



A CLINICAL STUDY ON FETAL AND MATERNAL OUTCOME OF PRETERM PREMATURE RUPTURE OF MEMBRANES AT A TERTIARY CARE HOSPITAL

Obstetrics & Gynaecology

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ABSTRACT

Introduction: Preterm premature rupture of membranes is a commonly encountered obstetric complication. It is an important cause of perinatal morbidity and mortality. **Aims and Objectives:** To analyze the maternal and perinatal outcome in patients with preterm premature rupture of membranes. **Materials and Methods:** A cross-sectional study was carried out in the department of Obstetrics and Gynaecology, Regional Institute of Medical Sciences, Imphal, Manipur for the duration of two years. The total of 134 patients with PPROM were included in the study after applying inclusion and exclusion criteria. **Results:** Majority of patients belonged to age group of 26- 30 years (52.2%). Majority of the patients were from lower socioeconomic status (56.8%), unbooked (70.9%), primigravida (60.4%). Late PPROM was seen in 56.8% cases and early PPROM in 43.2% cases. In this study, 22.5% cases underwent LSCS. Most common indication of LSCS was fetal distress (9%). Puerperal pyrexia was the most common maternal complication (5.2%). Neonatal morbidity was seen in 23.9% cases. RDS was the most common cause of neonatal morbidity (9%). Perinatal mortality was seen in 3.7% of cases. **Conclusions:** PPROM is a significant contributor of poor obstetric and neonatal outcome. Many of the contributing factors of PPROM if detected sufficiently early and appropriately treated may not only decrease the onset of PPROM, but also have the potential to reduce maternal and perinatal morbidity and mortality.

KEYWORDS

Perinatal morbidity, Preterm premature rupture of membranes, Respiratory Distress Syndrome

INTRODUCTION

Premature rupture of membranes (PROM) is defined as spontaneous rupture of fetal membranes before onset of labour.¹ When rupture of membranes occur beyond 37th week but before the onset of labour, it is called term premature rupture of membranes (TPROM), and when it occurs before 37 completed weeks, it is called preterm premature rupture of membranes (PPROM).² Latent period is the time interval between the rupture of membranes and the onset of uterine contractions. It may extend from hours to days. Generally, the shorter the gestational period, the longer the latent period.³ The condition poses jeopardy to both fetus and mother as prematurity and its sequelae endanger the fetus, while risk of infection with an amnionitis is a threat to both fetus and mother.

The pathogenesis of PPROM is multifactorial in nature. Premature rupture of membranes results in maternal, infant and neonatal risks. Fetal complications of PPROM include respiratory distress syndrome, hypothermia, hypoglycaemia, jaundice, necrotizing enterocolitis, intraventricular haemorrhage, neurologic impairment, apnoea, retrolental fibroplasias, bronchopulmonary dysplasia, patent ductus arteriosus, fetal limb contracture formation, pulmonary hypoplasia and neonatal sepsis depending upon gestational age and latency period.³ PPROM is an important cause of perinatal mortality and perinatal morbidity because it is associated with brief latency from membrane rupture to delivery, perinatal infection and umbilical cord compression due to oligohydramnios.⁴ Chorioamnionitis is the most common maternal complication (13 to 60%) after PROM. Endometritis and Abruptio placenta occurs in approximately 2-29% and 15-25% of cases respectively. Uncommon but serious complications include retained placenta and haemorrhage leading to death.⁴

PPROM evaluation and management are important for improving maternal and neonatal outcomes. A careful consideration of various factors and individualization of cases is necessary for appropriate management. Proper diagnostic facilities, proper monitoring facilities and a standard protocol in the management can improve the maternal and fetal outcome. So the present study is conceptualized to analyze the maternal and fetal outcome in cases with preterm premature rupture of membranes.

MATERIAL AND METHODS

Study Design: Cross-sectional study

Study Setting: Department of Obstetrics and Gynaecology, RIMS, Imphal.

Duration of Study: October 2019 to September 2021.

