

# Risk Factors and Clinical Profile of Preterm Deliveries at Dhulikhel Hospital, Kathmandu University Hospital

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## ABSTRACT

### Background

Preterm delivery is one of the major determinants of neonatal morbidity and mortality and has long term adverse health outcomes.

### Objective

To study the risk factors of preterm deliveries and the clinical profile of preterm births presenting to a tertiary center in Kavre district.

### Method

A hospital based prospective study was carried out in the Department of Pediatrics and Department of Obstetrics and Gynaecology, Dhulikhel Hospital, Kavre from 1<sup>st</sup> April 2016 to 31<sup>st</sup> October 2017.

### Result

Study included 152 babies born premature and attending Dhulikhel Hospital. There were 5.26% babies less than 1000 grams and the least weight being 700 grams. Majority of the premature babies were male (57.24%). Most of the babies were in the gestational age of 28 to 32 weeks (60%). Steroids were given to 42.10% of the cases. Mode of delivery was vaginal route (60.53%) followed by cesarean section in 37.50%. Hyperbilirubinemia (53.29%), neonatal sepsis (46.05%) and respiratory distress syndrome (43.42%) were the commonest morbid conditions. Among the 152 cases, mortality was seen in 13.82%. The minimum weight to have survived was 900 grams. The most common modifiable risk factors responsible for preterm birth in mother were inadequate antenatal visits (29.60%), history of premature rupture of membranes (28.29%), history of urinary tract infection (21.05%) and weight less than 45 kg (14.47%). The non modifiable risk factors were mothers with blood group A (33.55%) and height of less than 145 cm (20.40%).

### Conclusion

The modifiable risk factors such as inadequate antenatal visits, history of premature rupture of the membranes and urinary tract infection and under weighing mothers can be corrected by early interventions and preventive measures which will help in reducing perinatal morbidity and mortality.

## KEY WORDS

Morbidity, Preterm, Prevention, Risk factors

## INTRODUCTION

The WHO defines preterm birth as any birth before 37 completed weeks of gestation, or fewer than 259 days since the first day of the women's last menstrual period (LMP) and this can be further subdivided on the basis of gestational age: extremely preterm (<28 weeks), very preterm (28-32 weeks), and moderate or late preterm (32-37 completed weeks of gestation).<sup>1</sup> Complications of preterm birth are the single largest direct cause of neonatal deaths, responsible for 35% of the world's 3.1 million deaths a year, and the second most common cause of under-5 deaths after pneumonia. In almost all developing countries of the world, preterm birth is the leading cause of child death.<sup>2</sup>

Adaptation to the extra uterine life is difficult for the preterm babies and immaturity of their body systems lead to problems as these premature babies are prone to respiratory distress syndrome, hyperbilirubnemia, inadequate thermal regulation, necrotizing enterocolitis which increases their mortality and morbidity. In comparison to children born at term, preterm infants face to higher risk of several disabilities including neuro-developmental impairments, gastrointestinal complications, cerebral palsy, sensory deficits, learning disabilities, and respiratory illness.<sup>3</sup> However, some of these early births and a majority of the resulting deaths can be prevented with proven, low cost interventions.

Approximately 45-50% of preterm births are idiopathic, 30% are related to preterm rupture of membranes (PROM) and another 15-20% are attributed to medically indicated or elective preterm deliveries.<sup>4,5</sup> Infant mortality and morbidity from preterm birth can be reduced through interventions delivered to the mother before or during pregnancy, and to the preterm infant after birth.<sup>6</sup>

This study is carried out to identify at-risk women and risk factors for preterm birth which is essential for targeting of the services and commencement of risk-specific interventions and/or preventive measures.

## METHODS

This prospective longitudinal study was carried out in the Department of Paediatrics and Obstetrics and Gynecology at Dhulikhel Hospital, Kavre. It was conducted on 152 women and their baby and the study duration was nineteen months, from 1<sup>st</sup> April 2016 to 31<sup>st</sup> October 2017. The study group consisted of women giving birth to preterm babies and those women who delivered outside and babies were admitted in this hospital with diagnosis of prematurity.

