# Early Neonatal Outcome in Premature Rupture of Membranes

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# Abstract:

**Background:** Premature rupture of membranes (PROM) refers to the rupture of the amniotic sac before the onset of labor. When PROM occurs before 37 weeks of gestation, it is termed preterm PROM (PPROM). This condition significantly influences the course of pregnancy and neonatal outcomes. The early neonatal outcome in PPROM depends on various factors, including the gestational age at rupture, the presence of infections, the management of the pregnancy, and any complications arising from premature birth. **Objectives:** The aim of the study was to evaluate the early neonatal outcome in premature rupture of membranes. Methods: This observational crosssectional study was carried out in the Department of Obstetrics and Gynecology in the Mymensingh Medical College, Mymensingh, during January 2007 to July 2007. A total of 100 patients participated in the study. Statistical analyses of the results obtained by using window-based Microsoft Excel and Statistical Packages for Social Sciences (SPSS-24). Results: In this study, the majority of patients (66%), were aged between 21 to 30 years. The average age of patients with PROM was 27 years  $\pm 0.58$ . The majority of patients (57%) had a lower socioeconomic level, and the majority of patients were multipara (59%) primipara (41%). This study also revealed that the majority of patients (50%) had received prenatal care irregularly.37% of the patients received no prenatal care, while only 13% received regular antenatal checkups. Conclusion: The early neonatal outcome following PPROM are influenced by the gestational age at rupture, the duration of the rupture, the presence of infections, and the time of delivery. While many preterm infants born after PPROM have positive outcomes, the risk of complications such as respiratory distress, infection, and neurological impairments is elevated. Management strategies, including the use of corticosteroids, antibiotics, and close monitoring, are essential in improving neonatal outcome.

Keywords: PROM, PPROM, Neonatal, Neurologic, Corticosteroids.

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# I. Introduction

Every woman dreams to be a mother in her lifetime. To be a mother, a woman must have a happy outcome of her pregnancy both for the fetus and herself. Many factors influence the outcome of a pregnancy, premature rupture of membrane (PROM) is one of them. Under normal circumstances, the fetal membranes rupture during the active phase of labor. Premature rupture of membrane is defined as spontaneous rupture of the chorioamnion before the onset of uterine contraction. The membrane may rupture either at term that is after 37 completed gestational weeks or before term, then it is called preterm premature rupture of membrane. [1] The overall incidence of PROM is 2-8%. If more than 24 hours have elapsed before onset of labor then it is called prolonged rupture of membrane. [2]

The etiology of PROM is largely unknown. The possible causes are either reduction of membrane strength or an increase in intrauterine pressure or both. It may be associated with an incompetent cervix, unstable lie, polyhydramnios, multiple pregnancy, sexual activity, infection (Chorioamnionitis, Urinary tract infection and Lower genital tract infection). [3] Infection is closely associated either as an etiological factor or as a consequence of PROM. From the maternal point of view, chorioamnionitis is a major problem that can lead to intrapartum and postpartum sepsis and rarely, septicemia. PROM may lead to fatal deformities, neonatal morbidity and mortality and pre-maturity. [4]

The risk factors of PROM are low socio-economic status, malnutrition, over exertion, poor hygiene, stress, high parity, recurrent genito-urinary tract infection, anemia, smoking and repeated per vaginal examination. PROM is very often seen in obstetric ward in our country. PROM often leads to neonatal morbidity and mortality. To improve fatal outcome in PROM the present study was undertaken.

#### II. Methodology

This observational cross-sectional study was carried out in the Department of Obstetrics and Gynecology in the Mymensingh Medical College, Mymensingh during January 2007 to July 2007(6 months). A total of 100 consecutive cases fulfilling the inclusion and exclusion criteria were included in this study.

After taking a proper history, gestational age was determined by last menstrual period, previous antenatal records, clinical examination and confirmed by ultrasonography (where available). Documentation of membrane rupture was made by a sterile speculum examination or pooling of amniotic fluid in the posterior vaginal fornix following fundal pressure. Demonstration of Oligohydramnios by ultrasonographic examination was used as a supporting diagnostic method (when available).

