



“STUDY OF PRETERM DELIVERY AT TERTIARY CARE HOSPITAL”

Obstetrics & Gynaecology

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ABSTRACT

Background: Preterm delivery is a major obstetric complication and a leading cause of neonatal mortality and morbidity. In India, the reported incidence of preterm labour is 10-15%. Premature babies are at risk of many immediate and long-term complications. Objectives: With this background, the present study was aimed to analyse the clinical conditions based on maternal, fetal and placental etiology associated with preterm birth. **Method:** This prospective observational study was conducted in 250 consecutive women who presented with preterm labour between 28 to <37 weeks in the Department of Obstetrics and Gynaecology at tertiary care hospital during a period from April 2019 to September 2020. Mode of delivery, various maternal risk factors and neonatal outcome were noted. **Results:** The incidence of preterm births was found to be 16.15%. Maximum number of patients belonged to third gravida group (40.4%). Most common presentation on admission was pain in abdomen (74.8%) and most common associated risk factor was infection (50.8%) followed by preterm premature rupture of membrane (PPROM) (24.8%). All patients received steroid (betamethasone) before delivery. 90% of patients delivered vaginally and 31.2% of babies required NICU admission. The mean baby weight, mean APGAR Score (5min) and mean NICU stay was 2.41 ± 0.36 kgs, 8.94 ± 0.33 and 9.08 ± 5 days respectively. **Conclusion:** Preterm labour and birth continue to be a common occurrence, resulting in significant newborn death and morbidity, as well as financial burden on families and hospitals. This incidence can be lowered by early identification of proven risk factors with the assistance of universal and appropriate prenatal care. Strengthening the referral system so that high risk patients are managed in tertiary obstetric units with level III NICU facilities will improve the neonatal outcome of these babies.

KEYWORDS

Preterm delivery; Neonatal outcome; APGAR Score; NICU; PPRM

INTRODUCTION

Preterm birth is the most important cause of child mortality and morbidity (WHO, 2019b). Preterm birth as defined by the World Health Organization (WHO) includes all births occurring before 37 completed weeks of gestation or less than 259 days from the first day of a woman's last menstrual cycle^[1].

India is among the top 10 countries worldwide with the highest rate of preterm birth according to the WHO. Factors responsible for preterm births are still not clearly understood. Preterm birth is a complex syndrome and multiple factors are responsible for the preterm delivery. It is not clear whether preterm births occur through the interaction of several pathways or the independent effect of each pathway^[2, 3]. Preterm birth has been usually associated with many medical conditions of the mother and fetus. It has been found that the most common maternal risk factor associated with preterm births is first trimester bleeding, hypertensive disorders during pregnancy, followed by preterm rupture of membranes, idiopathic, and previous LSCS, gestational diabetes, placenta previa, polyhydramnios, oligohydramnios and maternal sepsis. Fetal risks factors associated with preterm labour are fetal distress, fetal anomaly and twin / triplet pregnancy^[4,5].

For clear understanding of etiology of preterm birth and to improve interventions that can prevent preterm delivery, Barros et al (2015) came up with clinical conditions classification based on severe maternal, fetal and placental conditions causally associated with preterm births. The proposed classification is based on clinical phenotypes that are defined as ≥ 1 characteristics of the mother, fetus, and placenta, the presence or absence of signs of parturition, and the pathway to delivery classification^[2]. Hence, the present study was undertaken to analyze the clinical conditions based on maternal, fetal and placental etiology associated with preterm birth. The results can be utilized in predicting the occurrence of preterm birth in tertiary care hospital and also proper interventions can be introduced as early as possible in order to reduce the incidence of preterm birth. This will further facilitate the reduction of neonatal mortality and morbidity which will go a long way in reducing child mortality. Identification of various risk factors and its association with preterm deliveries can be utilized as early indicators for preterm deliveries and thus early

preventive measures can be taken to save the new born.