The data was collected by interviewing the mothers and observing medical records of the newborn and the questionnaire was filled by the principal investigator. The study was conducted after obtaining approval from the Institutional Review Committee. Written consent was

taken from the parents after explaining the study in simple and understandable language.

The following variables were evaluated: parity, age at the time of conception (young age is maternal age <19 years and advanced maternal age is >35 years), maternal weight and height, antenatal visits, previous abortion, prior preterm delivery, interpregnancy interval, chorioamnionitis, premature rupture of membranes, urinary tract infection, polyhydramnios (defined as amniotic fluid index [AFI] of more than 25 cm) and oligohydramnios (AFI of less than 5 cm).<sup>7,8</sup>

The current WHO recommendation is that each woman receives a minimum of four goal-oriented or focused ANC visits for low risk deliveries, to be supervised or attended by a skilled ANC attendant.<sup>9</sup> The timing of the first visit should be before 16 weeks of pregnancy, the second visit should be between 24 and 26 weeks, the third visit between 30 and 32 weeks, and the fourth visit between 36 and 38 weeks.<sup>10</sup>

In the natal period, gestational age was assessed using date of last menstrual period and confirmed by Modified Ballard Score method. Place and mode of delivery, birth weight, APGAR scores, any congenital anomalies were noted. Birth weight less than 10<sup>th</sup> percentile for gestational age was classified as small for gestational age.<sup>11</sup> In cases of NICU admission, morbidities were observed and managed accordingly, duration of antibiotics and outcome of the cases were noted.

All the data were entered in Microsoft excel and analyzed by SPSS version 16.

## RESULTS

The preterm babies are mostly male where the male to female ratio is 1.33:1. Among the 152 cases, 132 (86.85%) were inborn and 20 (13.15%) were out born. The outborn babies were either delivered in health post (8.55%), home (2.63%) or inside the ambulance (1.97%). The delivery was vaginally in 92 (60.53%), lower segment cesarean section 57 (37.50%), instrumental delivery 2 (1.32%) and vaginal birth after cesarean in 1 (0.65%) case. The most common presentation was vertex 119 (78.30%) followed by breech 27 (17.75%) and 6 (3.95%) cases had transverse presentation.

Out of the 8 cases less than 1000 gms, the smallest weight was 700 grams and the least weight to have survived was 900 grams. Steroids was given to 64 (42.10%) before delivery. Among them 26 (40.62%) received a single dose of steroids and 38 (59.38%) received two doses which was given 12 hours apart. Congenital anomalies was seen in 8 (5.26%) of cases which included tracheoesophageal fistula, cleft lip, cleft palate, club foot, gastrochiasis, aqueductal stenosis and appendages on the upper limbs. NICU admission was needed in 122 (80.26%) for low birth weight

**Table 1. Distribution of preterm babies on the basis of gestational age, gender and birth weight**

Gestation	Number	Percentage
<28 weeks	2	1.31
28-32 weeks	85	55.92
32-37 weeks	65	42.77
<b>Gender</b>		
Male	87	57.24
Female	65	42.76
<b>Birth Weight</b>		
<1000 grams	8	5.26
1000-1500 grams	40	26.32
1501-2500 grams	103	67.76
>2500 grams	1	0.66

or to manage the complications. Rest 30 (19.74%) were managed in the neonatal ward in Department of Pediatrics or mother side in Obstetrics department.

These comorbid conditions mentioned in table 2 may have occurred alone or in combination with each other. Hyperbilirubinemia (53.29%) was the most common complication noted and phototherapy was given to all these cases. Diagnosis of neonatal sepsis (46.05%) was made both clinically or on the basis of laboratory report and antibiotics was given accordingly. Prophylactic CPAP was started in most of the cases with respiratory distress syndrome (43.42%). The diagnosis of RDS was made clinically and radiologically. Surfactant was given in only two cases because of the financial constraint.