During speculum examination, a high vaginal swab was taken from all the patients and sent for culture and sensitivity tests. When decision was taken for termination, single prevaginal examination was done to assess cervical condition. Plan of management was decided depending on the cervical condition and duration of membrane rupture and sign symptoms of chorioamnionitis. Induction or labor augmentation was done with oxytocin drip. In case of uninfected patients with gestational age < 36 weeks, conservative approach was taken. The patients in this group were advised for bed rest with toilet facilities and were asked to wear a pad which was inspected four- hourly to detect amount of liquor and its color. In case of any evidence of infection during conservative approach or patient went to spontaneous labor, induction or augmentation was done. Prevaginal examination was restricted to minimum and no further prevaginal examination was done if decision of delivery by Cesarean section was taken.

After taking consent and matching eligibility criteria, data were collected from patients on variables of interest using the predesigned structured questionnaire by interview/observation. Statistical analyses of the results were be obtained by using window-based Microsoft Excel and Statistical Packages for Social Sciences (SPSS-24).



# Figure I: Age distribution of patients with PROM (n=100)

Figure I is showing that majority of patients (66%), belonged to the age group between 21-30 yrs. Mean age of patients with PROM were  $27yrs \pm 0.58$  (0.58 was the standard deviation from the mean).

# Table I: Distribution of Incidence of parity, Gestational age at delivery, antenatal check-up during current pregnancy. antenatal check-up during current pregnancy. (n=100)

	n=100	%
Socio-economic condition		
Above average	4	4.0
Average	39	39.0
Below average	57	57.0

Gravida		
Primi	41	41
Multi	59	59
Gestational age		
28- 34 weeks	9	9
34-37wks	11	11
37-40wks	24	24
41-42wks	56	56
Antenatal Care		
No Antenatal care	37	37
Irregular Antenatal care	50	50
Regular Antenatal Care	13	13
Total	100	100

Table I shows that the fact that most (57%) of the patients came from below average socio- economic status. majority of patients were multipara (59%) and primipara was 41% patients. The PROM patient's (56%) gestational age at delivery were >40 weeks. Mean gestational age was  $41 \text{wks} \pm 0.98$  (0.98 was standard deviation from the mean). This table is showing that majority of patients (50%) had availed antenatal care irregularly .37% of the patients have received no antenatal care; only 13% had received regular antenatal check-up.

# Table II: Distribution of Associated disease and Past Obstetric History.

Disease Association	n=100	%
No associated disease	45	45
Associated disease	55	55
Urinary tract infection	21	21
Genital tract infection	9	9
Anemia	13	13
Malnutrition	8	8
Diabetes mellitus	4	4
Obstetric History		
Premature rupture of membrane	22	22
Preterm labor	9	9
Abortion	10	10
Multiple pregnancy	2	2
Others	3	3
No abnormality	54	54
Total	100	100

Table II shows that 55 PROM patient had some associated diseases and among them UTI (38.20%) was the most common associated disease and next common was anemia (23.64%). The distribution of past obstetric history. Recurrent PROM was present in 22% and history of abortion in the previous pregnancy was present in 10% cases. 54% of patients did not have any significant obstetric complication in the past.

# Table III: Interval between last sexual intercourse and PROM

Duration	n=100	%
<48 hrs	14	14
48 hrs-1wk	45	45
1wk-1mnth	15	15
>1mnth	26	26
Total	100	100

Table III shows that 14% patients had given the history of sexual contact within <48 hrs and 45% had sexual contact within 48hrs- 1 wk.



Figure II: Time interval between rupture membrane and delivery (n=100)

Figure II shows that 80% patient had delivery within 24 hours of rupture membrane. 17% delivered within <12 hours of rupture membrane and 63% delivered within 12-24 hours of rupture membrane. Mean PROM and delivery interval was  $16\pm0.6$  hrs.

High Vaginal Swab Culture	n=100	%
Negative Swab Culture	33	33.0
Positive Swab Culture	58	58.0
Escherichia colli	30	30.0
Staphylococcus	10	10.0
GroupB Streptococcus	2	2.0
Proteus	3	3.0
Klebsiella	3	3.0
Others	10	10
Total	100	100

# Table IV: High Vaginal Swab Culture of Patients with PROM.

Table IV shows that out of 100 patients, 33 cases were negative swab culture. 58 cases were positive swab culture. Only aerobic culture was done. Escherichia colli was found to be the most common pathogen 30 cases.

