RESEARCH PAPER

Maternal And Perinatal Outcome In Cases Of Preterm Premature Rupture Of Membrane - A Prospective Observational Study

Dr Indrajit Majumdar[1], Dr Suresh Chandra Mondal[2*]

[1]Senior Resident, Department of G & O, Malda Medical College & Hospital

[2*]Associate Professor, Department of G & O, Malda Medical College & Hospital

(Corresponding Author)

ABSTRACT

Background: PROM occurs in approximately 10 % of all pregnancies and in 70% of the cases at term. Although there is some morbidity when PROM occurs in term pregnancies, the fundamental clinical problem is preterm PROM, a condition that occurs in 3% of all pregnancies and is responsible for approximately 30 % of all preterm deliveries. Preterm PROM complicates 3-8% of pregnancies and leads to one-third of preterm deliveries. It increases the risk of prematurity and leads to other perinatal and neonatal complications, with a 1- 2% risk of fetal death. PROM is associated with increased risk of chorioamnionitis, dysfunctional labor, increased cesarean rates, postpartum hemorrhage, and endometriosis in the mother. In the fetus, there is increased occurrence of hyaline membrane disease, intra ventricular hemorrhage, sepsis, cord prolapse, fetal distress, and increased fetal wastage. Thus, the earlier the gestational age at the time of PROM, the longer the latency and the more complications. Management of PROM remains controversial and challenging. Controversy surrounds the role of tocolytics, steroids, and antibiotics. The aim of the study was to observe the maternal and perinatal outcome in patients with preterm premature rupture of membranes; to study the maternal complications in preterm premature rupture of membranes; to find out the perinatal morbidity and mortality in preterm premature rupture of membranes, and to study the mode of delivery in preterm premature rupture of membranes. So study of maternal and perinatal outcome in cases of PPROM is likely to yield valuable information regarding severe morbidity which could lead to death of the mother and fetus if not diagnosed early and treated in time. This prospective study will help to improve the quality of obstetric care.

Methods: The present study is an institution based prospective observational study of perinatal and maternal outcome in 100 cases of preterm premature rupture of membranes in between 28-37 weeks gestation with singleton pregnancy, from 1st March 2021 to 28th February 2022. Patients with medical complications like anemia, preexisting hypertension, diabetes, vascular or renal disease, multiple gestations, uterine or fetal anomalies etc. are excluded from the study. Detailed history, physical examinations were carried out and appropriate management instituted as per individual patients need.

Results: PPROM occurs more frequently in primi gravida (58%) compared to that of multigravida. Risk factors unknown factors 67% while the most common risk factor among others was found to be breech presentation (13%), and 59% of the study population had vaginal delivery while 32% of the patients delivered through LSCS and 9% of them had assisted breech mode of delivery. Out of all LSCS, Fetal distress was found to be the most common indication for LSCS in the present study, which accounted for 37.5% .53% of the population, had delivery within 24 hours. Out of 100cases studies, 31% of the babies born to PPROM mothers were admitted in NICU. Out of 31% of the babies admitted in NICU, the most common cause for neonatal morbidity was respiratory distress syndrome (14%), followed by jaundice (9%), septicemia (5%), IVH (3%). Perinatal mortality was 3% which was due to RDS.

Conclusion: The most common cause of perinatal mortality in early PPROM is prematurity and its complications. Hence conservative management to prolong pregnancy is recommended under strict monitoring for evidence of chorioamnionitis. C-reactive protein helps to pick up chorioamnionitis early. At the earliest evidence of chorioamnionitis termination irrespective of gestational age is warranted. In late PPROM, perinatal outcome is good. So, termination is advised as conservative management shall add to the fetal and maternal morbidity due to sepsis.

Keywords: *Preterm Premature Rupture of Membranes (PPROM), Prematurity, Chorioamnionitis, Respiratory Distress Syndrome (RDS), Fetal Distress.*

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INTRODUCTION

Preterm premature rupture of the membrane is one of the common problems in obstetrics. It has a major impact on

fetal & maternal outcomes. Despite progress in obstetric & neonatal care over the past 20 years, the perinatal outcome in preterm PROM remains dismal. Preterm PROM converts a normal pregnancy into a very risky pregnancy.

The normal development, structural integrity, and function of the fetal membranes are essential for the normal progress and outcome of pregnancy. One of the most important functions of the membranes is to remain intact until the onset of labor in order to maintain the protective intrauterine fluid environment. In most pregnancies, labor begins at term in the presence of intact fetal membranes1, 2. Without any intervention, their spontaneous rupture usually occurs near the end of the first stage of labor. In 8%-10% of pregnancies, they fail to maintain their structural integrity, resulting in pre-labor rupture1, 3. This can be either at term, Pre-labor Rupture of Membranes (PROM), or preterm pre-labor rupture of membranes (PPROM). Both are to some extent separate entities, as in the latter, "prematurity" become the main issue 1, 2.