**Table 2. Comorbidities seen in preterm babies during hospital stay**

	Number	%
Hyperbilirubinemia	81	53.29
Neonatal Sepsis	70	46.05
Respiratory distress syndrome	66	43.42
Necrotising enterocolitis	28	18.42
Asphyxia	27	17.77
Apnoea	15	9.87
Seizure	9	5.92
DIC	8	5.26
Congenital Heart Disease	5	3.29
Shock	4	2.63
Intraventricular Hemorrhage	3	1.97
Pneumonia	2	1.31
Hypothermia	2	1.31

Oxygen requirement was needed in 57 (37.15%) cases. Oxygen was also used as a weaning mode from ventilator and CPAP. Among the 26 (17.10%) ventilated cases, 7 (26.92%) were able to survive, 8 (30.77%) left against

medical advice and remaining 11 (42.31%) expired. Septic screening was sent only if required and if consent was given by the parents. It was found to be abnormal in 37.5% of the cases. Antibiotics was not mandatory to all and was started only if clinical features of sepsis was noted or any risk factor in mother was found. The antibiotic was given as per the hospital protocol. Duration of treatment was decided by the improvement in the clinical condition and laboratory results. In 42 (27.63%) multiple antibiotics was required and were upgraded depending upon the deterioration in their conditions.

**Table 3. Outcome of preterm babies**

	Number	%
Discharge	95	62.50%
LAMA	36	23.68%
Expired	21	%

From the above table 3, it is noted that among the 152 cases, 95 (62.50%) cases got discharged from the hospital after completion of antibiotics and adequate weight gain. It was also seen that mothers were confident enough to take care of their babies. Kangaroo mother care was recommended for the routine care of newborns weighing 2000 g or less at birth and it was initiated in the hospital as soon as the newborns were clinically stable. Multivitamin and calcium supplement was given to all and advised to continue till 40 corrected gestational age. After explaining the poor prognosis, 36 (23.68%) left against medical advice and mortality was seen in 21 (13.82%). The most common causes of mortality were sepsis, hyaline membrane disease, seizure, shock, DIC and necrotizing enterocolitis.

**Table 4. Risk factors in mother for preterm delivery**

	Number	%
Mother with blood group 'A'	51	33.55
Irregular visits	45	29.60
History of PROM	43	28.29
Pregnancy interval < 5 years	38	25.00
History of urinary tract infection	32	21.05
Height < 145 cm	31	20.40
History of Abortion	30	19.73
Weight < 45 kg	22	14.47
Age < 19 years	17	11.18
Systemic Illness	15	9.87
Previous preterm delivery	12	7.89
Twins	12	7.89
Oligohydraminos	11	7.24
Antepartum Hemorrhage	9	5.92
Preeclampsia	8	5.26
Fever in last 2 weeks	6	3.95
Age >35 years	4	2.63
Triplets	2	1.31
Polyhydraminos	2	1.31

Most of the mothers giving birth to preterm babies were multigravida 85 (55.93%) where the gravida ranged from 2<sup>nd</sup> to 8<sup>th</sup> order. The most common risk factors for preterm delivery were mother with blood group A (33.55%), irregular antenatal visits (29.60%), history of premature rupture of membrane for 24 hours to 4 days (28.29%), the pregnancy interval being less than 5 years (25.00%), history of urinary tract infection which was diagnosed on the basis of laboratory results (21.05%), height of the mother <145 cm (20.40%) and history of abortion in 19.73%. There were 22 (73.33%) mothers who had abortion once, 7 (23.33%) had twice and 1 (3.34%) mother had four abortions previously. Weight of the mother less than 45 kg in 22 (14.47%) cases and mother who had previous preterm delivery 12 (7.90%) were other risks for preterm births.

## DISCUSSION

This study presents the risk factors and clinical profile of preterm births from prospectively collected data. Multiple gestation was one risk for preterm deliveries in our study. This may be related to uterine distension, increased intrauterine volume, or related complications such as cervical incompetence. In particular, higher circulating levels of relaxin associated with superovulation may cause cervical insufficiency, with subsequent preterm birth.<sup>11</sup>

According to the WHO, at least four antenatal visits is recommended during pregnancy. In our study, inadequate antenatal visits were highly associated with preterm births. Ndiaye et al. and Prazuck et al. also noted that having less than 4 antenatal visits significantly increases the risk for prematurity.<sup>12,13</sup> Another study by Chiabi et al. showed that the number of antenatal visits was associated with higher odds of premature births.<sup>14</sup> Adequate antenatal checkup is important in order to ensure quality follow-up and early detection of high risk pregnancies. Insufficient monitoring of pregnancies in developing countries appears to result from the lack of an efficient health care system for perinatal care and a very unfavorable social environment.