Study Population

(a) Inclusion Criteria

- Patients admitted with PPROM less than 37 weeks of gestation
- Uncomplicated singleton pregnancy
- Willing to participate in the study

(b) Exclusion Criteria

- Patients admitted with PPROM less than 28 weeks of gestation and patients who have reached term.
- Gestational diabetes mellitus
- Antepartum haemorrhage
- Medical disorders
- Congenital anomalies and IUD
- Patients who refuse to give consent

Sample Size: 134

Sampling Method: Convenience sampling method was followed.

Study Variables

Independent Variables

Age, parity, socioeconomic status, education, antenatal check-ups, latency period, past history, risk factors,

Outcome Variables

1. Period of gestation
2. Mode of delivery
 - Vaginal
 - * Spontaneous
 - * Instrumental
 - Caesarean section
3. Maternal complications
 - Chorioamnionitis, Abruptio, Wound infection, Puerperal pyrexia
4. Perinatal complications
 - Sepsis, RDS, Low birth weight, NEC, Birth asphyxia, Hyperbilirubinemia, NICU admission

Statistical Analysis

Data was checked for consistency and completeness and analysed by using SPSS version 21.0 IBM for WINDOWS.

Ethical Approval

Ethical Approval was obtained from the Research Ethics Board, RIMS, Imphal with reference no. A/206/ REB- Comm (SP)/RIMS/2015/621/99/2019.

RESULTS

The maternal and fetal outcome of PPRM was analysed in relation to age, parity, socioeconomic status, antenatal care, gestational age, parity, past obstetric history, associated risk factors, mode of delivery. Table 1 shows various demographic variables and its relation in patients with PPRM. Majority of the patients with PPRM were in the age group 26-30 years (52.2%). Mean age was 28.42 ± 6.24 . Majority were unbooked (70.9%). Majority were from the lower socioeconomic background (56.7%) and were uneducated (21.6%). Maximum number of cases were seen in primigravida (60.4%).

Maximum number of cases (56.8%) occurred in patients with late PPRM (gestational age between 34 to less than 37 weeks) and 43.2% cases had early PPRM (gestational age between 28 to less than 34 weeks). Around 38.8% of patients had delivery within 24 hours of membrane rupture. Only 10.4% had a latency period of more than 72 hours (Table 1). In our study, 50.7% of patients had Bishop's score less than 7 and 46.3% had Bishop's score more than or equal to 7. In our study, 15.6% of patients had maternal morbidity. Puerperal pyrexia was the most common maternal complication (5.2%) followed by chorioamnionitis (3.7%), wound infection (3.7%), and abruption (3%).

Table 1: Demographic Characteristics

Demographic Characteristics	Number	Percentage
Age(years)		
<20	14	10.2
21- 25	29	21.6
26-30	70	52.2
≥30	21	16
Antenatal care		
Booked	39	29.1
Unbooked	95	70.9
Socioeconomic status		
Upper middle	13	19.7
Lower middle	20	14.9
Upper lower	25	18.6
Lower	76	56.8
Education		
Uneducated	29	21.6
Primary	41	30.6
Secondary	54	40.3
Graduate and above	10	7.5
Parity		
Primigravida	60.4	60.4
Multigravida	39.6	39.6
Gestational age (weeks)		
28 to < 32	14	10.4
32 to < 34	44	32.8
34 to <37	76	56.8
Latency period(hours)		
0 to 24	52	38.8
>24 to 48	36	26.9
>48 to 72	32	23.9
>72	14	10.4
Bishop's score		
<7	68	50.7
≥7	66	46.3
Maternal complications		
Puerperal pyrexia	7	5.2
Chorioamnionitis	5	3.7
Wound infection	5	3.7
Abruption	4	3

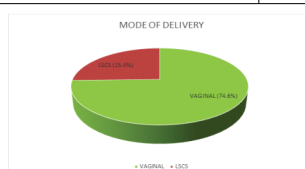


Figure 1: Distribution Of Patients By Mode Of Delivery (n= 134)

Majority of the patients had vaginal delivery (74.6%). Only 25.4% of cases underwent lower segment caesarean section. Most common indication for LSCS was fetal distress (9%), followed by previous LSCS (5.2%), malpresentation (4.5%), oligohydramnios (3.7%) and failure of induction (3%).

