

A Prospective Study to Assess the Neonatal Mortality and Morbidity Associated with Preterm labor and Delivery in a Tertiary Care Hospital.

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ABSTRACT

Background: Preterm labor and delivery are one of the challenging obstetric complications encountered by obstetricians, as are preterm neonates for the pediatricians. Therefore, this study was planned to identify etiological factors and to assess the neonatal mortality and morbidity associated with preterm labor and delivery. **Methods:** This prospective study was conducted over a 6 months period (September 2014 to February 2015) in the department of Obstetrics/Gynaecology and Paediatrics at Patliputra Medical College, Dhanbad, Jharkhand. 325 antenatal women admitted with threatened preterm labor, with or without rupture of membranes, were recruited. They were followed up from admission till delivery and discharge. Gestational age at onset of preterm labor, associated risk factors, response to tocolytics if given, gestational age at delivery, and neonatal outcome were recorded and analyzed. **Results:** Incidence of preterm labor was found to be 28.26% and that of preterm deliveries 25.9%. Preterm rupture of membranes and infection were the commonest causes of preterm labor. Irrespective of the use of a course of betamethasone, neonatal mortality was significantly higher ($P < 0.0001$) in babies delivering before 34 weeks (30.4%) as compared to that in babies delivering after 34 weeks (3.4%). Septicemia, respiratory distress syndrome (RDS) and birth asphyxia were the important causes of neonatal morbidity. **Conclusion:** Our results revealed a high incidence of preterm labor and preterm births in comparison to developed countries. Infection is one important modifiable risk factor which can be reduced. Prolongation of delivery for 48 hours by giving tocolytics for getting the benefit of betamethasone coverage reduces morbidity due to RDS but does not reduce overall neonatal mortality below 34 weeks.

Keywords: preterm labor, preterm delivery, uterine tocolytics, preterm neonate.

INTRODUCTION

Preterm labor and delivery are very challenging obstetric complications encountered by obstetricians, as are preterm neonates for the pediatricians. Preterm labor is defined as the onset of labor prior to 37 completed weeks of gestation i.e. 359 days from first day of last menstrual period. Preterm delivery affects one in 10 births (11%) in USA^[1] and even greater births in developing countries and causes 40-75% neonatal deaths. But now a days, due to continued innovation in neonatal intensive care facilities and obstetric interventions, fetal survival is now possible even at 20 weeks gestation in developed countries.

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However, the scenario is different in even the best setups in developing countries, salvage is rare below 28 weeks of gestation. The incidence of preterm labor is 23.3% and of preterm delivery 10-69% in India. This figure is rising in all the parts of the world because of so many reasons such as increased frequency of multiple births due to assisted reproductive techniques (ART), more working mothers, increasing psychological stress

and medically induced prematurity. Hence it is a time felt need to ascertain the causes and outcome of preterm labor and delivery and also the neonatal care resources available in most Indian nurseries.

MATERIALS AND METHODS

In this study, 325 antenatal women admitted (September 2014 to February 2015) with preterm labor at less than 37 weeks gestational age were enrolled. The study was conducted in the dept. of Obstetrics & Gynaecology in collaboration with the Dept. of Paediatrics, Patliputra Medical College, Dhanbad, Jharkhand. The selected patients were evaluated by history taking, clinical examination, and ultrasonography. ACOG criteria (1997) were used to document preterm labor and threatened preterm labor viz., four uterine contractions in 20 minutes with or without cervical dilatation greater than 1 cm or effacement 80% or greater. Leaking i.e., rupture of membranes was diagnosed by speculum examination and confirmed by ferning. Detailed history taking, and general, systemic and obstetrical examinations were done paying special attention to presence or absence of conventional risk factors for preterm labor. All women with preterm labor were investigated for the presence of infection by complete hemogram, and urine and vaginal swab culture. Antibiotics were provided to those with ruptured membranes or significant pathogen count on urine

or vaginal culture. Women with gestational age greater than 36 weeks, those in active phase, of labor (>4cm dilatation), those with signs and symptoms of chorioamnionitis, and those with antepartum hemorrhage, those with fetal distress due to any reason and those with any medical contraindication to tocolytics were not given tocolytics. This group comprised of 165 patients. Tocolytics were given to the other 160 women in either of two forms viz., nifedipine orally or isoxsuprine orally / parentally as per treating obstetrician's choice. The aim of using tocolytics was to delay delivery for at least 48 hours in women with ruptured membranes and through 36 completed weeks of gestation in those whose membranes were intact.