Premature rupture of membranes (PROM) is defined as the spontaneous rupture of amniotic membrane with a release of amniotic fluid at least one hour before the onset of labor. If the membranes rupture after 37 weeks of gestation it is called term PROM. If the rupture of membranes (ROM) occur after 28 weeks but before 37weeks of gestation is termed as the preterm premature rupture of membrane (PPROM).4

Latent Period:

This is the time between when the membranes rupture and when uterine contractions begin. Prolonged PROM: This means more than 24 hours pass after the membrane ruptures before labor starts.

High rupture of membranes: This happens when the amnio-chorion breaks at a spot far from the cervix (internal os), and sometimes the leaking of amniotic fluid stops on its own.

PROM is usually followed by labor. The onset of labor after PROM is directly related to the gestational age at the time of rupture. Labor started within 24 hours of PROM in 81% of patients carrying babies larger than 2500 grams. Only 48% of the patients develop labor within three. It is an obstetric conundrum that is poorly defined, with an obscure etiology, difficult to diagnose, and is associated with significant maternal and neonatal morbidity and mortality, and has diverse and controversial management strategies.5

Incidence of PROM:

PROM happens in about 10% of all pregnancies and occurs at term in 70% of these cases. While some problems can occur when PROM happens at term, the main issue is PPROM. PPROM occurs in 3% of pregnancies and accounts for about one-third of preterm births. PPROM increases the risk of prematurity, which can cause more complications for both the baby and mother, including a 1-2% chance of fetal death. Some risk factors for PPROM are natural changes in the body, infections early in pregnancy, low income, sexually transmitted diseases, bleeding during pregnancy, smoking, breech birth, and twin or multiple pregnancies.

Since PPROM is associated with lower latency from membrane rupture until delivery, it is an important cause of perinatal morbidity and mortality. 9 During the latency period, the ascent of pathogenic microorganisms from the lower genital area can create complications such as intrauterine infections.11-15 Bacterial infection in chorio-decidual levels with brief amnion involvement has been observed after PROM and one of the most common complications in PPROM patients is intrauterine infection, which can lead to chorioamnionitis, metritis after delivery puerperal sepsis and perinatal outcome such as neon, Other complications are cord compression leading to fetal distress, cord prolapse during rupture of membranes, and placental abruption. 9,11 Perinatal outcomes constitute prematurity, neonatal sepsis, respiratory distress syndrome (RDS), intra ventricular hemorrhage (IVH), and risk of fetal and neonatal death.12onatal death.12

Fetal membrane rupture is a physiologic process at term, but when it occurs preterm, it results from abnormal structural weakening of the membranes in the region of the internal cervical os, where it is initiated by membrane stretch and involves local inflammation and ascending bacterial colonization. The weakening of membranes is directly caused by bacterial collagenases and proteases, but a number of other pathways are also involved, like increased maternal cytokines or an imbalance in MMPs and TIMPs in response to microbial colonization, trauma, and uterine over-distension. .14 Genital tract pathogens that have been associated with PPROM include Neisseria gonorrhea, Chlamydia trachomatis, Trichomonas vaginalis, and group B, β_hemolytic streptococcus (GBS). When fluid leakage occurs after amniocentesis, resealing of the membranes is usual (86- 94%), but it is uncommon after preterm premature rupture. When PROM occurs earlier than term, there are significant risks of maternal and perinatal morbidity and mortality; therefore, the attending physicians play an important role in the management of PPROM. They should develop a pregnancy outcome plan, whereby a suitable decision is reached for decreasing

maternal and fetal risks. Most authors have proposed a strategy for the conventional management of women with antibiotic and corticosteroid administration.9 The main benefit of conservative management is to prolong pregnancy, which can decrease gestational age-related morbidity associated with prematurity, but the benefit must be balanced with the risks of conservative management, such as clinical chorioamnionitis.9, 12, 13

Preterm PROM has a wide spectrum of research material. The basis for the current management trend is a combination of antibiotics, corticosteroids & tocolytics. The exact cause of preterm PROM has yet not been explored. So felt the need for a study on maternal & fetal outcomes in preterm premature rupture of the membranes.