MATERIALS AND METHODS

After obtaining Institutional Ethical Committee approval, this prospective observational study was conducted in the Department of Obstetrics and Gynaecology at of Lokmanya Tilak Municipal Hospital and Medical College for a period of 18 months from April 2019 to September 2020. Total 250 consecutive women of preterm labor presenting to the labor ward and who delivered in our institute during study period were included. Non –probability consecutive sampling technique was used for the study until the required sample size was achieved

Inclusion criteria

- pregnant women who delivered in our institute after 28 weeks but before 37 completed weeks during study period.

Exclusion criteria:

- All pregnant women who delivered before 28 weeks and after 37 completed weeks.
- Pregnant women with intra uterine fetal demise (FSB-fresh stillbirth, MSB –Macerated stillbirth)
- Fetal congenital anomalies

In all cases, a detailed record regarding age, weight, height, socioeconomic status, parity, gestational age, medical comorbidities, history of previous preterm delivery and prior abortion was maintained. A general physical examination was performed with attention to vital parameters (Temperature, Pulse, BP) and pallor was assessed. Systemic (Cardiovascular and Respiratory system examination), obstetric examination was done. A per speculum examination and pelvic examination was done to assess the Bishop's score. Investigations performed were complete hemogram, urine microscopy, urine culture and high vaginal swab (HVS). An ultrasonography if required was done. Presenting features of preterm labour and risk factors for preterm delivery such as infections, HTN, anaemia, multiple pregnancy, APH, history of previous preterm delivery and prior abortion were assessed.

Maternal outcome parameters assessed were gestational age at the time

of delivery, mode of delivery, haemoglobin on admission and requirement of blood transfusion. Newborn outcome parameters such as baby weight, APGAR score at 1 minute & 5-minute, requirement of NICU admission, need for surfactant, requirement for ventilation, duration of stay in NICU and final outcome assessed.

OBSERVATIONS AND RESULTS

There were 11,700 deliveries in the hospital during study period of which 1890 were preterm deliveries, giving an incidence of 16.15 %. During the study period 250 cases were included in the study, out of which majority were in the age group of 20-24 years (54.80%). The mean age of patients was 24.72 ± 3.57 years, ranged from 20-38 years. Maximum number of patients belonged to upper lower group of socioeconomic status (36%), third gravida (40.4%) and most of the patients delivered vaginally (90%) as shown in table 1. Majority of the pregnant women who delivered had a gestational age of 34-37 weeks. The mean period of gestation (POG) was 35.25 ± 1.33 weeks, ranged from 28.3 - 36.6 weeks. The variable age and POG was not normally distributed (Shapiro-Wilk Test: $p = < 0.001$). Maximum pregnant women i.e., 90% delivered vaginally.

Most common presenting complaints during admission was pain abdomen 187(74.8%) followed by leaking PV 53(21.2%). Bleeding per vaginam and burning micturition was found in 2 % cases each. Most common risk factor associated with preterm delivery was antenatal infection (127,50.8%) followed by PPROM (62,24.8%) and history of abortion (46,18.4%) as shown in table 1.

Table 1: Risk factors responsible for preterm delivery

Risk factors	Frequency	Percentage
History of Abortion	46	18.4
Hypertensive disorder of pregnancy	26	10.4
Previous preterm delivery	15	6
PPROM	62	24.8
Infection (UTI, vaginal infections)	127	50.8
Anaemia	20	8.0

A total of 127 (50.8%) of the pregnant women had growth present in urine and High vaginal swab culture whereas 73(49.2%) of the participants had no growth. Overall, 42 (16.8%) patients had growth in urine present in culture media and most common organism found was *E. coli* (71.4%) whereas 85 (34%) patients had growth in high vaginal swab culture and most common organisms found were *Mycoplasma Hominis* (20,23.53%) followed by *E. coli* (18,21.18%) and *Staphylococcus Aureus* (15,17.65%).

The mean haemoglobin of the pregnant women was 10.44 ± 1.15 g/dl, ranging from 5 - 12.5 g/dL. The variable haemoglobin (g/dl) was not normally distributed (Shapiro-Wilk Test: $p = < 0.001$).