Preterm premature rupture of membranes is associated with increased rates of neonatal and maternal morbidity and mortality and is one of the significant causes of preterm delivery. In our study, one of the risk factor for preterm birth was premature rupture of membranes. A decrease in the collagen content of the membranes has been suggested to predispose patients to preterm PROM.<sup>15</sup> In a study by Khan et al. the result revealed that the poor fetal outcome in women with preterm premature rupture of membranes was associated with a gestation age of less than 34 weeks and an extremely low birth weight.<sup>16</sup>

In our study women who had urinary tract infections were more likely to have premature delivery. Similar finding was found in a study done in Iran.<sup>17</sup> This is explained by

the fact that infections trigger release of inflammatory mediators (prostaglandins) and matrix degrading enzymes which stimulate uterine contraction hence causing preterm delivery.

Height of the mother less than 145 cm was another risk factor in our study. The reason behind this is short women are more likely to have a small pelvis, which can lead to obstructed labour. Similar weight of the mother less than 45 kg is a risk for preterm delivery as low weight gain may indicate deficiencies in micronutrients, poor expansion of plasma volume, and an increased risk of infection and/or inflammation.

In our study, history of abortions is associated with preterm delivery. In induced abortion, the mechanical dilation of a woman's cervix is likely to result in cervical trauma that could compromise her ability to carry a subsequent pregnancy to term. In medical abortions, synthetic hormones are used to mimic natural agents that soften and dilate the cervix and cause preterm labour.

Male were predominantly affected in our study. Preterm birth is both more common in boys, with around 55% of all preterm births occurring in males and is associated with a higher risk of dying when compared to girls born at a similar gestation.<sup>18,19</sup>

The most common morbidity noted in our study was hyperbilirubinemia followed by sepsis. This was in contrast to the study done by Poudel et al. where sepsis was the most common one.<sup>20</sup>

Mortality was seen in 13.82% of the cases and the most common cause was sepsis in our study. This was similar to the study done by Chiabi et al. in Cameroon.<sup>14</sup> Ugochukwu et al. observed respiratory distress syndrome (40%), asphyxia (33.4%), and sepsis (13.3%) as major causes of death.<sup>21</sup> Shrestha et al. identified hyaline membrane disease, sepsis and necrotizing enterocolitis at 64.5%, 58.06% and 25.8% respectively, as major causes of death.<sup>22</sup>

As the study has been conducted in a small scale, there are chances of missing out more risk factors at different levels. Socioeconomic status and maternal nutritional status has not been analysed as the risk of preterm birth. In cases of hyaline membrane disease, surfactant was not given due to financial constraint so the improvement after the use of surfactant could not be noted.

## CONCLUSION

The most modifiable risk factors for preterm delivery were irregular antenatal visits and history of premature rupture of membranes and urinary tract infection. These modifiable risk factors can be prevented from the antenatal period so that perinatal morbidity and mortality can be reduced.

