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Original Research Article

A study of feto-maternal outcome in cases of pre-labour rupture of membranes

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ABSTRACT

Background: Prelabour rupture of membranes is a common obstetric problem and the assessment of women with possible membrane rupture is a management issue faced in every day practice. The diagnosis and treatment of Prelabour rupture of membranes depends upon the facilities available. Unrecognized and inadequately treated conditions can lead to various maternal and neonatal complications.
Methods: The present prospective study was conducted on 200 pregnant women satisfying the inclusion criteria after getting consent for participation. Pregnant women between the gestational age of 28 – 40 weeks who presented with Prelabour rupture of membranes to casualty were enrolled into the study.
Results: 76.5% of the study participants were between 37-40 weeks of gestation and the remaining 23.5% belonged to the preterm population. Maternal morbidity was found to be 68% among the study participants with latency period more than 24 hrs. 37.5% of the neonates developed morbidity and the neonatal mortality was 2%.
Conclusions: Prelabour rupture of membranes contributes significantly to maternal morbidity, neonatal morbidity and perinatal mortality.

Keywords: Maternal morbidity, Neonatal morbidity and mortality, Prelabour rupture of membranes

INTRODUCTION

Prelabour rupture of membranes (PROM) is spontaneous rupture of membranes before onset of labour; this is, therefore, defined in the absence of any obvious cervical changes or contractions consistent with established labour. Although there is no specific time frame, labour is expected to commence within 1 or 2 hrs after PROM, but according to Pernoll, PROM is considered to be prolonged if it occurs more than 24 hours before the onset of labour.[1,2]

Term PROM complicates approximately 5-10% of pregnancies. Preterm PROM occurs in 3% of pregnancies and is responsible for approximately one-third of all preterm births.There are many risk factors which are associated with PROM.

They include lower genital tract infection, increased intrauterine pressure as in twins, hydraminos, incompetent os, dietary habits, smoking, placental pathology, low socioeconomic status and others. At the same time PROM often occurs in the absence of any known risk factors.[3]

The management of PROM is controversial. Currently most authorities accept a plan of active management which includes prevention of infection, delay of delivery until foetal maturity is achieved, and active intervention by induction if labour is no longer preventable or if early infection is suspected.[4]

The fetal consequences of preterm delivery due to PROM are Respiratory distress syndrome, hypothermia, hypoglycaemia, jaundice, necrotizing enterocolitis,

intraventricular haemorrhage, neurologic impairment, apnoea, retro lental fibroplasias, broncho pulmonary dysplasia, Patent ductus arteriosus, fetal limb contracture formation, pulmonary hypoplasia and neonatal sepsis.[5] Maternal complications of PROM are chorioamnionitis, endometritis, puerperal pyrexia, abruptio placenta, wound infection and PPH.[6]

METHODS

After admission, full history including duration of pregnancy, time and onset of rupture of membranes, past history of rupture of membranes, past obstetric history were taken. Rupture of the membranes was diagnosed by documenting draining of clear fluid on per speculum examination. During speculum examination high vaginal swab was collected for culture and sensitivity.

Obstetric examination was done to know the maturity of fetus in weeks, presentation and position of fetus, fetal heart sounds and to rule out any signs and symptoms of chorioamnionitis. All cases were subjected to detailed ultrasonographic assessment of gestational age, liquor and placental location.

A single course of betamethasone consisting of two 12 mg I/M injection 24 hourly was given to all PROM patients after admission. In patients having uterine contractions short term tocolysis was given in order to allow steroid therapy which can produce maximal effect on pulmonary maturation. Fetal surveillance was by cardiotocography, auscultation of fetal heart sounds and daily fetal kick count chart. All patients received prophylactic antibiotic for 5 days after admission. The antibiotic was continued or changed depending upon the culture sensitivity report.