MATERIAL AND METHODS

This study is a single centered prospective comparative study of cases of preterm premature rupture of membranes (PPROM) to assess risk factors and feto- maternal outcome in 28 to less than 34 weeks of gestation and 34 to 37 weeks of gestation. A prospective comparative study is conducted at the department of Obstetrics and Gynecology, Nil Ratan Sircar medical college and hospital Kolkata over a period of 1 year from 1st March 2021-28th February 2022. Pregnant mother presenting to our institution admitted with complain of dribbling <37 weeks of POG were included in study. Patients who were willing to participate in the study were informed about the study and written informed consent was taken. A total of 100 patients PPROM were selected for the study.

ETHICAL CLEARANCE:

It was obtained before starting the study.

METHODOLOGY:

A detailed history was taken from the patient, including age, booking, socioeconomic status, time and onset of leakage of fluid per vaginum, amount of fluid lost, color of fluid, any association with uterine contraction or bleeding per vaginum, and perception of fetal movements, history of similar leakage in previous pregnancy. A detailed obstetric and menstrual history was taken.

General examination was done at the time of admission to assess general condition of the patient, especially maternal pulse and temperature. Height and weight were noted to calculate body mass index, pallor, edema was noted. Systemic examination included cardiovascular, respiratory system and central nervous system.

Obstetric examinations included

- Per abdominal examination (done after emptying the bladder and patient lying in supine position with knees flexed) – Uterine height, symphysio-fundal height, fetal lie, presentation and position of fetus, any uterine contractions, uterine tenderness was seen as sign of chorioamnionitis, Fetal heart sounds (FHS) was auscultated and its rate, rhythm were noted.
- Per vaginal examination – a sterile speculum examination was done to confirm leakage by seeing liquor draining from internal os , if not seen patient asked to cough or strain, color and smell of fluid was noted and a litmus paper test or fern test was done to confirm diagnosis, a high vaginal swab was taken for culture and sensitivity, a single pelvic examination was done to look for pelvic adequacy assessment of cephalo pelvic disproportion (CPD) and to rule out any cord prolapse or hand prolapse.

Investigations- Complete blood count, total count, differential count and other routine blood investigations were sent, C- reactive protein was sent of all the patients, Ultrasonography was done of all the patients.

Antibiotic course with Injection Ceftriaxone 1gm intravenous BD for 5 days or Tablet Erythromycin 250 QDS for 5 days was given to all patients.

Antenatal corticosteroids were given to group A patients as they were less than 34 weeks of gestation (Injection Dexamethasone 6mg i.m total 4 doses, 12 hours apart)

Maternal Pulse, Blood pressure (BP), and Temperature were checked frequently, and attention was paid to signs of chorioamnionitis.

Depending on all these parameters, patients were selected for conservative management with antibiotics, steroids, and a sterile vulvar pad or induction of labor. The patient was asked to preserve a sterile vulvar pad to assess the amount of liquor drained. In cases of fetal compromise like fetal distress, cord prolapse, placental abruption, or previous LSCS, caesarean section was done.

Mothers were watched for any postpartum hemorrhage, followed for any puerperal sepsis, foul-smelling lochia, febrile illness, or wound infection.

The babies were followed up in the postnatal period for SNCU admission, respiratory distress syndrome (RDS), sepsis, any birth injuries, and signs of asphyxia. Soon after delivery, Apgar score at 1- and 5-minute birth weight, sex, congenital anomalies, immediate complications and birth injuries, signs of asphyxia,

meconium aspiration, sepsis, and other associated complications were recorded. The babies were followed up in the postnatal period. Neonatal morbidity and mortality both the baby and the mother were followed till discharge from the hospital.om the hospital.

STUDY SETTINGS: The study is conducted in the Department of Obstetrics and Gynecology, Nil Ratan Sircar Medical College and Hospitals, Kolkata.

STUDY PERIOD: One year from 1st March 2021 to 28th February 2022.

STUDY POPULATION: All patients admitted with preterm premature rupture of membranes (PPROM) less than 37 weeks of gestation during the period of study, fulfilling the inclusion criteria, and willing to participate in the study.

SAMPLE SIZE: A total of 100 cases were taken, 28 weeks to less than 37 weeks of gestation, presenting with preterm premature rupture of membranes.

CASES AND CONTROLS: There were no controls used in this study.

INCLUSION CRITERIA

- Patients admitted with PPROM at Nil Ratan Sircar Medical College and Hospital, irrespective of their booking location.
- Patients willing to participate in the study.
- Singleton pregnancy.
- Gestational age between 28–37 weeks.
- Spontaneous rupture of membranes confirmed by history, clinical examination, and bedside diagnostic tests.
- Patients not in active labor.

