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A Study on Incidence, Risk Factors and Fetometarnal Outcome of Preterm Prelabor Rupture of Membranes

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Abstract **Original Research Article**

Background: Preterm prelabor rupture of membranes (PPROM) is a common obstetric problem and an important cause of maternal and perinatal morbidity and mortality. It complicates about 2%–3% of pregnancies before 37 completed weeks and contributes significantly to preterm birth. PPROM is commonly associated with infection, poor socioeconomic condition, malnutrition, previous obstetric complications and cervical or uterine abnormalities. ***Objective:*** To determine the incidence, risk factors and fetomaternal outcomes of PPROM. ***Methods:*** This descriptive cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Sir Salimullah Medical College and Mitford Hospital, Dhaka, from April 2013 to October 2013. A total of 50 pregnant women with PPROM between 28+0 and 36+6 weeks of gestation were enrolled by purposive sampling technique. Data were collected using a pretested structured questionnaire and analyzed using SPSS version 22. Descriptive statistics were used to present the findings. ***Results:*** The mean age was 27.24±6.28 years, and most were multigravida (62%). Half of the women had no antenatal care, and only 10% received regular antenatal care. The mean gestational age was 34.74±2.27 weeks, with most cases occurring between 35+0 and 36+6 weeks. Previous adverse obstetric or gynecological history was present in 56% of women. Urinary tract infection (34%), anaemia (26%) and lower genital tract infection (12%) were the common associated conditions. The mean latency period was 18.87±16.19 hours, and the mean interval between membrane rupture and delivery was 27.60±21.12 hours. Vaginal delivery occurred in 84% of cases. Neonatal complications included birth asphyxia (42%), neonatal jaundice (22%), respiratory distress syndrome (12%) and neonatal sepsis (8%). Maternal complications occurred in 32% of women, with chorioamnionitis being the commonest complication (14%). ***Conclusion:*** PPROM is associated with infection, poor antenatal care and adverse fetomaternal outcomes. Early identification of risk factors, proper antenatal care, appropriate antibiotics and timely delivery may improve outcomes.

Keywords: Preterm Prelabor Rupture of Membranes (PPROM), Fetomaternal Outcome, Maternal Complications, Neonatal Outcome.

INTRODUCTION

Preterm prelabor rupture of membranes (PPROM) is defined as rupture of the fetal membranes before the onset of labor and before 37 completed weeks of gestation [1]. It results in leakage of amniotic fluid in the absence of regular uterine contractions and exposes the fetus to an increased risk of infection and prematurity-related complications [2]. The latency period, defined as the interval between membrane rupture and the onset of labor, generally becomes shorter as gestational age advances [3]. PPROM is an important contributor to preterm birth and accounts for approximately 35% of all preterm deliveries [4]. Although many cases occur without an obvious cause, several risk factors have been identified. These include genital tract infection, urinary tract infection, low socioeconomic status, poor nutrition, anaemia, poor

hygiene, high parity, smoking, psychological stress, antepartum hemorrhage and previous history of PROM or preterm birth [5]. Low educational status and inadequate antenatal care may further increase the risk, particularly in developing countries [4-5]. PPROM is associated with significant maternal and neonatal morbidity and mortality [1]. Maternal complications include chorioamnionitis, endometritis and placental abruption. Neonatal outcomes are mainly influenced by gestational age at delivery and may include birth asphyxia, respiratory distress syndrome, hypothermia, hypoglycaemia, jaundice, neonatal sepsis, necrotizing enterocolitis, intraventricular hemorrhage and long-term neurological impairment [4]. PPROM also carries a risk of recurrence in subsequent pregnancies [6]. PPROM remains a common obstetric problem in Bangladesh and contributes substantially to adverse fetomaternal outcomes. Early identification of associated risk factors and timely management may reduce maternal and perinatal morbidity and mortality. This study was therefore designed to determine the incidence, risk factors and fetomaternal outcomes of PPROM among hospital admitted patients.

