

## Disease Profile and Outcome of Newborn Admitted to Neonatology Unit of BPKIHS

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### ABSTRACT

**Background & Objectives:** Neonatal period is a vulnerable time in which the newborn has to adapt to a totally new environment and is susceptible to many problems, which may even be life threatening. Every year, millions of neonates are born and a large proportion of them are admitted to the neonatal intensive care unit (NICU) for various indications. It is found that neonatal mortality rate is decreasing in Nepal but at a slower pace than infant and child mortality. In order to improve neonatal outcome, it is crucial to identify the areas where health care can be improved. Therefore, this study was conducted to identify the clinical profile, pattern of diseases and common causes of mortality and morbidity in neonates admitted to neonatology unit. **Materials & Methods:** A retrospective study was conducted at neonatology unit of BPKIHS, from January 2014 to December 2014. A total of 1009 neonates (both inborn and out-born) were admitted to neonatology division during the study period. Data was collected from the hospital record section. Ethical clearance was taken from the institutional ethical committee before the initiation of the study. Data was entered and descriptive analysis was done by using SPSS 20.0. **Results:** Total of 1009 neonates were admitted in neonatology unit. Among them, 349(34.5%) cases were admitted due neonatal sepsis, 236 (23.3%) due to prematurity and 233 (23.1%) with birth asphyxia. Among birth asphyxia, 102(43.7%) were in HIE III, 34.3% and 21.8% in HIE II and HIE I, respectively. The overall mortality was 47 (4.7%) during hospital stay. **Conclusion:** Sepsis, prematurity and birth asphyxia were major causes for admission in NICU. All these etiologies are preventable up to some extent and, if detected earlier, can be effectively treated in order to reduce morbidity and mortality.

**Key words:** Birth asphyxia; Neonatal mortality; Prematurity; Sepsis.

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### INTRODUCTION

Neonatal period (0-28 days of life) is a very vulnerable period of life and most diseases are preventable at neonatal period.<sup>1</sup> According to the WHO, out of 130 million babies born every year 4 million newborn die during neonatal period.<sup>2</sup> The neonatal disease pattern is a sensitive indicator of availability, utilization and effectiveness of mother and child health services in the community. The Nepal Demographic and Health Survey of 2011 found neonatal mortality rate of 33/1000 live births.<sup>3</sup>

The pattern of neonatal disease changes from time to time even at the same place.<sup>4</sup> According to a study done in Nepal, asphyxia is the leading cause of hospital admission (22%) followed by prematurity (20%) and sepsis (17%) with mortality due to these three causes being 7%, 3% and 5% respectively.<sup>5</sup> Sepsis, jaundice, birth asphyxia and pneumonia are the leading causes of mortality and morbidity and can be prevented by good obstetric and perinatal management.<sup>6</sup>

The objective of the study was to know the disease pattern of newborn in Nepal for better management

and outcome.

## MATERIALS AND METHODS

This was a retrospective study conducted at the Department of Pediatrics and Adolescent Medicine, BPKIHS Dharan, Nepal. Retrospective data of 2014 (January 2014 to December 2014) were recorded from medical record section of hospital. A total of 1009 neonates (both inborn and out-born) were admitted during this period and were included in the study. Neonatology division of BPKIHS has facilities of mechanical ventilation, arterial blood gas monitoring, central oxygen line, warmers, phototherapy, Bubble CPAP and multichannel patient monitor etc, which are needed for care of sick neonates. Data on age at admission, gender, gestational age, birth weight, initial presenting symptoms at admission, final diagnosis and outcome in regards to whether the newborn was discharged after completion of treatment, discharged on request, left against medical advice, referred or expired were collected. Cases whose data were not available were excluded. Diagnosis was mainly clinical with specific laboratory or radiological findings. Sepsis and meningitis were diagnosed on clinical grounds along with C-reactive protein (CRP), complete blood count (CBC), positive blood culture and cerebrospinal fluid (CSF) examination. Congenital heart disease was confirmed by Echocardiography.

Birth weight less than 2500 grams was defined as low birth weight<sup>7</sup> and any live born baby before 37 completed weeks was defined as premature.<sup>8</sup> Neonatal sepsis was classified as suspected and culture proven sepsis on the basis of clinical profile, septic screen and blood culture.<sup>9</sup> Diagnosis of perinatal asphyxia was based on the criteria set by the National Neonatology Forum of India and World Health Organization.<sup>10</sup> APGAR score at one minute of 0 to 3 and 4 to 7 signifies severe and moderate birth asphyxia respectively. Hypoxic ischemic encephalopathy was classified on the basis of Sarnat and Sarnat staging.<sup>11</sup> Ethical clearance was taken from the institutional ethical committee before the initiation of the study. Data was entered and analyzed using SPSS 20.0.