EXCLUSION CRITERIA

- Patients not willing to participate in the study.
- Intrauterine growth restriction (IUGR).
- Uterine anomalies.
- Multiple pregnancies.
- Fetal anomalies.
- Gestational age more than 37 completed weeks.
- Presence of uterine fibroids (myoma uteri).
- Hypertensive disorders, including pregnancy-induced hypertension (PIH).
- Gestational diabetes mellitus (GDM).
- Antepartum hemorrhage
- Chronic renal failure
- Class II to IV cardiac diseases.
- Intrauterine death of fetus.

OUTCOME DEFINITIONS AND PARAMETERS

Maternal and fetal parameters used for the study are as follows:

- Maternal mortality is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of duration and site of pregnancy, from any cause aggravated by the pregnancy or its management but not from accidental or incidental causes.
- Maternal parameters–Gestational age, parity, age, socioeconomic status, booking status, latency period, mode of delivery (normal delivery, assisted vaginal delivery, caesarean section), indication of LUCS, CRP, cervical swab culture, maternal pyrexia.
- Perinatal mortality is defined as the number of still births and deaths within the first week of life (early neonatal mortality) per 1000 live births.
- Fetal parameters – NICU (Neonatal Intensive Care Unit) admission, reason for NICU admission (complications like respiratory distress syndrome or neonatal jaundice), birth weight, neonatal sepsis, APGAR score at 1 minute and after 5 minutes (less than 7 is considered a poor score).
- Perinatal morbidity–disorder in the neonate, child or family which occurs as a result of adverse influences or treatment acting either on the fetus during pregnancy and/or infant during first four weeks of life.
- Stillbirth–fetal death after 20 to 28 weeks of pregnancy

DATA ANALYSIS

Data was analyzed using SPSS 22 for Windows statistical package. Results are expressed in frequencies and their respective percentages. Chi-Square and Fisher's exact test were used to test for association among categorical data. We considered alpha=0.05, i.e., a 95% level of confidence for all hypothesis testing.

RESULT AND ANALYSIS

Data are expressed as frequency, percentage depending on distribution. Test for independence were carried out either using Chi Square Test or Fisher exact test when data deviated from normality or had very less frequency. Analysis was carried out using Microsoft Excel 365 and R Studio Version 1.3.1056. Statistical significance was accepted at the level of p-value < 0.05.

Table 1: Distribution of Study Population According to their Age

Age group	N	%

<20	12	12
20-25	46	46
26-30	31	31
>30	11	11
Total	100	100

The above table shows that 46% of the study population were of the age group 20-25, 31% belonged to the age group 26-30, 12% of them were of ages <20, and the least number of patients, i.e., 11% of them, were of ages >30.

Table 2: Distribution of Study Population According to their Socio- Economic Status

SOCIO-ECONOMIC STATUS	N	%
Low	58	58
Middle	42	42
Total	100	100

Table 2 shows the distribution of the study population according to their socio economic status. We see that larger half of the study population (58%) belonged to the low socio economic category and the rest 42% of them had middle socio economic status.

Table 3: Distribution of Study Population According to their Education

Education	N	%
Primary	12	12
MP	33	33
HSE	42	42
Graduate	13	13
Total	100	100

In the above table and figure we see that most of the study population (42%) had an education qualification of HSE. 33% of them had competed MP, 13% of them were graduates and 12% of them had studied up to primary.

Table 4: Distribution of Study Population According to their Parity

Parity	N	%
Multi	56	56
Primi	44	44
Total	100	100

Table 4 and Figure 4 shows the distribution of study population according to their parity. From the above table and graph we see that 56% of the study population had multi parity while 44% of them had primi parity.

Table 5: Distribution of Study Population According to their Pprom

PPROM	N	%
Booked	58	58
Unbooked	42	42
Total	100	100

In the above table and figure, we see that 58% of the study population who had pre- premature rupture of membranes were booked antenatal cases, while 42% of them were unbooked antenatal cases.

Table 6: Distribution of Study Population According to their Pprom

Gestational Age Group	N	%
28-31+6	11	11
32-34+6	34	34
35-36+6	55	55
Total	100	100

In the above table and graph we see that more than half the study population belonged to the gestational age group of 35-36+6 weeks (55%), 34% of them were in the gestational age group of 32-34+6 weeks and the least number of patients belonged to the gestational age group 28-31+6 weeks.

Table 7: Distribution of Study Population According to their Corticosteroid Received

Corticosteroid Received	N	%
No	51	51
Yes	49	49
Total	100	100

The table and figure above shows the distribution of study population according to their corticosteroid received. We see that 51% of the study population did not receive corticosteroid while 49% of the patients received corticosteroid.

Table 8: Distribution of Study Population According to their CRP

CRP	N	%
Negative	74	74

Positive	26	26
Total	100	100

From the above table and figure, we see the distribution of the study population according to their C-reactive protein level. Out of 100 patients, 74 of them were found to have negative CRP (74%), while 26 out of 100 patients had positive CRP (26%).