METHODS

This descriptive cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Sir Salimullah Medical College and Mitford Hospital (SSMC&MH), Dhaka, Bangladesh, over a period of six months from April 2013 to October 2013. The study population included 50 pregnant women admitted with preterm prelabor rupture of membranes during the study period. Although the calculated sample size was 384, a total of 50 eligible patients were enrolled due to time constraints and limited availability of cases. Purposive sampling technique was used.

Pregnant women with gestational age between 28+0 and 36+6 weeks and a history of spontaneous rupture of membranes before the onset of labor were included. Women with pregnancy of 37 completed weeks or more, established labor, antepartum hemorrhage with infection, or iatrogenic induction of labor before 37 weeks were excluded. After obtaining informed written consent, data were collected using a pretested structured questionnaire and data collection form. Information was recorded on sociodemographic characteristics, obstetric history, clinical presentation, examination findings, investigation reports, mode of delivery, maternal complications and neonatal outcomes. All patients underwent proper history taking, general physical examination, systemic examination, local examination of the vulva, vagina and cervix, and relevant laboratory investigations.

Data were checked, edited and cleaned before analysis. Statistical analysis was performed using SPSS version 22. Descriptive statistics, including frequency (n) with percentage (%) and mean with standard deviation (SD) were used for data presentation.

Ethical Consideration

Ethical clearance was obtained from the Ethical Review Committee (ERC) of SSMC&MH, Dhaka, Bangladesh. Informed written consent was taken from each participant or legal guardian after proper counseling. Confidentiality of patient information was strictly maintained, and no additional financial burden was imposed on the participants.

RESULTS

Table 1 shows that PPROM was more common among women aged 21 years and above. The mean age was 27.24±6.28 years. Most participants were multigravida (62%), housewives or unemployed (70%), and had poor antenatal care. Half of the women had no antenatal care, while only 10% received regular antenatal care, indicating inadequate pregnancy supervision among the study participants.

Table 1: Sociodemographic and obstetric characteristics of women with PPROM (N=50)

Variables	Frequency (n)	Percentage (%)
Age group		
<20 years	12	24.0
21–30 years	19	38.0
>30 years	19	38.0
Mean ± SD	27.24±6.28 years	
Parity		
Primigravida	19	38.0
Multigravida	31	62.0
Monthly family income		
<10,000 Tk	20	40.0
≥10,000 Tk	30	60.0
Occupation		
Housewife/unemployed	35	70.0
Service holder	15	30.0
Educational status		

Variables	Frequency (n)	Percentage (%)
Below primary level	16	32.0
Up to SSC	18	36.0
Above SSC	16	32.0
Antenatal care		
Regular	5	10.0
Irregular	20	40.0
No antenatal care	25	50.0

Table 2 shows that most cases of PPROM occurred in late preterm pregnancy. The majority of women, 66%, were between 35+0 and 36+6 weeks of gestation. The mean gestational age was 34.74±2.27 weeks.

Table 2: Distribution of women with PPROM according to gestational age at admission (N=50)

Gestational age at admission	Frequency (n)	Percentage (%)
29+0 to 31+6 weeks	5	10.0
32+0 to 34+6 weeks	12	24.0
35+0 to 36+6 weeks	33	66.0
Total	50	100.0
Mean ±SD	34.74 ± 2.27 weeks	

Table 3 shows that 56% of the women had previous adverse obstetric or gynecological history. History of abortion was the most common finding (20%), followed by previous PROM (14%) and previous preterm delivery due to PROM (10%).

Table 3: Previous obstetric and gynecological history of the study participants (N=50)

Previous history	Frequency (n)	Percentage (%)
Abortion	10	20.0
Previous PROM	7	14.0
Previous preterm delivery due to PROM	5	10.0
Menstrual regulation	4	8.0
Dilatation and curettage	2	4.0
No relevant history	22	44.0
Total	**50**	**100.0**

Table 4 shows possible risk factors and associated maternal conditions. Most women, 60%, had sexual activity within 2 to 7 days before PPROM. Urinary tract infection was the most common associated condition (34%), followed by anaemia (26%) and lower genital tract infection (12%).