## RESULT

During the period of study, total of 1009 neonates were admitted to the Neonatology division. A total of 415(41.1%) babies were inborn and 594(58.8%) were outborn. Maximum numbers of babies were admitted through the emergency room or outpatient department. There were 679 males and 330 females. Majority of the babies (n=715; 70.8%) were term, 294 (29.1%) were preterm. Number of babies admitted on the first day of life was 561(55.5%); whereas 390 babies (38.6%) were admitted between second to seventh days of life. Similarly, 58 newborn(5.7%) were admitted on >7<sup>th</sup> day of life. The commonest indication for admission was neonatal sepsis (n=349; 34.5%) followed by prematurity (n=236; 23.3%) and perinatal asphyxia (n=233; 23.1%) (Table 1 and 2).

Table 1. Distribution of study subjects

Diseases	Number (%)	Total
Early onset sepsis	Pneumonia 42 (21.6%)	194 (19.2%)
	Septicemia 124 (63.9%)	
	Meningitis 28 (14.4%)	
Late onset Sepsis	Pneumonia 15 (9.6%)	155 (15.3%)
	Septicemia 74 (47.7%)	
	Meningitis 66 (42.5%)	
Prematurity	236 (23.3%)	236 (23.3%)
Birth asphyxia	HIE I 51 (21.8%)	233 (23.1%)
	HIE II 80 (34.3%)	
	HIE III 102 (43.7%)	
Meconium aspiration syndrome	66 (6.5%)	66 (6.5%)
Neonatal jaundice	60 (5.9%)	60 (5.9%)
Transient tachypnea of newborn	24 (2.3%)	24 (2.3%)
Congenital anomalies, birth defects and syndromes		41 (4.06%)
<b>Total</b>		<b>1009 (100%)</b>

**Table 2.** Congenital anomalies, birth defects and syndromes

Congenital anomalies, birth defects and syndromes	Number (%)
Duodenal atresia	2 (0.1%)
Congenital heart disease	14 (1.3%)
VACTERL anomalies	4 (0.39%)
Tracheo-esophageal fistula	7 (0.69%)
Congenital hydrocephalus	4 (0.39%)
Choanal atresia	1 (0.09%)
Congenital mesenteric cyst	1 (0.09%)
Situs inversus	1 (0.09%)
Brachial plexus injury	1 (0.09%)
Down syndrome	2 (0.1%)
Goldenhar syndrome	1 (0.09%)
Cleft lip and palate	2 (0.1%)
Macrosomia	1 (0.09%)
<b>Total</b>	<b>41 (4.06%)</b>

Among 1009 newborn, 68 babies (6.7%) required mechanical ventilation, 110(10.9%) were on bubble CPAP and 27(2.6%) went for double volume exchange transfusion (Table 3).

Positive blood cultures were identified from 166 (16.4%) newborn babies. Among 1009 newborn, 59.03%, 7.22% and 19.27% had Staphylococcus aureus, Klebsiella and Acinetobacter respectively (Table 4). Among 1009 newborns, 486(48%) were discharged within 2-5 days of admission. A total of 264 (26%) stayed for six to 10 days, 102 (10%) each for 10 to 14 and more than 14 days and 57 (6%) for less than a day. 814 babies (80.6%) were discharged after improvement, 107(10.6%) left

**Table 3.** Intervention performed in study subjects

Procedures	n = 1009
Bubble CPAP	110 (10.9%)
Double volume exchange transfusion	27 (2.6%)
Mechanical ventilation	68 (6.7%)
Blood transfusion	102 (10.1%)
Phototherapy	78 (7.7%)
Laparotomy	3 (0.3%)
Lumbar puncture	205 (20.3%)
Procedure not required	416 (41.22%)
<b>Total</b>	<b>1009 (100%)</b>

**Table 4.** Distribution of organisms grown on blood culture

Organisms	n = 166
Methicillin resistant Staphylococcus aureus	98 (59.03%)
Klebsiella pneumoniae	12 (7.22%)
Acinetobacter species	32 (19.27%)
Citrobacter koseri	2 (1.2%)
Enterococcus species	14 (8.43%)
Coagulase negative staphylococcus	8 (4.81%)

**Table 5.** Outcome distribution

Outcome	n = 1009
Improved	814 (80.6%)
LAMA	107 (10.6%)
Mortality	47 (4.6%)
Referred	26 (2.5%)
Discharge against advices	15 (1.5%)

against medical advice, 26(2.5%) babies were referred to higher centers for surgical interventions and there were 47 (4.6%) mortalities. Commonest causes for mortality were hyaline membrane disease 12 (25%) and hypoxic ischemic encephalopathy 10 (20%) and Sepsis 10 (20%) (Table 5).