Apgar Score	%
>7	80
5-7	15
< 5	5
Birth weight (kg)	No of Babies of PROM patients
Birth weight (kg) < 1.5 kg	No of Babies of PROM patients 5
Birth weight (kg)           <1.5 kg           1.5- 2.5 kg	No of Babies of PROM patients 5 25
Birth weight (kg) <pre></pre>	No of Babies of PROM patients 5 25 45

# Table V: Apgar score of the Babies.

Table V shows that most of the babies were born with Apgar score > 7. Table also shows that majority of the babies weighed 2.5 kg or more at birth (60%); of them 45% weighed 2.5-3 kg.



Figure III: Line diagram of the Neonatal Outcome

Figure III shows that 60% neonates had no morbidity. 40% cases had neonatal morbidity. Most common neonatal morbidity was neonatal jaundice (17%).

# Table VI: Distribution of Sex of the Babies.

Sex of baby	Babies of PROM patient
Male	57
Female	43

Table VI shows that male babies were 57% and female babies were 43%.

# IV. Discussion

Premature rupture of membrane (PROM) is defined as spontaneous rupture of chorioamnion before the onset of uterine contraction. The membranes may rupture either at term, that is after 37 completed gestational weeks or before term, when it is called preterm PROM.

In this study, conducted in Mymensingh Medical College, Mymensingh 80% PROM cases occur in term pregnancy; in which 56% PROM cases were > 40 weeks and 24% were  $\geq$  37- 40 weeks. Twenty percentage PROM occurred in pre term pregnancy. Ghosh in his study conducted in 2003 had shown incidence of term PROM as 60% and preterm PROM as 40% in BSMMU. [5] This discrepancy may be due to the difference in methods of case selection (selection bias) in these two different tertiary hospitals or due to small number of cases. Further studies involving more cases may help. In this study majority of the patients (66%) belongs to the age group 21-30 years; which is similar to the studies done by Afrina and Ghosh. [5, 6]

In the present study socioeconomic status was considered by per month income of the family. We classified this into three strata: above average, average and below average. Majority (57%) of PROM patients was in the group of below average strata, and 39% were in the group of average socioeconomic status. These results are not very different in comparison to other studies. [5, 6] Wideman et al found the relationship between low plasma ascorbic acid levels and PROM in patients from lower socioeconomic classes. [7]

In our cross-sectional study fifty percent of mothers had irregular antenatal check-up. 37% of the patient of PROM belonged to no antenatal check-up group and 13% had regular antenatal check-up. This data is consistent with the other studies done in our country. [5, 6]

Maternal Diseases have highly significant impact on PROM. Comparisons with previous study are consistent with the findings, Majority percentage (55%) of PROM cases had maternal diseases, among which included 21% UTI, 13% anemia, 9% genital tract infection; 8% malnutrition and 4% Diabetes Mellitus. [5, 6]

PROM in a prior pregnancy is an identified risk factor for PROM. Recurrence rate in this study was 22% compared to 21% shown by Naeye et al, 18.8 % by Ghosh

et al. [4, 5]

Coitus is suggested as a risk factor for amniotic infection. So, chance of PROM significantly increases when coitus occurs among cases within previous 7 days. Coitus may facilitate microbial pathogen entrance into the upper reproductive tract. [6] In this study significant association was found between time of last sexual contact and PROM. About 59% of PROM cases reported last sexual intercourse within one week (48hr- 1 week=45%; <48 hr.= 14%).

Most of the patients (80%) with term pregnancy with PROM go into labor and delivery occur spontaneously. In this study 17 cases (17%0 delivered spontaneously within 12 hours, 63 cases (63%) delivered spontaneously within 24 hours and 20 cases (20%) had delivery after 24 hours of PROM. These findings are consistent with the previous study. [5, 6]

Different studies have shown the prevalence of microbial invasion of the amniotic cavity in patients with term PROM. The risk of infection after PROM is influenced by the number of vaginal examinations, potential pathogens present in the vaginal flora and antibacterial activity of the amniotic fluid. In this study we have tried to reduce the risk of infection as a result of a vaginal examination. After initial evaluation, no vaginal examination was done until and unless patient went into labor. No further vaginal examination was done once decision of delivery by caesarean section was taken.