Table 9: Distribution of Study Population According to their Swab Culture

Swab Culture	N	%
Negative	80	80
Positive	20	20
Total	100	100

In the above table and graph, we see the distribution of the study population according to their swab culture. Out of 100 patients, 80 of them showed negative results in the swab culture test (80%), while the rest 20 or 20% showed positive swab culture test results.

Table 10: Distribution of Study Population According to their Latency Period

Latency period	N	%
0–24	53	53
25–72	34	34
>72	13	13
Total	100	100

The above table and figure shows the distribution of study population according to their latency period. We see that more than half the study population, 53% had a latency period of 0-24 hours, 34% of the patients had a latency period of 25-72 hours and 13% of them had a latency period of >72 hours.

Table 11: Distribution of Study Population According to their Mode of Delivery

Mode of delivery	N	%
Assisted Breech	9	9
LSCS	32	32
Vaginal	59	59
Total	100	100

The table and figure above show the distribution of the study population according to their mode of delivery. We see that 59% of the study population had vaginal delivery, while 32% of the patients delivered through LSCS, and 9% of them had assisted breech mode of delivery.

Table 12: Distribution of Study Population According to their Indication of LSCS

Indication of LSCS	N	%
Breech	4	12.5
CPD	2	6.25
Fetal Distress	12	37.5
Previous LSCS	8	25
Severe Oligo	6	18.75
Total	32	100

Table 12 and Figure 12 show that out of 32 patients who gave birth through lower section cesarean section, 12 of them had fetal distress (37.5%), 25% of them had had previous LSCS, 18.7% of them had severe oligo, 12.5% had breech, and 6.3% of them had CPD.

Table 13: Distribution of Study Population According to the Birth Weights of their Babies

Birth Weight Groups	N	%
<1.5	11	11
1.5–2	23	23
2- 2.5	36	36
>2.5	30	30
Total	100	100

The above table and figure show the distribution of the study population according to the birth weight of their babies. 36 out of 100 had babies with birth weight 2-2.5 kg, 30% of the women had babies with birth weight more than 2.5kg, 23% of them had babies who weighed 1.5-2 kg at birth, while 11% of the women's babies weighed <1.5 kg at birth.

Table 14: Distribution of Study Population According to their Apgar Score

APGAR Score	N	%
<7	16	16
>7	84	84
Total	100	100

In the table and figure above we see the distribution of study population according to their APGAR score. We see that 84% of the study population had an APGAR score of >7 on the other hand 16% of the population had an APGAR score of <7.

Table 15: Distribution of Study Population According to their Hospital Stay

Hospital Stay	N	%
<5	33	33
5-10	47	47
>10	20	20
Total	100	100

Table 15 and Figure 15 shows the distribution of study population according to their hospital stay. Most of the patients were seen to have stayed in the hospital for 5-10 days (47%). 33% of the study population had a hospital stay for <5 days and only 20% of the patients were found to have the longest hospital stay of >10 days.

Table 16: Distribution of Study Population According to their Risk Factors

Risk factors	N	%
H/O Coitus	6	6
Polyhydramnios	6	6
H/O previous PPROM	8	8
Breech	13	13
None	67	67
Total	100	100

From the above table and figure we see that 67% of the patients had no risk factors, 13% of the babies were breech, 8% of them had previous preterm premature rupture of membrane, 6% of the study population had Polyhydramnios while another 6% of them had coitus history.

Table 17: Distribution of Study Population According to Maternal Morbidity

Maternal morbidity	N	%
Abruption	3	3
UTI	4	4
Anemia	5	5
PPH	6	6
Chorioamnionitis	7	7
Puerperal Sepsis	7	7
None	68	68
Total	100	100

The above table and figure show that out of 100 patients, 68% of them had no maternal morbidity, 7% of them had puerperal sepsis, 7% had Chorioamnionitis, 6% of them had PPH, 5% of them had anemia, 4% of them had UTI, and the least no. of women, 3 out of 100, had abruption.

Table 18: Distribution of Study Population According to NICU Admission

NICU Admission	N	%
No	69	69
Yes	31	31
Total	100	100

The above table and figure shows the distribution of study population according to NICU admission. 31 out of 100 patients had admitted their babies to neonatal intensive care unit (31%) while 69 others did not admit their babies to NICU (69%).