All those with less than 34 weeks gestation (n=133, 41%) were given 12 mg betamethasone intramuscularly at the time of admission and again after 24 hours. Women with rupture of membranes (n=81, 25%) were kept on strict bed rest with foot end elevated. Risk factors related to preterm labor and neonatal outcome were recorded and analyzed.

RESULTS

Amongst the 1150 antenatal admissions during the study period, 325 were admitted to preterm labor, giving an incidence of 28.26%. At the same time, out of the total 977 live births, 254 delivered prior to 37 completed weeks, giving a 25.9% incidence of preterm births.

The distribution of cases of preterm labor according to gestational age is shown in [Table 1]. The maximum number of women (48.5%) were in the gestational age group of 34-36 weeks. Out of 325 cases of preterm labor, 160 (49.23%) were given tocolytics. Out of these 160 cases, 25 (15.6%) reached term, 38 (23.75%) were discharged satisfactorily and 97 (60.6%) delivered prematurely. Remaining 165 (50.76%) were allowed delivery on admission due to reasons shown in [Table 2].

[Table 3] shows the various risk factors for preterm labor and delivery. Premature rupture of membranes was found to be the most common cause of preterm labor (28%).

Table 1: Gestational age of patients enrolled in the study.

Gestational age (weeks)	Admission for preterm labor		Tocolytics	Preterm deliveries
	Number	Percent	Number	Number
< 28	16	4.8	8	12
28-34	115	35.5	78	102
34-36	153	47	74	119
>36	41	12.6	-	21
Total	325		160	254

Table 2: Reasons for allowing delivery on admission (n=165).

Reason	Number	Percent
Active phase of labor	118	71.5
Antepartum hemorrhage	25	15.1
Acute fetal distress	16	9.6
Severe preeclampsia	2	1.2
Chorioamnionitis	4	2.4

Infection was the next most common risk factor seen in 22.1% women. Urinary tract infections (UTI) were found in 30 (9.2%) of these women in whom E. coli accounted for 75%, while Klebsiella, staphylococcus and Citrobacter were present in fewer.

Table 3: High risk factors for preterm labor (n=325).

Risk factors	No. of cases	Percentage
Preterm rupture of membranes	91	28
Infections	72	22.1
Urinary	30	9.2
Vaginal	42	12.9
Antepartum hemorrhage	32	9.8
Multiple gestation	21 (Twins 19, triplets 2)	6.4
Maternal disease	76	23.3

Neonatal mortality was quite high (35.2%) in babies less than 34 weeks gestation compared to 4.2% in those with more than 34 weeks gestation. The difference was highly significant (P=<0.0001). Neonatal mortality was not affected in babies under 34 weeks by gaining 48 hours through tocolytics for the beneficial effect of betamethasone (P=0.961). Neonatal morbidity was significantly reduced (P=0.043) in cases where some time was gained for betamethasone coverage. The incidence of respiratory distress syndrome (RDS) was significantly less (P=0.029) in this group.

DISCUSSION

Preterm labor and delivery are not rare. McPheeters et al^[1] state that incidence of first time hospitalization for preterm labor is 9% with only 38% delivering in their first episode. According to annual vital statistics in USA percentage of infants delivering before 37 weeks is continuously rising from 11% in 1998 to 12.3% in 2003^[2]. The incidence of preterm labor is showing an increasing trend due to assisted reproduction leading to an increase in multiple births, early and late procreation, and better obstetrical intervention.

We compared the incidence of preterm labor, preterm births and their trends in different countries. Amongst the developing countries, India has a very high incidence of preterm labor (23.3%) corroborating our 22% incidence. Our incidence of preterm birth was 25.9%, which is similar to an incidence rate in India.

Etiology of preterm labor is multifactorial. Van der Pool^[3] found that approximately 30% of preterm births are associated with rupture of membranes. In our study also, preterm rupture of membranes was associated with 25.9% preterm births.