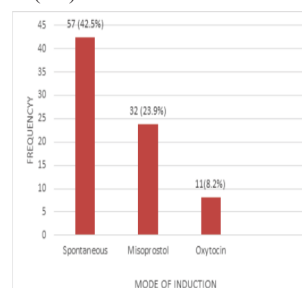


Figure 2: Distribution Of Patients According To Mode Of Induction In Vaginal Delivery (n=100)

Among 100 patients delivered vaginally, 42.5% patients had spontaneous vaginal delivery (Figure 2).

Table 3: Foetal Outcomes

Baby weight (gram)	Number	Percentage
< 1000	3	2.2
1000 to < 1500	9	6.7
1500 to < 2000	18	13.4
2000 to < 2500	64	47.8
≥2500	40	29.9
Perinatal morbidity		
Respiratory Distress Syndrome	12	9
Birth asphyxia	7	5.2
Sepsis	6	4.5
Hyperbilirubinemia	5	3.7
Necrotizing enterocolitis	2	1.5
Perinatal mortality		
Birth asphyxia	3	2.3
RDS	1	0.7
Sepsis	1	0.7
NICU admissions		
Yes	34	25.4
No	100	74.6

Table 3 shows that 23.9% of cases had neonatal morbidity. RDS was the most common cause of neonatal morbidity. Perinatal mortality was seen in 5 cases (3.7%). Birth asphyxia was the most common cause of perinatal mortality (2.3%). Almost one forth of the babies had NICU admissions.

Table 4: Association Between Gestational Age And Latency Period

LATENCY PERIOD (hrs)	GESTATIONAL AGE		
	Early PPRM n (%)	Late PPRM n (%)	P VALUE
0 – 24	19 (37.5%)	33 (63.5%)	0.010
>24 – 48	15 (41.7%)	21 (58.3%)	
>48 – 72	14 (43.7%)	18 (56.3%)	
>72	10 (71.4%)	4 (28.6%)	

Table 4 shows that out of 10.4% who had latency period of more than 72 hours, 71.4% were of early PPRM and 28.6% were of late PPRM. Around 63.5% of patients with late PPRM delivered within 24 hours. It signifies that shorter the gestational period, the longer the latent period.

Table 5: Association Between Mode Of Delivery And Gestational Age

MODE OF DELIVERY	Early PPRM n (%)	Late PPRM n (%)	P VALUE
VAGINAL DELIVERY	53 (91.3)	47 (61.9)	0.007
LSCS	5 (8.7)	29 (38.1)	

Almost 91.3% of women with early PPRM delivered vaginally and 8.7% delivered by LSCS. In patients with late PPRM, almost 61.9% delivered vaginally and 38.1% delivered by caesarean section, which was statistically significant (Table 5).

Table 6: Association Between Birth Weight And Gestational Age

BIRTH WEIGHT (gm)	GESTATIONAL AGE (WEEKS)		P VALUE
	Early PPROM n (%)	Late PPROM n (%)	
Extremely low birth weight	3 (100)	0 (0)	0.000
Very low birth weight	8 (88.9)	1 (11.1)	
Low birth weight	37 (45.2)	45 (54.8)	
Normal	0 (0)	40 (100)	

Table 6 shows that neonates delivered following early PPROM had low birth weight and this trend significantly decreases as the gestational age increases.

Table 7: Association Between Apgar Score At 1 And 5 Minutes And Gestational Age

APGAR SCORE AT 1 MINUTE	EARLY PPROM n (%)	LATE PPROM n (%)	P VALUE
< 7	20 (34)	6 (7.9)	0.0000
≥ 7	38 (66)	70 (92.1)	
APGAR SCORE AT 5 MINUTE			
<7	11(19)	2(2.6)	0.02
≥7	47(81)	74(97.4)	

Table 7 shows that 92.1% of the neonates of cases with late PPROM had APGAR score more than or equal to seven in the 1st minute and was found to be statistically significant. APGAR score at 1 and 5 minutes significantly improved as the period of gestation increased.