Table 4: Risk factors and associated maternal conditions among women with PPROM (N=50)

Variables	Frequency (n)	Percentage (%)
Time since last coitus		
<48 hours	6	12.0
2–7 days	30	60.0
1 week–1 month	10	20.0
>1 month	4	8.0
Associated maternal conditions		
Urinary tract infection	17	34.0
Anaemia	13	26.0
Lower genital tract infection	6	12.0
Hypertension	5	10.0
Diabetes mellitus	2	4.0
Renal disease	1	2.0

Table 5 shows cervical findings at admission. Most women had cervical effacement of 0–50% (68%) and cervical dilatation of less than 2 cm (72%).

Table 5: Cervical findings at admission among women with PPROM (N=50)

Cervical finding	Frequency (n)	Percentage (%)
Cervical effacement		
0–50%	34	68.0
51–100%	16	32.0
Cervical dilatation		
<2 cm	36	72.0
≥2 cm	14	28.0

Table 6 shows that 46% of women developed labor pain within 15 hours of membrane rupture, and 72% developed labor pain within 30 hours. The mean latency period was 18.87±16.19 hours. More than half of the women delivered within 24 hours, and the mean interval between membrane rupture and delivery was 27.60±21.12 hours.

Table 6: Latency period and interval between membrane rupture and delivery among women with PPROM (N=50)

Clinical interval	Frequency (n)	Percentage (%)
Interval between rupture of membranes and onset of labor pain		
1–15 hours	23	46.0
16–30 hours	13	26.0
31–45 hours	5	10.0
46–60 hours	4	8.0
No labor pain	5	10.0
Mean ± SD latency period	18.87 ± 16.19 hours	
Interval between rupture of membranes and delivery		
<12 hours	12	24.0
12–24 hours	15	30.0
24–48 hours	11	22.0
>48 hours	7	14.0
Undelivered during study period	5	10.0
Mean ± SD interval between rupture of membranes and delivery	27.60 ± 21.12 hours	

Table 7 shows that vaginal delivery was the predominant mode of delivery. Most women, 84%, delivered vaginally, while 16% required caesarean section.

Table 7: Mode of delivery among women with PPROM (N=50)

Mode of delivery	Frequency (n)	Percentage (%)
Vaginal delivery	42	84.0
Caesarean section	8	16.0
Total	**50**	**100.0**

Table 8 shows neonatal outcomes among the study participants. Birth asphyxia was the most common neonatal complication, occurring in 42% of newborns, followed by neonatal jaundice (22%), respiratory distress syndrome (12%) and neonatal sepsis (8%).

Table 8: Neonatal outcomes among PPROM cases (N=50)

Neonatal outcome	Frequency (n)	Percentage (%)
Birth asphyxia	21	42.0
Neonatal jaundice	11	22.0
Respiratory distress syndrome	6	12.0
Neonatal sepsis	4	8.0
Total	**42**	**84.0**

Table 9 shows maternal complications following PPROM. Overall, 32% of women developed maternal complications. Chorioamnionitis was the most common complication (14%), followed by puerperal sepsis (10%), endometritis (4%), abruptio placentae (2%) and wound infection (2%).

Table 9: Maternal complications among women with PPROM (N=50)

Maternal complication	Frequency (n)	Percentage (%)
Chorioamnionitis	7	14.0
Puerperal sepsis	5	10.0
Endometritis	2	4.0
Abruptio placentae	1	2.0
Wound infection	1	2.0
Total maternal complications	**16**	**32.0**

DISCUSSION

Preterm prelabor rupture of membranes (PPROM) is an important obstetric problem because of its association with preterm birth, maternal infection and adverse neonatal outcomes. Its incidence varies between countries and hospitals, mainly due to differences in socioeconomic status, nutrition, hygiene, antenatal care and health service facilities. In the present study, most women belonged to lower or middle socioeconomic groups, and half had no antenatal care, indicating poor antenatal supervision as an important contributing factor.