According to Gonclaves et al^[4] intrauterine infections are a major cause of preterm labor, with or without intact membranes and accounts for approximately 25% of cases. Lamont^[5], concludes that infection is responsible in 40% of cases and earlier the abnormal genital tract colonization is detected the greater is the risk of adverse outcome. Wright et al^[6] identified urinary tract infection (UTI) as a significant risk factor, contributing to 7% of preterm births. In our study, genitourinary infection is the second commonest cause (22.1%). UTI was present in 9.2%.

Carey and Klebanoff^[7] state that increases in *E. coli* (commonest) and *Klebsiella pneumoniae* in the vagina are independent risk factors for preterm birth. It has been shown that *E. coli* is the organism that can permeate living intact chorioamniotic membranes. According to Cram et al^[8] asymptomatic bacteriuria, gonococcal cervicitis and bacterial vaginosis are strongly associated with preterm labor and the role of chlamydia, candida, trichomonas and urea plasma is less clear.

It has been reported that the risk of preterm labor is highest (15.8%) in adolescents and teenage pregnancies (<18 years age).^[9,10] It decreases to a minimum of 6% in reproductive age (20-45 years) and again rises, reaching a new peak of 9.9% around 45 years. Diallo et al^[11] found that early and late age of procreation (7.95% and 3.9%), first and last parities (7.75% and 5.31%), and poor and rich women groups (7.34% and 3.84%), are the important risk factors. They state that 83% of maternal causes could be controlled by efficient prenatal care. Begum et al^[12] state that weight less than 45 kg (OR 4.9), height less than 150 cm (OR 3.4), BMI less than 19 kg/m² (OR 2.9), education less than 5 years (OR 2.7), monthly income less than 2000 rupees (OR 5.05) and birth interval less than 12 months (OR 6.39) were significant risk factors for preterm labor. In the present study 32 (7.7%) women were less than 18 years old, 24 (5.8%) more than 35 years old, 72 (17.3%) weighed less than 50 kg, and 92 (22.2%) belonged to a lower socioeconomic group (Kuppuswami class IV & V).

In our study two babies died in utero, both before 32 weeks gestational age. One was associated with preeclampsia and consequently had severe

placental abruption, while the other had severe oligohydramnios with chorioamnionitis following rupture of membranes for 1 week.

According to Sehgal et al^[13], neonatal hyperbilirubinemia (78%) and RDS (65%) were the most common causes of morbidity in extremely low birth weight babies. Sing et al^[14] reported that there was 21% overall mortality amongst preterm babies delivered in hospital and managed in the nursery. According to them intraventricular hemorrhage was the most common cause of death (42%) followed by septicemia 31%.

In contrast, our institution has an overall mortality of 12.7% among preterm births which indicates a comparatively better neonatal care and outcome. There were 36 neonatal deaths (30.4%) in babies of less than 34 weeks gestational age, while only eight (3.4%) in those of more than 34 weeks gestational age ($P < 0.0001$). This indicates a clear cut benefit of prolonging pregnancy beyond 34 weeks in cases of preterm labor.

In less than 34 weeks gestational age, mortality was almost same in both betnesol (steroid) covered and uncovered groups (30.98 vs 29.16%). However, neonatal morbidity was significantly higher in betnesol uncovered group (52.1% vs 37.5%; $P=0.043$). Similarly, incidence of RDS was significantly high in babies without steroid coverage than in those with (26.8% vs 10% ; $P=0.029$). One baby of more than 34 weeks gestation developed RDS as the mother was having impaired glucose tolerance. Septicemia and hypoxic ischemic encephalopathy were the two most common causes of neonatal morbidity and mortality after RDS, accounting for 16.8% and 9.2% respectively in less than 34 weeks gestational age group. Hyperbilirubinemia developed in approximately 50% of preterm babies irrespective of gestational age. Delay in delivery and steroid coverage decrease neonatal morbidity due to RDS but overall mortality is not reduced if baby is delivered before 34 weeks.

CONCLUSION

Preterm labor and preterm births require early and prolonged hospitalization posing greater financial and psychological burden on the family. Most etiological factors are modifiable, and preconception counseling should emphasize family planning, good nutrition, safe sex, good hygiene, treatment of sexually transmitted diseases, and avoidance of tobacco, alcohol, abusive drugs and harmful work conditions. All efforts should be made to prolong the pregnancy beyond 34 weeks for better neonatal outcome. Tocolytics help by giving time for steroid coverage so that morbidity due to RDS can be decreased.

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