

Prevalence and Outcome of Admission of Preterm Neonates: A Hospital Based Study at the Tertiary Care Center in Rural Nepal

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ABSTRACT

Background: Preterm births are one of the leading causes of perinatal mortality and morbidity despite of recent advances. It causes long-term medical problem for affected children, the financial burden for their families as well as the health care system of country. The objective and aim of the present study was to identify prevalence and outcome of preterm admissions attending a tertiary care centre in rural Nepal, Jumla.

Methods: A retrospective study was carried out on 52 preterm births which were admitted at the Neonatal Intensive Care Unit (NICU) and Special Newborn Care Unit (SNCU) of the Karnali Academy of Health Sciences (KAHS), Jumla from January 2020 to December 2020. This study was carried out from March 2021 to July 2021 for 5 months. All the data were recorded and then analyzed using Statistical Package for Social Sciences (SPSS) version 16. P-value <0.05 was considered statistically significant.

Results: Preterm admissions constituted 19.4% of all admissions i.e 52 out of 268 cases at the NICU of KAHS. The mean birth weight and mean gestational age were 1730 ± 378 grams and 33.3 ± 2.13 weeks respectively. The most common cause for hospital admission was sepsis (34.62 %) followed by perinatal asphyxia (15.39%) and neonatal jaundice (13.47%). Premature rupture of membrane (28.8%) was the most common risk factor of preterm delivery followed by hypertensive disorders of pregnancy (15.3%) and teenage pregnancy (11.5%) in our study. Mortality was observed in 10 (19.2%) cases.

Conclusion: Prematurity is still one of the important and main cause for admissions in intensive care unit. Identification of at risk pregnancy, early detection and treatment of medical diseases, improving pregnant women's health care quality may decrease the rate of preterm birth.

Keywords: preterm, prevalence, mortality, outcome

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INTRODUCTION

According to World Health Organization (WHO), prematurity is defined as gestational age less than 37 completed weeks measured from the first day of the last normal menstrual period.¹ It is classified into 3 categories, namely mild preterm (birth occurring at 32-36 weeks), very preterm (28-31 weeks), and extremely preterm (less than 28 weeks).² Prematurity is included as a major determinant of neonatal morbidity and mortality causing long term adverse health conditions.³ Studies suggest that infants born preterm compared to term infants experience more feeding problems, difficulty in thermoregulation, sepsis, blood glucose control, jaundice, apnea and respiratory distress that may present either singly or in combination.⁴ Causes for prematurity are multifactorial.⁵ Many factors that may cause preterm births include, multiple pregnancy, premature rupture of membrane (PROM), uterine malformation, placenta previa, uteroplacental insufficiency, grand multiparity, teenage pregnancy, intrauterine vascular lesions, cervical incompetence, and chorioamnionitis.^{6,7}

Of the 4 million annual new born deaths worldwide, preterm deaths constitute 28% with 99% of these deaths occurring in developing countries like Nepal.⁸ Data collected by USAID in 2015 showed that in Nepal, 81,000 preterm babies are born in a year and out of them, 4,300 children of age less than five years die due to complications of prematurity.⁹

During the last twenty to thirty years, survival of premature infants have improved due to recent advances in the perinatal care and support, increased availability and use of postnatal surfactant therapy, antenatal

corticosteroids use in pregnant mother who are likely to deliver preterm and easy availability of modern ventilatory machines and techniques. But still there are more neonatal morbidity and mortality due to low birth weight and short gestational age.¹⁰ Similarly, preterm infants have prolonged stay in the neonatal intensive care units so as to allow sufficient and increased maturation of lungs and other organs that will help them survive independently.¹¹

Very few or limited studies have been conducted in our country, especially in rural setting, to find out prevalence and outcome of preterm admissions. Hence, this study aims to determine the prevalence and outcome of preterm admissions as well as to identify possible risk factors for preterm births. Data from this study will be utilized and this will help in giving advises to the management team of hospital in undertaking different measures and plans that will help increase survival of this vulnerable group.

MATERIALS AND METHOD

This retrospective study was carried out at the Neonatal Intensive Care Unit (NICU) and Special Newborn Care Unit (SNCU) of the Karnali Academy of Health Sciences (KAHS), Jumla. KAHS is a tertiary care center located in Karnali Province, which has the 6 bedded NICU located in the most rural and at highest altitude in whole Nepal which cares the babies born in around 13 neighbouring districts along with Jumla. It has 4 ventilators, 6 radiant warmer beds, 6 incubators and 5 phototherapy machines, managed by 6 consultant pediatricians, 1 resident, 3 medical officers and efficient nursing team.

This study was carried out from March 2021 to July 2021 for 5 months. Data of all

preterm births from January 2020 to December 2020 admitted in NICU were retrieved from preterm neonates' admission records from NICU, maternity ward and monthly audit. We received ethical approval from Institutional Review Committee (IRC) of KAHS (ref no: 077/078/019) before commencing this study.