Maternal monitoring to detect the signs of chorioamnionitis was done by recording the pulse, blood pressure, temperature, abdominal tenderness, color and smell of liquor. All patients were observed for spontaneous onset of labour. Induction was advocated as per hospital protocol considering the gestational age, cervical condition, latent period, presentation of the fetus, symptoms and signs of infection.

The mother was observed carefully during her postnatal hospital stay, with special emphasis on temperature, pulse, lochia and involution. Condition of the baby during its hospital stay was observed carefully. Neonatal outcomes were categorised into: Healthy, presence of respiratory distress syndrome, early neonatal sepsis, days at neonatal Intensive Care Unit and neonatal death.

Statistical analysis

The data obtained from the study was analysed using IBM SPSS Version 22.0 software. Means and proportions were calculated for continuous variables and categorical variables respectively. Chi square test was used for finding statistically significant difference in proportions. Pearson correlation coefficient was estimated for finding linear association between two variables. P value < 0.05 was considered to be statistically significant. Data entry was done using MS Excel 2013.

RESULTS

76.5% of the study participants were at term gestation (37-40) weeks at the time of presentation and 3% of the participants were in the gestation age group of (28-32) weeks (Figure 1).

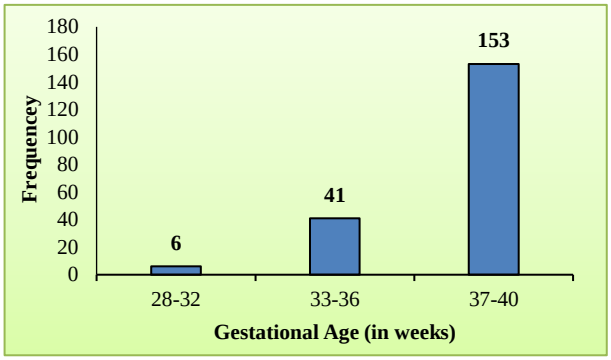


Figure 1: Distribution of study participants based on gestational age (n=200).

Duration after rupture of membranes to delivery was less than 24 hours for 87.5% of the study participants, and within 12 hours for 44 % of them while 12.5% of study participants delivered 24 hours after rupture of membranes (Figure 2).

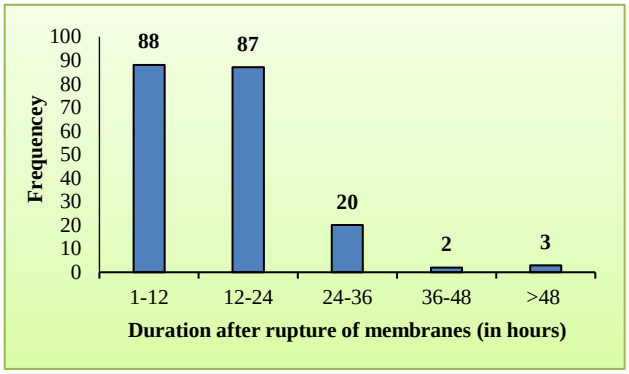


Figure 2: Distribution of study participants based on duration after rupture of membranes to delivery (n=200).

On Culture and sensitivity testing of high vaginal swab, 85.5% of the participants had no isolates or normal vaginal flora, while among 8.5% of the participants *Candida* Species was isolated followed by isolation of *Klebsiella* Species in 3.5% of study participants.

Staphylococcus was isolated in 2% of the study participants (Figure 3).

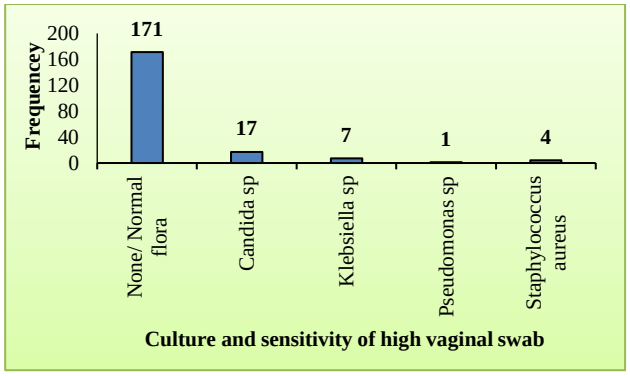


Figure 3: Distribution of study participants based on culture and sensitivity of high vaginal swab (n=200).