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## REFERENCES

- Lumley J. Defining the problem: The epidemiology of preterm birth. *BJOG*. 2003;110 (Suppl 20):3-7.
- Liu L, Johnson H, Cousens S, Perin J, Scott S, Lawn J et al. Global, regional and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. *The Lancet*. 2012; 379:2151-2161
- Modarres SZ, Amooian B, Movahed SB, Mohamadi M. periodontal health in mothers of preterm and term infants. *Taiwan J Obstet Gynecol*. 2007;46:157-61.
- Haas DM. Preterm birth in clinical evidence. London: BMJ Publishing Group; 2006.
- Pennell CE, Jacobsson B, Williams SM, Buus RM, Muglia LJ, Dolan SM, et al. Genetic epidemiologic studies of preterm birth: guidelines for research. *Am J ObstetGynecol*. 2007; 196: 107-18
- Pocket book of hospital care for children: guidelines for the management of common childhood illnesses, second edition. Geneva: World Health Organization; 2013 ([http://www.who.int/maternal\\_child\\_adolescent/documents/child\\_hospital\\_care/en/](http://www.who.int/maternal_child_adolescent/documents/child_hospital_care/en/), accessed 9 July 2015).
- Phelan JP, Smith CV, Small M. Amniotic fluid volume assessment with the four-quadrant technique at 36-42 weeks' gestation. *J Reprod Med*. 1987;32:540-2.
- Cunningham FG, Leveno K, Bloom S, et al. Spong CY Williams Obstetrics. Williams Obstetrics 22ed: USA: The McGraw-Hill Companies, Inc. Medical Publishing Division, 2010:59-61 and 491-96
- World Health Organization. Standards for maternal and neonatal care. Geneva: World Health Organization; 2007.
- World Health Organization. Pregnancy, childbirth, postpartum and newborn care: a guide for essential practice. Report No.: 3<sup>rd</sup> ed. Geneva: WHO, 2015. 1-184.
- Weiss G, Goldsmith LT, Sachdev R, von Hagen S, Lederer K. Elevated first-trimester serum relaxin concentrations in pregnant women following ovarian stimulation predict prematurity risk and preterm delivery. *Obstetrics & Gynecology*. 1993;82(5):821-8.
- Prazuck T, Tall F, Roisin AJ, Konfe S, Cot M, Lafaix C. Risk factors for preterm delivery in Burkina Faso. *Int J Epidemiol*. 1993 Jun; 22(3):489-94.
- Ndiaye O, Fall AL, Sylla A, Guèye M, Cissé T, Guélaye M, et al. Facteursétiologiques de la prématurité au centrehospitalierrégional de Ziguinchor, Sénégal. *Bull SocPatholExot*. 2006; 99(2):113-4.
- Chiabi A, Mah EM, Mvondo N, Nguéack S, Mbuagbaw L, Kamga KK et al. Risk Factors for Premature Births: A Cross- Sectional Analysis of Hospital Records in A Cameroonian Health Facility. *African Journal of Reproductive Health*. 2013;17(4):77-83.
- Stuart EL, Evans GS, Lin YS, Powers HJ. Reduced collagen and ascorbic acid concentrations and increased proteolytic susceptibility with prelabor fetal membrane rupture in women. *Biol Reprod*. 2005;72:230-5.
- Khan S, Khan AA. Study on preterm pre mature rupture of membrane with special reference to maternal and its fetal outcome. *Int J Reprod Contracept Obstet Gynecol*. 2016 Aug;5(8):2768-2774.
- Alijahan, S. Hazrati, M. Mirzarahimi, F. Pourfarzi, P. Ahmadi Hadi. Prevalence and risk factors associated with preterm birth in Ardabil, Iran. *Iran J Reprod Med*. 2014;12:47-56.
- Zeitlin J, Saurel-Cubizolles MJ, De Mouzon J, Rivera L, Ancel PY, BlondelB, Kaminski M: Fetal sex and preterm birth: are males at greater risk? *Hum Reprod*2002, 17:2762-8.
- Kent AL, Wright IM, Abdel-Latif ME: Mortality and adverse neurologic outcomes are greater in preterm male infants. *Pediatrics*. 2012, 129:124-31.
- Poudel P, Budhathoki S, Shrivastava MK. Maternal Risk Factors and Morbidity Pattern of Very Low Birth Weight Infants: A NICU Based Study at Eastern Nepal. *J Nepal Paediatr Soc*. 2009;29(2):59-66.
- Ugochukwu EF, Ezechukwu CC, Agbata CC, Ezumba I. Preterm admissions in a special care baby unit: the Nnewi experience. *Nig J Paed*. 2002; 29(3):75-9.
- Schrestha S, Dangol SS, Schrestha M, Schrestha RP. Outcome of preterm babies and associated risk factors in a hospital. *J Nepal Med Assoc*. 2010 Oct-Dec; 50(180):286-90.