All patients received steroids out of which 147 (58.8%) patients received 2 doses of Betamethasone and 103 (41.2%) patients received a single dose.

Table 3: Neonatal outcomes or neonatal data

Neonatal data	Frequency	Percentage
Baby weight (kgs)	1.5 to 2	106
	2 to 2.5	118
	2.5 to 3	26
NICU admission	Yes	78
Ventilator mode	Room air	244
	CPAP	04
	O2 Hood	02
	Surfactant required	04
APGAR Score at 1 min	2-5	60
	6-8	145
	8-10	45
APGAR Score at 5 min	2-5	08
	6-8	62
	8-10	180

The neonatal outcomes or neonatal data are shown in table 3. The mean baby weight, APGAR Score (5 min) and mean NICU stay was 2.41 ± 0.36 kgs, 8.94 ± 0.33 and 9.08 ± 5 days respectively. 31.2% of babies had NICU admission.

DISCUSSION

During the study period from April 2019 to September 2020, there

were a total of 11,700 deliveries, out of which there were 1890 cases of preterm births. The incidence of preterm births in our study was 16.15 % which was similar to that by Shetty MB et al (18.01%)^[6]. However, incidence reported by Bangal et al (13.2%), Garg S et al (11.16%) and Berry et al (11.4%) was found to be slightly lower than our study^[5,7,8]. A study by Gupta et al showed a higher incidence rate of 27.9%^[9]. This shows that the incidence of preterm births differs from place to place.

The majority of patients were in the age group of 20 to 29 years (90.4%), out of which maximum patients (54.8 %) were in the age group 20-24 yrs. However, in the study by Shetty et al (40%) and Berry et al (45%), maximum patients were seen in the age group of 25-30 yrs^[6,8]. However, the results of a study by Hidayat et al^[1] in Indonesia indicated that maternal age factor has a significant relationship to preterm birth. It showed that pregnant women with age <20 years are 1586 times likely to experience preterm birth compared to the age group of 20 - 35 years.

Maximum patients (36%) belonged to upper lower group of socioeconomic status. whereas low socioeconomic status was seen in the studies by Bangal et al (95%), Berry Et al (71.7%) , Gupta et al (56.3 %) , Chaudhary et al (46%) and Pandey et al 41.7%^[5,8,9,10,11]. In a study by Das et al, 27.88%^[12] of cases comprised of Kuppaswamy IV (upper lower) and V(lower) which was similar to our study. This indicates that low socioeconomic status is a predictor of preterm births.

In the present study, we observed that the incidence of preterm labour was more in third gravida group (40.4%) which is comparable with the studies by Shetty et al (57.4%), Berry et al (54%) and Alijahan et al (53.9%)^[6,8,13]. In a study by Das et al, the index pregnancy was fourth or higher order for 42.4% women^[12]. This was in contrast to a study by Bangal et al where 60 % were primigravidas^[5].

The optimal mode of delivery for preterm babies is controversial. In current study 90% women delivered vaginally and only 10% women delivered by caesarean section which is similar to the study done by Chaudhary et al^[10]. In practice though the rate of elective caesarean deliveries in preterm babies has markedly increased over the last decade, it has been observed in various studies that caesarean delivery did not enhance neonatal survival of preterm infants nor did it decrease the morbidity in these infants^[14,15].

Previous Obstetric Outcomes

Present study showed that previous history of abortion was present in 18.4% cases. This was similar to the studies by Berry et al (18.4%), Gupta et al 18.8% and Alijahan et al (20%)^[8,9,13]. The incidence was higher in Mahajan A et al (25%) and Fernandes SF et al (35%)^[16,17]. This was in contrast to the study by Chaudhary et al (4%)^[10].

The history of previous preterm delivery was present in 6% cases which was similar to that in the studies by Chaudhary et al (5%) and Alijahan et al (7.2%)^[10,13]. This was in contrast to various studies by Berry (9.7%), Gupta N et al (11.6%), Pandey et al (14.4), Das A. et al (12.8%), Mahajan A et al, (26%), and Fernandes SF et al (12.11%)^[8,9,11,12,16,17]. This indicates that previous history preterm delivery is a predictive factor for future preterm deliveries. It was very low in Chaudhary et al^[10] as there were more cases of primigravidas in this study.