Table 19: Distribution of Study Population According to Neonatal Morbidity

Neonatal morbidity	N	%
IVH	3	3
Sepsis	5	5
Jaundice	9	9
RDS	14	14
None	69	69
Total	100	100

Table 19 and Figure 19 show the distribution of the study population according to neonatal morbidity. Out of 100 patients, 69 of them had babies with no neonatal morbidity, 14% of them had babies with respiratory distress syndrome, 9% of the women's babies had jaundice, 5% had sepsis, and 3% of them had babies with intra ventricular hemorrhage.

Table 20: Distribution of Study Population According to Neonatal Deaths in Gestational Age Group

Neonatal death since Gestational age group	N	%
No	97	97
28-31+6	2	2
32-34+6	1	1
Total	100	100

Table 20 and Figure 20 shows the distribution of study population according to neonatal deaths in gestational age group. Here we see that among the study population,

only 3 out of 100 i.e., 3% of the patients had faced neonatal death and no neonatal mortality occurred for the rest 97% of them. Out of the 3% deaths, for 2 women neonatal death occurred in the gestational age group 28- 31+6 weeks while the other 1 lost her neonate during 32-34+6 weeks of gestational age.

DISCUSSION

Preterm premature rupture of membranes is a fair complication of pregnancy that leads to various maternal and neonatal complications.

- The present study was done in N.R.S. Medical College and Hospitals with a total of 100 patients, 28-37 weeks of gestation, admitted to the labor room for a period of one year.
- This study was undertaken to identify risk factors causing PPROM and compare the feto-maternal outcome in both groups.
- **Maternal age :** In this study, PPROM was present in 46% of cases in the age group of 20-25 years and 31% belonged to the age group 26-30 years. Similar results were obtained in a study conducted by **Akter et al.,15** i.e. 40.33% belonged to 21-25 years. and also similar to the study done by **Khade SA et al, 16** who found majority of patients (79%) belonged to 20-29 years age group and it may be due to majority of fertile women are in this age group.
- **Socio-economic status:** In this study, the patients of low socioeconomic status were 58% and middle socioeconomic status were 42% which is comparable with the study by **Shehla Noor17,** which is 68.23% and 31.77% respectively. **Swati Pandey et al**18 found in their study that 61% of their patients with PPROM belonged to lower socioeconomic status, and 39% belonged to middle socioeconomic status. **Dr. Velpula Srilakhsmi et al. 19** also found similar data in her study, where 60% of patients belonged to low socioeconomic status. This data was also supported by a study done in Narayana Medical College, Andhra Pradesh, in 2017 by **Shailaja Suryapelam et al, 22,** where 64% belonged to low socioeconomic status. Studies have shown that defects in the amniotic membranes occur due to low socio-economic status associated with factors like malnutrition, overexertion, poor hygiene, stress, high parity, recurrent genitourinary infection, and anemia. The risk of PPROM increases with decreased antibacterial activity in the amniotic fluid of patients with low socioeconomic status.
- **Education:** In this study most of the study population (42%) had an education qualification of HSE. 33% of them had competed MP, 13% of them were graduates and 12% of them had studied up to primary.
- **Booked and unbooked cases:** The percentage of booked cases in the present study was found to be 58% while that of unbooked cases was noted to be 42%. These results are comparable to a study conducted by **Shwetha Patil et al.** (23 where the percentage of unbooked cases accounted for 31% and booked cases for 69%. There was no significant correlation between the antenatal care and incidence of PPROM, which was in contrast to a study done by **Shweta Anant Mohokar et al.**,24, where there was a strong correlation between the unbooked cases (84%) and the incidence of PPROM. In unbooked cases, there is a lack of antenatal care, leading to a lack of identification of recurrent risk factors like PPROM, preterm delivery, induced abortions, and their management. Also, urogenital infections are not detected and treated due to a lack of antenatal care, leading to PPROM.
- **Parity:** In this study 56% of the study population had multi-gravida, while 44% of them had primi-gravida. Multiparity is a risk factor for PPROM due to long- standing infection, previous trauma to the cervix, and patulous os.

Comparison of parity with other studies

Comparison of parity with other studies.	Swathi 18	Shehla 17	Okeye 20	Khade 16	Present study
Primi gravida	48%	44.7%	29.1%	48%	44%
Multi gravida	52%	55.3%	69.9%	52%	56%

- **Gestational age :** In this study more than half the study population belonged to the gestational age group of 35-36+6 weeks (55%), 34% of them were in the gestational age group of 32-34+6 weeks and the least number of patients belonged to the gestational age group 28-31+6 weeks(11%). In a study conducted by **Shweta Patil et al.**23 the percentage of PPROM in 28-31 weeks 73 was 7%, that between 32-34 weeks was 18% and 75%

between 35-36 weeks of gestational age, whose results correlate with the present study.