Table 8: Association Between Nicu Admissions And Gestational Age

NICU ADMISSIONS	GESTATIONAL AGE (WEEKS)		P Value
	Early PPROM n (%)	Late PPROM n (%)	
YES	29 (85.3)	5 (14.7)	0.000
NO	29 (29)	71(71)	

NICU admissions were common (85.3%) in patients with early PPROM. Only 14.7% got admitted in patients with late PPROM. NICU admissions significantly decreased as the gestational age at the time of admission increased.

Table 9: Association Between Gestational Age And Neonatal Morbidity

NEONATAL MORBIDITY	GESTATIONAL AGE (WEEKS)		P VALUE
	Early PPROM n (%)	Late PPROM n (%)	
YES	25(43.1)	7(9.2)	0.000
NO	33(56.9)	69(90.8)	
NEONATAL MORTALITY			
YES	4(80)	1(20)	0.03
NO	54(41.8)	75(58.2)	

Out of 23.9 % of neonatal morbidity, maximum complications (43.1%) were seen in patients with early PPROM, which is statistically significant. Neonatal mortality was 80% in patients with early PPROM and 20% in patients with late PPROM, which was statistically significant.

Table 10: Association Between Gestational Age And Maternal Morbidity

MATERNAL MORBIDITY	GESTATIONAL AGE (WEEKS)		P VALUE
	Early PPROM n (%)	Late PPROM n (%)	
YES	14(66.7)	7(33.3%)	0.017
NO	44(38.9)	69(61.1%)	

The maternal morbidity increases as the duration of PPROM increases. Maternal morbidity was 66.7% in cases with early PPROM and 33.3% in cases with late PPROM and was statistically significant. (Table 10)

Table 11: Analysis Of PPROM According To Duration Of PPROM And Maternal Morbidity

LATENCY (hrs)	MATERNAL MORBIDITY n(%)	P VALUE
	YES	NO

0 – 24	4 (7.6)	48 (92.4)	0.003
>24 – 48	3 (8.3)	33 (91.7)	
>48 – 72	9 (28)	23 (72)	
>72	5 (35)	9 (65)	

Table 11 shows that maternal morbidity increases as the duration of PPROM increases, which was statistically significant.

DISCUSSION

The study is a cross sectional study conducted among 134 patients with PPROM admitted to Department of Obstetrics and Gynaecology, RIMS, Imphal. Majority of the cases (52.2%) belonged to age group of 26 – 30 years (52.2%). The mean age was 28.42 ± 6.24 . This finding is in accordance with the study conducted by Triniti A et al⁵ where the mean age of patients were 29.8 ± 7.2 years. In this study, booked cases were 29.1% and unbooked cases were 70.9% which was comparable with the study conducted by Akter et al⁶. In unbooked cases, there is lack of antenatal care leading to lack of identification of recurrent risk factors like PPROM, preterm delivery, induced abortions and their managements. Urogenital infections are also not detected and treated due to lack of antenatal care leading to PPROM.

In this study, patients of low socioeconomic status were 56.8%, which was comparable with the study conducted by Pandey S et al⁷ were 61% of patients belonged to lower socioeconomic status. Ferguson SE et al⁸ in his study reported that PPROM is associated with low maternal haemoglobin and low socioeconomic status. In this study, 40.3% of cases had secondary level of education, while 21.6% were uneducated which was comparable with the study conducted by Akter S et al⁶ which showed that 36% of cases had secondary level of education.

In this study, around 43.2% of the patients had early PPROM and 56.8% had late PPROM, which implies that the risk of PPROM increases with increasing gestational age. This was comparable with the study by Akter et al¹⁴, where 66% of cases were late PPROM. In the present study, 38.8% of patients delivered within 24 hours of membrane rupture and 10.4% of patients had a latency period of more than 72 hours. 71.4% cases were of early PPROM and 28.6% cases were of late PPROM. It signifies that shorter the gestational period, the longer the latent period (p value = 0.036). This finding is consistent with the study conducted by Singhal S et al¹¹.

