagnosing the different clinical conditions are as follows: septicemia (clinical evidence of infection which was supported by leucocytosis, bandemia in peripheral blood smear, positive quantitative C- reactive protein, positive blood culture, hyaline membrane disease (clinical and radiological evidence after other causes of respiratory distress had been excluded); necrotizing enterocolitis (NEC) (based on the criteria of Bell's⁷); intraventricular hemorrhage (IVH) (by clinical finding of increasing pallor and bulging fontanelle, or lumbar puncture yielded uniformly blood stained cerebral spinal fluid).

However cranial ultrasound had not been performed routinely.

Patent ductus arteriosus (PDA) was diagnosed by appearance of sudden murmur and echocardiography was performed only in cases with strong suspicion and only when baby become stable, but echocardiography was not performed routinely in all cases. Statistical analysis was done by statistical package for social sciences (SPSS) version 10.0 for windows.

RESULTS

There were 838 admissions in NICU during the study period. Among them 164 were preterm giving an

incidence of 19.5%. In 14(8.53%) cases there were inadequate data hence were excluded from the study so the final analysis was done in 150 cases. Out of which 95(63.3%) were male and 55(36.6%) were female, the male female ratio of 1.72:1. Mean birth weight was 1670 ± 370 grams. Minimum weight of survival was 880 grams. Among the preterm babies 82(54.6%) were inborn and 68(45.4%) were outborn. Among outborn 58(38.7%) were home delivered and 10(6.7%) were delivered in other hospital. 106(70.7%) were born by normal vaginal delivery and 44(29.3%) were born by caesarian section. 111(74%) were appropriate for gestational age (AGA) and 39(26%) were SGA babies. The mean gestational age was 30.0 ± 0.37 weeks. Distribution of babies according to gestational age and weight are shown in table 1 and 2 respectively. Seventy two (52%) had inadequate ANC and 52(34.7%) of mothers belong to < 20yrs whereas 15(10%) were > 35yrs. The commonest obstetrical risk factor was antepartum hemorrhage (APH) followed by pregnancy induced hypertension (PIH), twin pregnancy comprising 35(23.3%), 20(13.3%) and 20(13.3%) respectively (Table 1-3).

Table 1. Distribution of preterm babies according to gestational age

Gestational age	No (%)
< 28 weeks	8 (5.4)
28-32 weeks	44 (29.3)
32-37 weeks	98 (65.3)

Table 2. Distribution of preterm babies according to weight

Weight	No (%)
< 1 kg	10 (6.7)
1-1.5 kg	43 (28.7)
> 1.5 kg	97 (64.7)

Table 3. Maternal risk factors for preterm birth.

Risk factors	No (%)
Inadequate ANC	72 (52)
Age < 20	52 (34.7)
APH	35 (23.4)
PIH	20 (13.3)
Twin pregnancy	20 (13.3)
Premature rupture of membrane	15 (10)
Age > 35	15 (10)
Urinary tract infection	5 (3.3)
Portal Hypertension	1 (0.7)
Polyhydramnios	1 (0.7)
Triplet	1 (0.7)

Clinical sepsis was found in 102(66.7%) and only 20(13.1%) had culture proven sepsis. Ninety (58.8%) had hyperbilirubinemia and managed with phototherapy only. Twenty (13.1%) of babies develop NEC.

Hyaline membrane disease (HMD) was seen in 36(23.5%). Mechanical Ventilation was required in 32(21.3%) where as 60(40%) of preterm were managed with oxygen only. Fifteen (9.8%) had meningitis however none of them grew organism in cerebral spinal fluid culture (Table 4).

Table 4. Morbidities of preterm babies.

Morbidity	No (%)
Clinical Sepsis	102 (66.7)
Hyperbilirubinemia	90 (58.8)
Birth Asphyxia	41 (26.8)
HMD	36 (23.5)
Culture Positive Sepsis	20 (13.1)
NEC	20 (13.1)
Hypothermia	20 (13.1)
Meningitis	15 (9.8)
Hypoglycemia	15 (9.8)
Hyponatremia	10 (6.5)
IVH	6 (3.9)
Hypocalcaemia	6 (3.9)
Apnea	5 (3.3)
Pulmonary Hemorrhage	5 (3.3)
Acute Renal Failure	4 (2.6)
Seizure	4 (2.6)
PDA	2 (1.3)
DIC	2 (1.3)
Congenital Ascites	1 (0.7)

Table 5. Mortality of preterm babies.

Variables	No (%)
< 1 kg	8 (80)
1-1.5 kg	17 (39.5)
> 1.5 kg	6 (6.18)
Inborn	9 (29)
Out born	22 (71)
SGA	19 (61.29)
AGA	12 (38.7)

Table 6. Causes of Mortality

Mortality	No (%)
HMD	20 (64.5)
Sepsis	18 (58.06)
NEC	8 (25.8)
DIC	5 (16.1)
Pneumonia	4 (12.9)
Pneumothorax	3 (9.6)
Neonatal Seizure	2 (6.45)
Shock	2 (6.45)
IVH	2 (6.45)

Mortality was observed in 31 cases (20.6%). The mortality rates in extremely low birth weight (ELBW) and very low birth weight (VLBW) was eight (80%) and 17(39.5%) respectively. Five cases left against medical advice after explaining poor prognosis. Out of expired cases nine (29%) were inborn and 22 cases (71%) out

born. Nineteen (61.29%) of the expired cases were SGA and 12(38.7%) were AGA. The commonest cause of mortality was HMD followed by sepsis comprising 20(64.5%) and 18(58.06%) respectively (Table 5, 6).