The risk of PPROM increases with increasing gestational age. This can be justified by the fact that PPROM occurs due to mechanical stretching of membranes with increasing gestational age.

- **Risk Factor:** Assessing the risk factors causing PPROM, 67% of the study population had no risk factors while the most common risk factor among others was found to be breech presentation (13%). **Gunn et al**.28 also showed similar results in his study where breech presentation was the most common risk factor. In the present study, previous history of PPROM was the second commonest risk factor with (8%), followed by history of recent coitus (6%), polyhydramnios (6%).
- **PPROM to delivery interval:** In the present study, 53% of the population had delivery within 24 hours, which was similar to the results obtained in a study conducted by **Shweta Patil et al.**, 27(64%) and also in a study conducted by Russels102 (80%). Only 13% had a latent phase of >3days, 34% delivered within 25-72 hours in my study which also correlated with the above-mentioned studies.
- **Mode of delivery:** In this study We see that 59% of the study population had vaginal delivery while 32% of the patients delivered through LSCS and 9% of them had assisted breech mode of delivery. which is comparable with the results of a study of **Shehla 17 and Surayapalem et al.** (2017)22, where NVD occurred in 80 % and 70% cases and caesarean section occurred in 20% and 27.5% of study subject respectively. A.Devi14 reported vaginal delivery to be 67% in her study and **Khade SA et al16** found it to be 75%, all these study are comparable to present study. LSCS were more when cervix was unripe, and induction was done compared to cases with Bishop Score >5. Also, malpresentations, failure of induction and fetal distress due to oligohydramnios resulted in LSCS.
- **Indication for LSCS:** Fetal distress was found to be the most common indication for LSCS in the present study, which accounted for 37.5%, followed by previous LSCS (25%), severe oligohydramnios (18.75%), breech presentation (12.5%), and CPD (6.25%). In studies conducted by **Swathi Pandey** 18, fetal distress was the most common indication for LSCS (45.16%).
- **Birth Weights:** In this study 36% had babies with birth weight 2-2.5 kg, 30% of the women had babies with birth weight more than 2.5kg, 23% of them had babies who weighed 1.5-2 kg at birth while 11% of the women's babies weighed <1.5 kg at birth. These results obtained were nearly similar to the results in the study by **Swetha Anant Mohokar et al**.,24 where 26% gave birth to babies weighing 2- 2.5kg.
- **Investigations for evidence of infection:** The investigations like total count, C- reactive protein and high vaginal swab for culture and sensitivity were done to evaluate for the evidence of infection. Leukocytosis can be affected by pregnancy and labor. CRP estimates seem to be reliable monitoring tool. But in more detailed studies WBC and CRP were poor predictors of the presence of a positive amniotic fluid or foetal blood culture. In this study Out of 100 patients 74 of them were found to have negative CRP (74%) while 26 out of 100 patients had positive CRP (26%) and Out of 100 patients, 80 of them showed negative results in the swab culture test (80%) while the rest 20 or 20% showed positive swab culture test result. The commonest organism isolated by **Swathi Pandey18** in cervical swab was E. coli.
- **APGAR Score:** In the present study 84% of the study population had an APGAR score of >7; on the other hand, 16% of the population had an APGAR score of <7.

Out of 31 patients with babies having neonatal morbidity 16 of them had an APGAR score of <7 while 15 of them had an APGAR score of >7. Again out of 69 patients with babies who had no neonatal morbidity, none had an APGAR score of <7 and all of them had an APGAR score of >7. There was significant correlation between APGAR score and neonatal morbidity. And out of 16 patients with an APGAR score <7, 4 of them had a higher gestational age lying between 35-36+6 weeks, most of the women i.e., 7 out of 16, had a gestational age within 32-34+6 weeks while 5 patients had a gestational age that lied between 28-31+6 weeks. Women who had an APGAR score >7, higher number of patients were seen to have a higher gestational age group i.e., 51 out of 84 patients had a gestational age lying between 35-36+6 weeks, 27 of them had gestational age within 32-34+6 weeks while 6 patients

had a gestational age that lied between 28-31+6 weeks. There was significant correlation between APGAR score and gestational age.

This difference was due to prematurity, low birth weight, and a higher risk of Asphyxia and respiratory distress syndrome.

- **Maternal Morbidity :** In this study 68% of them had no maternal morbidity, 7% of them had puerperal sepsis, 7% had Chorioamnionitis, 6% of them had PPH, 5% of them had anemia, 4% of them had UTI, and the least no. of women, 3 out of 100, had abruption.