Associated Risk Factors

Hypertension was present in 10.4% of the cases in this study which was in accordance to the studies by Bangal et al 14.4 %^[5]. The incidence was higher in Mahajan A et al and Fernandes S et al, i.e., 21.07% and 20% of the cases respectively^[16,17]. Earlier studies by Hidayat et al^[1] and Gebreslasie K^[18] showed significant correlation between hypertensive disorder of pregnancy and preterm birth. The study by Gebreslasie K reported that others who had pregnancy induced hypertension had five times increased risk of having a preterm birth than those mothers without pregnancy induced hypertension^[18].

Antepartum haemorrhage (APH)/early bleeding per vagina in pregnancy also had a significant relationship with the occurrence of preterm birth as a risk factor. It is a life- threatening obstetric emergency necessitating medically indicated early delivery^[19]. In present study only 2.0% of the patients had complaints of bleeding PV which is in accordance with the study done by Shetty MB et al^[6]. Fernandes SF et al reported an 11% incidence of APH. In APH, the rate of iatrogenic preterm deliveries increases in view of maternal and fetal

well-being^[17].

Anaemia has a significant relationship with occurrence of preterm birth as a risk factor. In pregnant women with anaemia, disruption delivery of oxygen and nutrients from mother to placenta and fetus, affecting the function of placenta. Anaemia in pregnant woman other than impaired fetal growth, can also cause abortion, obstructed labour, puerperal sepsis, prematurity and maternal, even fetal mortality. In current study 8.0% of the patients had pallor, this is consistent with the study conducted by Bangal et al (7.4%)^[5]. Studies by Shetty MB et al and Fernandes et al showed 2.9% and 2.7 % pregnant women with anemia respectively^[6,17].

We found that 62 (24.8%) patients had history of PPROM. which was similar to the studies by Khanum et al 24.8% and Singh et al 25.9%^[20,21]. Various studies reported an incidence of Preterm Premature Rupture of membranes ranging from 11.26 to 33.9%^[3,5,22,23,24]. This shows a significant association of PPROM with preterm births.

In our study, 127 (50.8%) patients had genitourinary infections which included local vaginal and urinary tract infections. This was consistent with the studies by Gupta et al (55.7%) and Pandey et al (65.5%)^[9,11]. Patel et al also reported 21.7% incidence of chorioamnionitis^[25]. We reported 16.8% of urinary tract infections which was similar to various studies where the incidence of UTI ranged from as low as 8.4% to 34.5%^[7,11,21,26,27,28]. The incidence of vaginal infections in our study was found to be 34% which was similar to that by Chauhan et al (32.7%)^[28]. Lesser incidence was reported by Patel et al 21.7% and Satija A et al (26%)^[25,26]. In our study the most common organism found in urinary growth was E. Coli, and in vaginal growth were Mycoplasma Hominis, E coli, Staphylococcus Aureus and Group B Streptococcus. Chauhan et al found that E. coli was the most common organism isolated both in urine culture (22.5%) and vaginal culture (14.5%)^[28]. Goldenberg MD et al found a strong association between bacterial vaginosis and preterm labour^[29]. Deka et al found that cervical infection was present in 55% patients with preterm labour^[30]. Patel et al reported 32.5% incidence of bacterial vaginosis in his study^[25].

Thus, there is significant association between antenatal infections and preterm birth. This occurrence could be as a result of the fact that infections are known to initiate production of pro-inflammatory cytokines in the uterus which initiate premature labour resulting in preterm birth^[31].