## DISCUSSION

BPKIHS is a tertiary-care and teaching hospital at Eastern region of Nepal. Many neonates are admitted in later stage of the disease or complicated by their illnesses.

Total 1009 newborns were admitted in neonatology division during study period. Males were predominant in our study, which was similar to other studies.<sup>12,13</sup> Males get more attention on part of caregivers and are brought to the hospital for seeking health services. In the present study, most of our admissions (55.5%) occurred during the first 24 hours of life. This was similar to a study done in Nepal, which found the 44.5% of admissions occurred during the first 24 hours of life<sup>14</sup>. This emphasizes the fact that most of the neonatal problems present within the first day of life, during which early detection and intervention is crucial.

Sepsis accounted for about one-third cases requiring admission in our NICU. Jan et al. also reported a high incidence (41.3%) of neonatal sepsis.<sup>12</sup> However, lower incidences (6.4-10.5%) were reported by other authors in their studies.<sup>13,15</sup> Early and late onset sepsis were accounted almost equal in our study. Risk factors for neonatal sepsis during antenatal, intrapartum and postnatal period are equally important and should be taken into consideration for its prevention.

Prematurity was the next common cause (23.3%) for admission, which was similar to the study reported from South Africa.<sup>16</sup> In contrast, much higher incidence (34.6- 48.2%) has been reported from other neighboring countries.<sup>13,17</sup> Preterm neonates really require very close attention and advanced care because of their inherent problems and complications. Preventive aspects should be taken into consideration for the betterment of newborn.

Birth asphyxia (23.1%) accounted for the third most common cause of admissions to our unit. The incidence is almost similar to the study conducted by Butt et al.<sup>18</sup> and much lower than reported from South Africa.<sup>19</sup> Thus occurrence of high incidence of severe birth asphyxia indicate that, the level of neonatal care existing in our health sector especially in the community is not appropriate. So adequate attention is to be paid in training of health workers that can effectively reduce the incidence as well as its severity and decrease the load of NICU admissions at tertiary care level.

Neonatal hyperbilirubinemia is the common cause of admissions in NICU and it accounts for 5.9% of admissions. Much higher incidences (36.2-54%) have been reported in other studies.<sup>18,20,21</sup> Cases of neonatal hyperbilirubinemia were mainly admitted for exchange transfusion and phototherapy. However, these could have been curtailed by early detection, bilirubin monitoring and effective phototherapy. Congenital anomalies like jejunal atresia, anal atresia, and tracheo-esophageal fistula required surgical interventions. Rests were minor malformations and had accompanying features with some other illnesses requiring therapy. Methicillin resistant *Staphylococcus aureus* was detected in 59.03% of cases followed by *Pseudomonas* species, *Klebsiella pneumonia*, *Enterococcus* and

*Acinetobacter*. Other authors reported *Staphylococcus aureus*, Coagulase Negative *Staphylococcus* (CoNS) and *Klebsiella pneumoniae* as the three predominant pathogens in their studies. However, they did not mention regarding methicillin resistance in *Staphylococcal* isolates.<sup>22,23</sup> Overall mortality observed was 4.6%. Mortality is low in our setup but in contrast, rate of LAMA (leave against medical advice) is high. Other studies have reported higher mortality rates (25.8-34%) but Jan et al.<sup>26</sup> found much lower mortality (8.3%) in their audit report.<sup>24,25</sup> The mortality depends upon the stage of the disease and facilities available in a particular NICU. Moreover, attempt should be made to keep it as low as possible.

## CONCLUSION

Infection was the leading cause of admission into the neonatal care unit, followed by prematurity and birth asphyxia. Neonatal sepsis is the leading cause of morbidity and mortality in our part of world. This study was done to know the disease pattern among newborn which is important for good neonatal care and development of preventive strategies. Majority of the admissions occurred within the first 24 hours of life. Therefore to improve neonatal outcome, it is imperative to be vigilant especially during the first 24 hours of life. Progress is possible, but only if we manage to prevent or detect and treat problems as early as possible, which can be achieved by public awareness, training of manpower and procurement of necessary equipments and also by improving antenatal care of pregnant women, timely interventions of high risk pregnancies.

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