Comparison of Maternal Morbidity with other Studies

Studies	Swathi 18	Okeye 20	Anjana 21	Khade 16	Present
Maternal morbidity	9%	20%	21%	16%	32%

A study by **Artal K**26 showed the incidence of puerperal pyrexia to be 13% and chorioamnionitis to be 3%.

- **NICU Admission:** 31% of the babies born to PPROM mothers were admitted to the NICU for various complications in my study. These results correlated with **Shweta Patil et al. (23** where the percentage of NICU admissions was 36%.

As per table no 32, Women with gestational age of 28-31+6,32-34+6 and 35-36+6 weeks; 81.82%, 35.29% and 18.18% of their babies were admitted in the neonatal intensive care unit respectively. It is significant in this study(P=<0.001). So, NICU admission was inversely proportional with gestational age.

- **Perinatal Morbidity:** Out of 31% of the babies admitted in NICU, the most common cause for neonatal morbidity was respiratory distress syndrome (21%), followed by jaundice (9%), septicemia (5%), and IVH (3%). The study conducted by **Arul Kumar**25 showed that after 32 weeks of gestation, the common causes of perinatal morbidity were RDS, perinatal asphyxia, and infection, but with good supportive neonatal care, most of the infants can survive.
- **Perinatal Mortality:** In this study, perinatal mortality was 3% which was due to RDS. Out of the 3% deaths, for 2 neonatal deaths occurred in the gestational age group 28-31+6 weeks and 1 neonatal death occurred in the gestational age group 32-34+6 weeks.

Comparison of Perinatal Mortality with other Studies

Studies	Swathi 18	Okeye 20	Anjana 21	Khade 16	Present
Perinatal mortality	12%	8.9%	5%	15%	3%

CONCLUSION

In this study, the prevalence of PPROM in our institute was comparable to that of other studies. The mode of delivery in PPROM was not different from that of the general population delivering in our institute. The rate of caesarean section was not high, and the indications were fetal distress from oligohydramnios and malpresentation. The maternal morbidity, perinatal morbidity, and mortality increase as the duration of PPROM increases. Also, perinatal morbidity and mortality were high in very premature babies and infants with low birth weight. As the weight increases, the morbidity and mortality decrease.

PPROM is a significant obstetric problem. Despite exhaustive research, most aspects of PPROM remain enigmatic. It contributes to increased maternal morbidity as well as perinatal morbidity and mortality. Careful antenatal monitoring, detection, and prompt treatment of infection are necessary. Strict aseptic precautions, appropriate therapy, and regular antenatal follow-up are important factors in the prevention and management of PPROM.

We feel that recent measures like CRP, band neutrophil count, and therapeutic use of specific human gamma globulin against vaginal flora, as well as preventive measures like coital abstinence, will definitely help to reduce the morbidity and mortality.

These patients are at a high risk for infection, and amniocentesis can be used to evaluate early markers for infection and provide a sample of amniotic fluid for culture. Any evidence of infection by amniocentesis should be considered carefully as an indication for delivery.

Close antenatal monitoring, identification of risk factors like cervico-vaginal infection, and their management play an important role in the prevention of PPROM.

Routine antibiotic administration reduces maternal and neonatal morbidity. Antibiotic therapy also delays delivery, thereby allowing sufficient time for prophylactic prenatal corticosteroids to take effect. PPROM with oligohydramnios is associated with shorter latency, a higher rate of cesarean sections, and early neonatal death.

From this study we arrive at the conclusion that management should not be a generalized regime. Multi factorial study of individual cases and management has to

be planned accordingly, varying from expectant to aggressive therapy. Danger of infection to both mother and fetus increases with increased duration of PPROM.

Our experience to date from available sources suggests that management of PPROM still requires critical study.

Recommendations

- Regular antenatal care, good hygiene, nutritious diet, early diagnosis of vaginal infection, literacy, and health education can decrease the incidence of PROM.
- Timely referral of PROM cases to tertiary care hospitals and timely in
- Strict aseptic precautions, appropriate therapy, and regular antenatal follow-up are important factors in the prevention and management of PPROM.
- The management protocol should be improved and strictly followed in order to improve neonatal outcomes.
- Thus, a PPROM patient should be considered high risk and monitored closely with strict supervision and managed according to protocol.

LIMITATION OF THE STUDY

Despite all efforts, there are certain shortcomings in the study.

- Patient presenting to hospital with PPROM could only give an approximate time of rupture of membranes and not the exact time.
- Diagnosis was confirmed by per speculum examination, fern test, and litmus test, but tests like Amnisure were unavailable in a government setting.
- The labor room was managed by different teams at times, hence there was a difference of opinion.
- All the risk factors could not be assessed due to limited resources.
- The study was carried out in a tertiary care hospital, so hospital bias cannot be ruled out

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