The mean baby weight was found to be 2.4±0.36 kg which is comparable with the study by Rao et al where the mean baby weight was 2452 grams^[32]. At 1 minute, 24% babies had APGAR score between 2 to 5, 58% babies had APGAR score between 6 to 8 and 18% babies had APGAR score between 8 to 10. At 5 minutes after birth, due to prompt neonatal resuscitative measures, most of the babies (72%) had an APGAR score of 8 to 10 while remaining babies had score between 6 to 8. The mean APGAR Score (5 min) was 8.94±0.33. These findings correlated with the previous studies^[10,32]. However, only 31.2% babies required neonatal admission which was lower than observed by Chaudhary et al^[10] and Akhtar et al.^[32] This difference could be because of low birth weight of their babies.

CONCLUSION

Despite of the so many advances made in antenatal care and neonatal care, preterm birth still remains an economic as well as emotional burden to the family and society. The causes of preterm birth are multifactorial and modifiable. This incidence can be reduced by early identification of established risk factors, as revisited and reemphasized in our study, with the help of universal and proper antenatal care. In our country as it has low resource settings strengthening of the primary care providers with adequate knowledge with emphasis on prevention of preterm births, identification of risk factors, avoiding late referrals will benefit. Strengthening the referral system to make sure that high risk patients must be managed in tertiary obstetric units with level 3 NICU facilities will improve the neonatal outcome of these babies who are "Born too Soon" to a great extent

Funding: No funding sources

Conflict of interest: None declared

REFERENCES:

1. WHO: recommended definitions, terminology and format for statistical tables related to the perinatal period and use of a new certificate for cause of perinatal deaths. Modifications recommended by FIGO as amended October 14, 1976. Acta Obstet