69.3% of the study participants at term gestation had SVD but there was no statistically significant association between gestational age and mode of delivery (p value =0.235) (Table 1).

Table 1: Association between gestational age and mode of delivery (n = 200).

Gestational age (in weeks)	Mode of delivery		Total n (%)	p value*
	LSCS n (%)	SVD n (%)		
29-32	0 (0.0)	6 (100.0)	6 (100.0)	0.235
33-36	14 (34.1)	27 (65.9)	41 (100.0)	
37-40	47 (30.7)	106 (69.3)	153 (100.0)	
Total	61 (30.5)	139 (69.5)	200 (100.0)	

*Chi square test was applied

83.6% of the study participants did not have any associated morbidity, where as 16.4% had various co morbidities of which fever accounted for 10.4% (Figure 4).

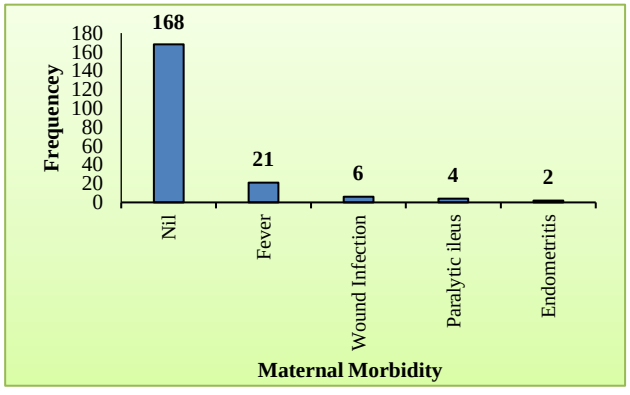


Figure 4: Distribution of study participants based on maternal morbidity (n=200).

Respiratory Distress Syndrome (RDS) was observed to be present on 36.5% of the neonates involved in the study (Figure 5) and Neonatal mortality was observed in 2% of the neonates of the study participants.

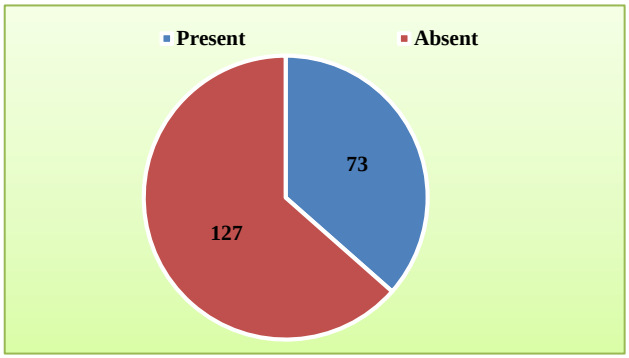


Figure 5: Distribution of neonates based on presence of RDS (n=200).

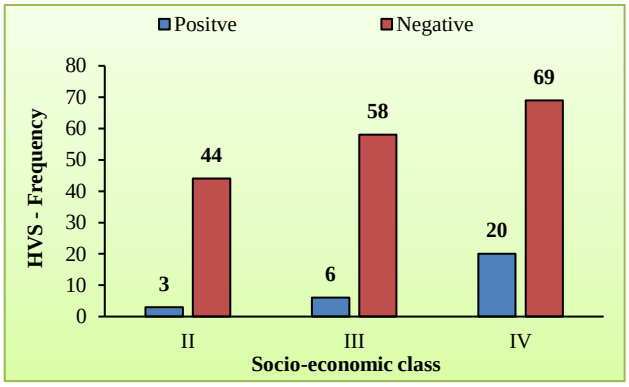


Figure 6: Association between socio-economic status and high vaginal swab culture results (n=200).