The mean age of the patients was 27.24±6.28 years, which is comparable with related other studies [7-10]. PPROM was more common among multigravida women than primigravida women, although this differs from the findings of a previous study [8]. Notable previous obstetric and gynecological history was also frequent; 56% of women had a history of abortion, PROM, preterm delivery due to PROM, menstrual regulation or dilatation and curettage. These factors may increase the risk of PPROM by causing cervical weakness, altered genital tract environment or ascending infection [11-12].

Infection appeared to be an important associated factor. Urinary tract infection was present in 34% of cases and lower genital tract infection in 12%, consistent with previous reports [13-15]. Ascending infection may weaken the fetal membranes through inflammation and enzymatic collagen degradation. Anaemia, hypertension and diabetes mellitus were also observed and may contribute through impaired immunity, poor tissue strength and altered maternal health [13, 15-16].

Sexual activity before membrane rupture was reported by 72% of women within one week of PPROM. Coitus may cause local irritation and facilitate ascending microbial infection. Similar findings have been reported in some studies, although lower rates were observed in others [7-8, 11-12].

In this study, most cases (66%), occurred between 35+0 and 36+6 weeks of gestation, similar to previous studies [8-9]. The mean latent period was 18.87±16.19 hours, and 72% of women developed labor pain within 30 hours of membrane rupture. This supports the known inverse relationship between gestational age and duration of latency [13].

Among the study cases, vaginal delivery was the commonest mode of delivery, occurring in 84% of cases, while 16% underwent caesarean section. The main indications for caesarean delivery were fetal distress, malpresentation and chorioamnionitis. This rate was similar to findings of a related study [18], but lower than that reported by another study [19]. The mean interval between membrane rupture and delivery was 27.60±21.12 hours, and more than half of the women delivered within 24 hours.

Neonatal morbidity was considerable. The mean birth weight of the newborns was 2.59±0.33 kg. Birth asphyxia occurred in 42% of newborns, neonatal jaundice in 22% babies, respiratory distress syndrome in 12% and neonatal sepsis in 8% newborns. These outcomes are influenced by gestational age, birth weight, duration of membrane rupture, infection and availability of neonatal care facilities [8-9].

Maternal complications occurred in 32% of study cases. Chorioamnionitis was the most common complication, affecting 14% of women, followed by puerperal sepsis, endometritis, abruptio placentae and wound infection. Ascending infection, prolonged rupture of membranes and delayed presentation may contribute to these complications. Bacterial vaginosis-related organisms and enteropharyngeal organisms have been associated with PPROM [16].

All patients received antibiotics, mainly ampicillin or cephradine according to hospital supply. However, other previous studies used erythromycin, cephradine or metronidazole-based regimens [8-9, 17]. Variation in antibiotic protocol, hospital setting and early infection detection may explain differences in maternal infection rates. In this study, C-reactive protein and ultrasonography were not routinely available for early prediction of infection.

Overall, PPROM was associated with multigravidity, poor antenatal care, previous adverse obstetric history, urinary tract infection, lower genital tract infection and anaemia. Early antenatal detection and treatment of infection, correction of anaemia, proper counseling, antibiotic therapy and timely delivery planning may reduce fetomaternal morbidity related to PPROM.

CONCLUSION

PPROM was more common among women with poor socioeconomic status, inadequate antenatal care, infection and anaemia, and was associated with

adverse maternal and neonatal outcomes. Regular antenatal care, early detection and treatment of risk factors, timely antibiotics and appropriate delivery planning may improve fetomaternal outcomes. Conservative management should be carefully balanced against maternal and fetal risks, and early delivery should be considered when chorioamnionitis or fetal compromise is suspected. The findings should be interpreted cautiously due to the small sample size and short study duration.

Limitations of the study

It was a single-center study having small sized sample with purposive sampling, thus limiting generalizability. The cross-sectional design and absence of a control group prevented causal inference, while short follow-up restricted assessment of long-term fetomaternal outcomes.

Conflict of interest: The author declares no conflict of interest.

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