Neonates admitted in NICU with gestational age less than 37 weeks were included as the study population. Term as well as post term neonates were excluded. Details such as age of gestation, birth weight, place of delivery, morbidity and mortality pattern in preterm were reviewed. Maternal risk factors leading to preterm labor such as preterm premature rupture of membrane (PROM), pregnancy-induced hypertension, maternal febrile illness, antepartum hemorrhage (APH), fetal distress, multiple pregnancy, polyhydromnias, oligohydromnias, gestational diabetic mellitus, teenage pregnancy and chorioamnionitis were analyzed.

Data was entered onto a spreadsheet and presented as means and percentages in tabular form. It was then analyzed using Statistical Package for Social Sciences (SPSS) version 16. Chi-square test was used to test for significance of the differences between categorical variables. p -value <0.05 was considered significant.

RESULTS

During the study period, 268 cases got admitted to NICU and SNCU. Among them 52 were preterm giving 19.4 % of total. Out of which males were 32 (61.5%) and females were 20 (38.5%) with male to female ratio being 1.6:1. Mean birth weight was 1730 ± 378 grams.

Among all preterm neonates, 38 (73.07%) have birth weight between 1500 and 2500 grams followed by 11 (21.15%) neonates with birth weight between 1000 and 1500 grams (Table 1).

Mean gestational age was 33.3 ± 2.13 weeks. Of total 52 neonates, 45 (86.53%) were mild preterm, 6 (11.53%) were very preterm and 1 (1.92%) was extremely preterm.

Table 1: Distribution of preterm neonates by birth weight

Birth Weight (in Grams)	Frequency (n=52)	Percentage
<1000	1	1.92
1000 -1500	11	21.15
1500-2500	38	73.07
>2500	2	3.86

Similarly, among the preterm babies 44 (84.6%) were inborn and 8 (15.4%) were out born. Out of 8 out born 5 (62.5%) were delivered in other health facilities and 3(37.5%) were home delivered.

Sepsis was present in 34.62 % cases in this study followed by perinatal asphyxia and neonatal jaundice which constituted 15.39% and 13.47 % cases respectively as elicited in Table 2. Though there are multiple diagnoses, only the primary disease was taken in our study as morbidity factor that is also similar to other studies. Case fatality rate was found to be highest in pulmonary hemorrhage followed by RDS.

Mortality was observed in 10 (19.2%) cases. It was 100% in preterm neonates with gestational age less than 28 weeks. Mortality in preterm neonates with gestational age between 28 to 31 weeks and 32-36 weeks were 50% and 13.3% respectively. Outcome was significantly related to birth weight ($p = 0.00003$), and gestational age ($p = 0.022$) but not to gender ($p = 0.54$) and place of delivery ($p = 0.15$) as illustrated in Table no

3. In this study, the most common maternal risk factors for prematurity were premature rupture of membrane 15 (28.8%), hypertensive disorders of pregnancy 8 (15.3%), and teenage pregnancy 6 (11.5%) as shown in Table no 4.

Table 2: Morbidity and Mortality Patterns in Preterm Neonates (n=52)

Morbidity	Frequency	Percentage (%)	Mortality	Case fatality rate
Sepsis	18	34.62	2	11.12
Perinatal asphyxia	8	15.39	3	37.50
Neonatal jaundice	7	13.47	0	0.00
Respiratory Distress syndrome (RDS)	6	11.53	3	50.00
Hypothermia	3	5.76	0	0.00
Hypoglycemia	2	3.84	0	0.00
Neonatal Seizure	2	3.84	0	0.00
Congenital Heart Disease (CHD)	2	3.84	0	0.00
Pulmonary Hemorrhage	2	3.84	2	100.00
Hypocalcemia	1	1.92	0	0.00
Meconium Aspiration Syndrome (MAS)	1	1.92	0	0.00

Table 3: Outcome of preterm neonates (n=52)

Variables	Number	Discharge	Mortality	Chi- square value	p-value
Sex					
Male	32	25	7	0.375	0.54
Female	20	17	3		
Total	52	42	10		
Gestational age					
<28 weeks	1	0	1	7.6	0.022*
28 -31 weeks	6	4	3		
32 – 36 weeks	45	38	6		
Total	52	42	10		
Birth weight (in gram)					
<1000	1	0	1	23.41	<0.001*
1000-1500	11	4	7		
1500-2500	38	36	2		
>2500	2	2	0		
Total	52	42	10		
Place of delivery					
Inborn	44	37	7	2.03	0.15
Outborn	8	5	3		
Total	52	42	10		

* significant relation

Table 4: Maternal Risk Factors for Preterm Delivery (n=52)

Maternal risk factors	Frequency(n=52)	Percentage (%)
Premature rupture of membrane (PROM)	15	28.8
Hypertensive disorders in pregnancy	8	15.3
Teenage pregnancy	6	11.5
Idiopathic	6	11.5
Ante partum hemorrhage (APH)	4	7.7
Multiple pregnancy	4	7.7
Maternal febrile illness	3	5.8
Previous preterm delivery	2	3.8
Maternal chorioamnionitis	2	3.8
Previous cesarean section	2	3.8