Cervico-vaginal infection is most common etiological association of PROM. The facility of anaerobic culture was limited in the study facility. There were few patients where the culture wasn't done due to non-availability of the laboratory facility. In this study, out of 91 patients, 35 cases were negative in vaginal swab culture. 58 cases were positive in culture of high vaginal swab. Only aerobic culture was done. E. coli was found to be the most common pathogen which was 30 cases (33%). Because of limitation in study facility, anaerobic culture and other investigations; e.g. detection of Chlamydia, U. Urialyticum, Mycoplasma for diagnosis of sub clinical and clinical amniotic infections were not done. Afrina in her study showed positive HVS culture in 50% cases. [6] Begum in her study showed positive HVS culture in 57% cases. [8] These data and findings are consistent with this study. Patients with microbial invasion of the amniotic cavity are more likely to have clinical culture.

In this study, among 100 PROM cases, 57% was male baby and 43% female baby. Majority of the babies (80%) were born with upgar score >7. In this cross-sectional study majority (45%) of the babies had weight between 2.5-3 kg; 25% had weight between 1.5-2.5 kg; 5% had< 1.5 kg and 25% had >3 kg weight. In this study 60% cases had no neonatal morbidity. 40% cases had neonatal morbiditys. Most common neonatal outcome and morbidity was neonatal jaundice which was 17%. The second most common outcome was neonatal infection (12%) which included Septicemia, Meningitis, Pneumonia, Umbilical sepsis, Pyoderma, Conjunctivitis followed by neonatal death which was 5%. There were few cases of congenital anomaly and birth trauma. There was also a case of RDS and a case of Convulsion of neonate. Study focusing on neonatal outcome should be done in trials with larger no of cases. Our study has lower no of morbidity comparing to other studies, though mortality rate is higher comparing to Afrina. [6] This variation in result may due to the availability of facility in two different hospitals or because of the small number of cases. Further study should be done to evaluate this outcome difference in two different hospitals including larger group.

Because of scarcity of hospital bed, PROM patients with normal delivery were discharged earlier and follow- up of patients was not possible after their discharge. The real number of mortality and morbidity could not be estimated from this study. We need both hospital and community- based large scale studies on PROM to know the exact incidence of PROM (term and preterm), etiology of PROM and neonatal outcome of PROM. [6] Creating a national registry for hospital admitted PROM patients can help regarding this. To assess the outcome of infants delivered after PROM a longer period will help to evaluate the prognosis of these infants at highest risk of adverse events, especially pulmonary hypoplasia.

# Limitations of the study

The present study was conducted in a very short period due to time constraints and funding limitations. The small sample size was also a limitation of the present study.

# V. Conclusion

Various factors have been found to be associated in the causation of PROM. In this study some risk factors e.g. coitus, maternal diseases specially UTI, lower genital tract infection, malnutrition, multiple previous pregnancies. Past obstetric history, like past history of PROM, preterm labor, Abortion also plays some role in causation of PROM. This study focused on certain risk factors in relation to PROM which is preventable. Smoking, coitus, malnutrition, cervical examinations these are few preventable risk factors. Proper health education, motivating patient of personal hygiene, adequate maternal and child health care services, improved transport system for immediate medical attention/intervention, improvement of neonatal care system can help to curtail the neonatal morbidity and mortality. To assess neonatal morbidity and mortality further research should be done in PROM. Perinatal morbidity (40%) and mortality rate (50/ 1000 total birth) is a major threat in context to limited laboratory and pediatric support in our country. In our country we need more studies on PROM and studies may be designed in a large scale including larger number of patients to find out the causes of PROM and also further studies focusing on neonatal outcome should also be done.

#### VI. Recommendation

This study can serve as a pilot to much larger research involving multiple centers that can provide a nationwide picture, validate regression models proposed in this study for future use and emphasize points to ensure better management and adherence.

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