- Gynecol Sc and 1977;56: 247–53.
2. Barros FC, Papageorgiou AT, Victora CG, Noble JA, Pang R, Iams J et al. International Fetal and Newborn Growth Consortium for the 21st Century. The distribution of clinical phenotypes of preterm birth syndrome: implications for prevention. *JAMA Pediatr.* 2015;169(3):220-9.
3. Hidayat ZZ, Ajiz EA, Achadiyani and Krisnadi SR. Risk Factors Associated with Preterm Birth at Hasan Sadikin General Hospital in 2015. *Open Journal of Obstetrics and Gynecology* 2016;6:798-806.
4. Mohsenzadeh A, Saket S, Karimi A. Prevalence of preterm neonates and risk factors. *Iran J Neonatol.* 2011;2(1):38–42.
5. Bangal VB, Shinde KK, Khanwelkar GK, Patil NA. A study of risk factors and perinatal outcome in preterm labour at tertiary care hospital. *IJBR* 2012;3(03):147-150.
6. Shetty MB, Krupa BM, Malyala M, Swarup A, Pathadan DS, Pocha S. Preterm birth: associated risk factors and outcome in tertiary care center. *Int J Reprod Contracept Obstet Gynecol* 2017;6:3271-4.
7. Garg S, Kaur T, Saran AS, Yadav M. A study of etiology and outcome of preterm birth at a tertiary care centre. *Int J Reprod Contracept Obstet Gynecol* 2017;6:4488-91.
8. Berry SD, Sood R, Negi K, Kumar N. Study of risk factors for preterm deliveries in a tertiary hospital. *Int J Reprod Contracept Obstet Gynecol* 2020;9:3032-6.
9. Gupta A, Divedi P, Dwivedi D. Preterm labour and its effect on perinatal morbidity and mortality. *Int J Reprod Contracept Obstet Gynecol* 2018;7:1993-6.
10. Chaudhary K, Hooja N, Mital P, Kumari U, Sethi S, Chaudhary A. A study of perinatal outcome in women with preterm labour at a tertiary care hospital. *Sch Int J Obstet Gynec* 2020;3(6): 147-152.
11. Pandey K, Ajay B, Neena G, Geetanjalay K. Predictive value of various risk factors for preterm labour. *J Obstet Gynecol India.* 2010;60(2):141-5.
12. Das A, Subrat P, Ahanthem SS, Sourabh GD, SG BP. Preterm Birth: Analysis of Risk Factors and Neonatal Outcome. *Gynecology & Obstetrics Case report.* 2015;1(1).
13. Alijahan, R., Hazrati, S., Mirzarahimi, M., Pourfarzi, F., & Hadi, P. A. (2014). Prevalence and risk factors associated with preterm birth in Ardabil, Iran. *Iranian journal of reproductive medicine* 2014;12(1):47.
14. Iqbal N, Azhar IA, Ahmad I & Tayyab M. A study of neonatal outcome associated with preterm birth in a tertiary care hospital. *Annals of King Edward Medical University* 2013;19(3):231-231.
15. Sonkusare S, Rai L & Naik P. Preterm birth: mode of delivery and neonatal outcome. *Medical Journal of Malaysia* 2009;64(4):303-306.
16. Mahajan A, Magon S. Study of risk factors for preterm births in a teaching hospital: A prospective study. *Int J Med and Dent Sci* 2017;6(1):1407-1412.
17. Fernandes SF, Chandra S. A study of risk factors for preterm labour. *Int J Reprod Contracept Obstet Gynecol* 2015;4:1306-12.
18. Gebreslasie K. Preterm Birth and Associated Factors among Mothers Who Gave Birth in Gondar Town Health Institutions. *Open Access Journal* 2016:1–6.
19. Brown HK, Speechley KN, Macnab J, Natale R, Campbell MK. Maternal, fetal, and placental conditions associated with medically indicated late preterm and early term delivery: a retrospective study. *BJOG.* 2016;123(5):763-70.
20. Khanum, M. A., Lavereen, Salma, Moniruzzaman,., & Romana,.-. (2020). Risk Factors and Outcome of Preterm Labour in Tertiary Health Centre. *Bangladesh Journal of Obstetrics & Gynaecology*, 32(2), 90–93. <https://doi.org/10.3329/bjog.v32i2.48279>
21. Singh U, Singh N, Seth S: A prospective analysis of etiology and outcome of preterm labour. *Journal of Obstetrics and Gynaecology of India* 2007; 57(1) 48-52
22. Rao CR, de Ruiter LE, Bhat P, Kamath V, Kamath A, Bhat V. A case-control study on risk factors for preterm deliveries in a secondary care hospital, southern India. *ISRN Obstet Gynecol.* 2014;2014:935982. Published 2014 Mar 13. doi:10.1155/2014/935982
23. Garg S, Kaur T, Saran AS, Yadav M. A study of etiology and outcome of preterm birth at a tertiary care centre. *Int J Reprod Contracept Obstet Gynecol* 2017;6:4488-91.
24. Soundarajan P, Muthuramu P, Veerapandi M, Mariappan R. Retrospective study factors related to preterm birth in Government Raja Mirasudar hospital and obstetric and perinatal outcome. *Int J Reprod Contracept Obstet Gynecol* 2016;5:3006-10.
25. Patel PK, Pitre DS, Bhookey SP. Predictive Value of Various Risk Factors for Preterm Labor. *Natl J Community Med.* 2015;6(1):121-5.
26. Satija A, Satija V, Kaur J, Bains HS. Prospective analysis of preterm labour: its etiology and outcome. *Int J Basic Appl Med Sci.* 2014;4(2):70-77.
27. Chhabra S Patil; Study of factors causing and arresting preterm labour. *Journal of Obstetrics and Gynecology of India* 2001;51: 99-103.
28. Chauhan N, Purohit RC, Rawat U. Analysis of Etiology and Outcome of Preterm Labour in Tertiary Health Centre of Uttarakhand. *Sch J App Med Sci.* 2016;4(3B):740-3.
29. Goldenberg RL, Culhane JF, Iams JD & Romero R. Epidemiology and causes of preterm birth. *The lancet* 2008;371(9606):75-84.
30. Deka D, Buckshee K, Kharsyntiew B, Gupta U; Association of inter-amniotic fluid infection and cervical infection with preterm labour. *Journal of Obstetrics and Gynecology of India* 1997;47: 318-321.
31. Chiabi A, Mah EM, Mvondo N, Nguefack 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; 77–83.
32. Akhter G, Rizvi SM, Hussain SI, Ali F, & Ali A. Evaluation of perinatal outcome in preterm labour. *International Journal of Current Research and Review* 2015;7(21):66.