DISCUSSION

Prematurity becomes one of the major health challenge contributing to substantial neuro-cognitive, pulmonary and ophthalmologic morbidity and leading to infant mortality.^{12,13} It is one of the causes for NICU admissions.¹⁴ Studies have shown that rate of preterm birth are higher in developing countries of Africa and Asia than in developed countries.¹⁵

Of all admissions at the Neonatal intensive care unit of Karnali Academy of Health Sciences, preterm admissions included 19.4% as shown by the present study. This rate is expectedly high because the study center is a tertiary center with referrals from 13 nearby districts. This finding is in agreement with the study done by Kunle et al.¹⁶ in Nigeria where preterm admissions were 24%. Another study done by Paudel et al.¹⁴ found 16.4% of total preterm admission. Singh U et al.¹⁷ and Satija A et al.¹⁸ reported a prevalence of preterm admission of 20.9% and 20.4% respectively. However, Onwuanaku et al.¹⁹ reported preterm birth prevalence of 31.3% in Jos University Teaching Hospital, North Central Nigeria. There were more preterm males than females in the present study with male to female ratio of 1.6:1. Comparable finding was

observed in a study performed by Kunle et al.¹⁶ and Paudel et al.¹⁴ who reported male to female ratio of 1.1:1 and 1.32:1 respectively. The reason behind this could be due to the fact that parents are more anxious and are of more health seeking behaviour when it comes to be for a male baby as compared to female. But McGilUgwu et al.²⁰ in Warri and Zeleke et al.²¹ in Ethiopia reported preterm females more than males.

In our study, 38 (73.07%) preterm neonates have birth weight between 1500-2500 grams followed by 11 (21.15%) neonates with birth weight between 1000 and 1500 grams. Similar observations were found in a done by Shrestha et al.²² at Dhulikhel Hospital in Nepal where 64.5% preterm neonates have birth weight more than 1500 gram. Mohamed et al.²³ also have similar percentage of preterm admission in their study. Mean Birth weight was found to be 1730 ± 378 grams which was similar to the study performed by Shrestha et al.²² and Paudel et al.¹² Out of 52 preterm neonates, 45 (86.53%) were mild Preterm (32 – 36 completed weeks). It was as similar to the study done by Mohamed et al.²¹ in Egypt. But it was quite less than that of the study performed by Shrestha et al.²² where mild preterm were 65.3%. In the current study, sepsis was the main cause for hospital

admission followed by perinatal asphyxia and neonatal jaundice. This was comparable to the study done by Paudel et al.¹⁴ and Shrestha et al.²² where they reported the commonest cause of morbidities in their preterm infants as sepsis and jaundice. Neonatal jaundice followed by RDS and sepsis was the commonest cause for morbidity in study performed by Chauhan et al.²⁴ and Khan et al.²⁵ This might be due to various causes including poor and immature immune system of preterm babies, poor personal hygiene and home deliveries mostly done under aseptic techniques leading to exposure to sources of infections. This indicates the importance of infection prevention and control in management and treatment of preterm neonates. Mortality was observed in 10 (19.2%) cases which mean survival rate was 80.8%. In present study, maximum neonatal mortality (100%) was seen in those neonates with gestational age less than 28 weeks whereas mortality in preterm neonates with gestational age 28-31 weeks and 32-36 weeks were 33.3% and 15.5% respectively. This indicated that mortality rate increased with decreasing gestational age in our study. Venkat S et al.²⁶ and Singh et al.¹⁷ reported overall mortality of 18.18% and 12.7% respectively among preterm births with more mortality among neonates born before 32 weeks of gestation. This highlights that gestational age is one of the significant factors of preterm mortality. Our study shows that the most common maternal risk factor of preterm delivery was premature rupture of membrane (28.8%) followed by hypertensive disorders of pregnancy (15.3%) and teenage pregnancy (11.5%). This is similar to findings

in the study conducted by Kuppusamy et al.²⁷ and Singh et al.¹⁷ where they concluded premature rupture of membrane as the major risk factor for prematurity. Von der Pool et al.²⁸ also reported that rupture of membrane was present in around 30% preterm births. Hypertensive disorders in pregnancy are also one of the main causes for the prematurity. Similar Findings were also found in a study by Shrestha S et al.²² Our study also showed that teenage mother has increased risk of preterm delivery. This finding was similar to the study done by Yadav et al.²⁹

CONCLUSION

Prematurity or preterm birth is one of the significant causes for admissions of neonates at intensive care unit. They are not only associated with high morbidity and mortality but also require early and prolonged hospitalization leading to great psychological as well as economical problem to family and also to whole health care system of country. Prolonged premature rupture of membrane, hypertensive disorders in pregnancy and teenage pregnancy are some of the risk factors of preterm birth. The rate of preterm birth may be decreased by identifying at risk pregnant women, promoting quality healthcare, proper antenatal care, early diagnosis and management of medical disorders of pregnancy.

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