DISCUSSION

According to annual vital statistics in USA percentage preterm delivery is continuously rising from 11% in 1998 to 12.3% in 2003.⁸ Studies revealed incidence is higher in developing countries than in developed countries. The highest rates of preterm birth were in Africa and North America (11.9% and 10.6% of all births, respectively), and the lowest were in Europe (6.2%).³ Our incidence was 19.5% which was comparable to study done in India where incidence was found to be 20.9%.⁹

Analysis of non obstetrical risk factor revealed 52 % had inadequate ANC visit. Similar study conducted by Poudel¹⁰ in Eastern Nepal showed 95.7 % had inadequate ANC; hence ANC coverage is higher in our set up. The second factor was delivery in young age group (< 20 yrs) comprising 34.7%. Study conducted by Yadhav et al showed teenage mother had significantly increased incidence of delivery of preterm babies.¹¹

APH was seen in 23.3% which was the commonest obstetrical risk factor. The finding was similar to the study done by Poudel¹⁰ in which APH was seen in 28.6% but contradicting to our findings, study by Kayestha¹² in Nepal showed APH of 5.8% and study conducted in Lucknow (India) the commonest obstetrical risk factor was premature rupture of membrane (25.96%) followed by APH (13.4%).⁹ The common morbidity was clinical sepsis (66.7%) with culture proven sepsis of only 13.1%, similar to study in Eastern part of Nepal¹⁰ where clinical and culture proven sepsis was 77.1% and 15.7% respectively.

In developed countries with improvement of neonatal care facilities in recent years, septicemia is no longer a common cause of morbidity and mortality among VLBW neonates.^{13,14}

HMD (72.6%) was the commonest morbidity in study conducted in Malaysia¹⁵. NEC was seen in 13.1% which was higher than in other studies.^{10,15} The mortality and morbidity of VLBW varied from hospital to hospital and country to country reflecting the quality of antenatal, intrapartum and neonatal care.¹⁶ The overall survival rate in preterm birth was 79.4% and in ELBW and VLBW was 20% and 60.5% respectively. The relatively lower survival is reported from Malaysia¹⁵ (100% and 70.88% in ELBW and VLBW respectively).

In many developing countries, infants weighing less than 2000 g (corresponding to about 32 weeks of gestation in the absence of intrauterine growth retardation) have

little chance of survival. In contrast, the survival rate of infants born at 32 weeks in developed countries is similar to that of infants born at term.³ According to recent evidence from the United States, about 50% of infants born as early as 22–25 weeks of gestation may survive, and half of the survivors were without moderate to profound impairment at 18–22 months of age.^{17,18}

The favorable survival can be explained by improvement of neonatal care including increasing use of continuous positive airway pressure (CPAP) as a form of ventilation in practice, willingness, and ability of the care team in the NICU.¹⁹ In developing countries and areas where the availability of exogenous surfactant, NICU beds, mechanical ventilation, and equipment are limited, the survival of especially ELBW tends to be low.²⁰

A continuing audit of survival and outcome stratified by birth weight or gestational age should be encouraged in every hospital to reflect the quality of care. However, the authors preferred to use birth weight rather than gestational age because discrepancy between antenatal and postnatal assessment of gestational age existed.²¹ These measures have important role to decide a cutoff birth weight below which it may be advisable to offer the intensive care since birth when resources, facilities, and budgets are limited.²²

The commonest cause of mortality was HMD followed by sepsis which was similar to study conducted by Poudel.¹⁰ In another large population based study conducted in Malaysia¹⁵ the commonest cause of death in preterm was HMD followed by sepsis comprising 33.2% and 29.6 %. Evidence from both these studies showed that HMD is probably the most important cause of death in preterm neonates in developing countries.

In our study antenatal steroids was received only in 42% and exogenous surfactant was given only in one case because of financial constraints others couldn't afford surfactant even if indicated. This could be the cause of higher mortality due to HMD. Doyle²³ reported

the substantially higher survival and better prognosis of VLBW infants who had antenatal steroids.

Infants born out of the admitting hospital have previously been reported to suffer higher morbidity and mortality²⁴ while other study failed to confirm this.²⁵ SGA babies found to have higher mortality than AGA babies in our study.

Study conducted in Norway revealed fourfold increase in mortality in SGA than AGA preterm babies.²⁶ In our study, out born infants suffered higher mortality than in-born infants.

This could be a reflection of poor transfer facilities between hospital and adverse perinatal events in home delivered babies. However, reliability of these morbidity figures is limited because of the small sample size of the present study.

The limitation of our study is not able to assess non-obstetrical risk factors like socioeconomic status²⁷, maternal malnutrition²⁸, cigarette smoking²⁹, and direct abdominal trauma³⁰ as direct questions were not asked to mother.

Routine cranial ultrasound and echocardiography was not performed hence intracranial hemorrhage and congenital heart disease could be underdiagnosed which was our another limitation.

CONCLUSIONS

The commonest obstetrical risk factor for preterm was APH and nonobstetrical risk factor was inadequate ANC visit and teenage pregnancy hence increasing ANC visits to prevent complications, preventing teenage pregnancy; early diagnosis and treatment of APH are major steps to prevent preterm birth. The most common morbidity was clinical sepsis followed by hyperbilirubinemia. The major cause of mortality was HMD followed by sepsis.

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