Vaginal delivery was seen in 74.6% and 25.4% underwent caesarean section. This was similar with the study conducted by Singhal S et al¹¹ where the incidence of caesarean section was 31.3%. Most common indication of LSCS was fetal distress (9%) which was comparable with the study conducted by Pandey S et al⁷ and Singhal S et al¹¹. Among 100 patients who delivered vaginally, 42.5% had spontaneous vaginal delivery and 32.1% had induced delivery. Induction with misoprostol was done in 23.9% patients and oxytocin was done in 8.2% patients. This was comparable to the study conducted by Devi et al¹², where 31% of patients had induced labour.

Maternal morbidity was seen in 15.6% of patients. Puerperal pyrexia was the most common maternal complication (5.2%) followed by chorioamnionitis (3.7%), wound infection (3.7%), and abruption (3%). Maternal morbidity was common in patients with early PPROM (66.7 %) and was statistically significant (p=0.017). In this study, as the duration of PPROM increases maternal morbidity also increases, which was found to be statistically significant (p=0.000). Almost one forth (25.4%) of babies required NICU admissions. NICU admissions were common (85.3%) in patients with early PPROM. NICU admissions significantly decreased as the gestational age increased (p< 0.01). D souza et al¹³ also showed in his study that lesser the gestation age more are the chances of fetomaternal complications in patients with PPROM. APGAR score less than 7 at 1 minute was seen in 20% and 10% of the neonates had APGAR score less than 7 at 5 minute. APGAR score at 5 minute significantly improved as the period of gestation increased (p=0.02), which was comparable to studies conducted by D souza et al¹³ and Kadikar GK et al¹⁴.

Perinatal morbidity was 23.9%, out of which 9% were RDS, 5.2% were birth asphyxia, 4.5% were sepsis, 3.7% were hyperbilirubinemia and 1.5% were Necrotizing enterocolitis. This was comparable with the study by Diraviyam JMV et al⁹ where perinatal morbidity was 24%. Out of 23.9 % of perinatal morbidity, maximum complications (43.1%) were seen in early PPROM. Perinatal mortality was seen in 3.7% of patients, out of which 2.3% were due to sepsis, 0.7% were due to birth asphyxia and 0.7% due to RDS, which was much lower than the

finding in the study by Pandey S et al⁷ which showed a perinatal mortality of 12% with sepsis 25% with birth asphyxia. Perinatal mortality was 80% in patients with early PPRM and 20% in patients with late PPRM. This translates to great benefit of prolonging pregnancy beyond 34 in cases with PPRM. Perinatal morbidity and mortality increases when the birth weight decreases. When birth weight was less than 1000gm, perinatal morbidity was 100% and mortality was 66.6%. This was reduced to 12.5% and 0% respectively when the birth weight was more than 2500gm. Devi A et al¹² also showed in her study that survival of the newborn and birth weight increases as gestational age at PPRM increases.

CONCLUSION

Preterm premature rupture of membranes (PPROM) is a commonly encountered obstetric complication. The condition poses jeopardy to both fetus and mother as prematurity and its sequelae endanger the fetus, while risk of infection with an amnionitis is a threat to both fetus and mother. Premature infant puts immense burden on the economy and health care resources of the country. Therefore, management of PPRM requires accurate diagnosis and evaluation of the risks and benefits of the continued pregnancy or expeditious delivery.

Screening and treatment of risk factors may contribute to prevention of PPRM. Neonatal survival depends on gestational age and availability of advanced neonatal facilities. Patients and family members should be counselled regarding the outcome of pregnancies with PPRM. A team effort by the obstetrician and neonatologist can ensure a healthy and fruitful life for mother and baby.

In our study, the results revealed that the poor fetal outcome in women with preterm premature rupture of membranes was associated with a gestational age of less than 34 weeks and an extremely low birth weight. As such, more efforts have to be made to improve our neonatal intensive care unit so that they become better equipped to deal with such kind of complications to improve outcomes. Proper health education, improved health hygiene, adequate antenatal checkups and improved neonatal care service can reduce maternal and perinatal morbidity.

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