22.5% of study participants in socio-economic class IV were found to have positive High vaginal swab culture reports when compared to other classes. Also, this difference was found to be statistically significant (p value – 0.015) (Figure 6).

Table 2: Association between amniotic fluid index and urine culture results (n = 200).

Amniotic Fluid Index	Urine Culture		Total n (%)	p value*
	Positive n (%)	Negative n (%)		
<5	14(45.2)	17(54.8)	31(100.0)	<0.001
5-10	9(13.4)	58(86.6)	67(100.0)	
> 10	8(7.8)	94(92.2)	102(100.0)	
Total	31(15.5)	169(84.5	200(100.0)	

*Chi square test was applied

45.2% of study participants with lower amniotic fluid index were found to have positive urine culture reports when compared to adequate AFI (7.8%).

Also, this association was found to be statistically significant (p value –<0.001). 19.4% of the study participants with lower amniotic fluid index were found

to have positive high vaginal swab culture reports when compared to the participants with adequate amniotic fluid index (7.8%).

Table 3: Association between amniotic fluid index status and high vaginal swab culture results (n = 200).

Amniotic fluid index	High vaginal swab culture		Total n (%)	p value*
	Positive (%)	Negative n (%)		
<5	6(19.4)	25(80.6)	31(100.0)	0.022
5-10	15(22.4)	52(77.6)	67(100.0)	
> 10	8(7.8)	94(92.2)	102(100.0)	
Total	29(14.5)	171(85.5)	200(100.0)	

*Chi square test was applied

Also, this association was found to be statistically significant (p value – 0.022) (Table 2 and Table 3).

Table 4: Association between amniotic fluid index status and RDS in neonates (n = 200).

Amniotic fluid index	RDS		Total n (%)	p value*
	Present n (%)	Absent n (%)		
<5	18(58.1)	13(41.9)	31(100.0)	0.01
5-10	26(38.8)	41(61.2)	67(100.0)	
> 10	29(28.4)	73(71.6)	102(100.0)	
Total	73(36.5)	127(63.5)	200(100.0)	

*Chi square test was applied

58.1% of the study participants with amniotic fluid index less than five were found to have neonates with RDS when compared to the participants with amniotic fluid index more than five and this association was found to be statistically significant (p value – 0.01) (Table 4).

Table 5: Association between duration of rupture of membranes to delivery and maternal morbidity (n = 200).

Duration of rupture of membranes to delivery (in hours)	Maternal morbidity		Total n (%)	p value*
	Present n (%)	Absent n (%)		
<12	4(4.5)	84(95.5)	88(100.0)	<0.001
12-24	12(13.8)	75(86.2)	87(100.0)	
24-36	14(70.0)	6(30.0)	20(100.0)	
36-48	1(50.0)	1(50.0)	2(100.0)	
>48	2(66.7)	1(33.3)	3(100.0)	
Total	33(16.5)	167(83.5)	200(100.0)	

*Chi square test was applied

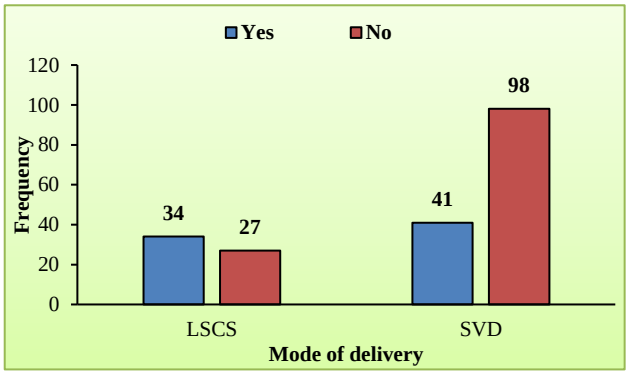
Morbidity was seen in 68% of the study participants with latency period more than 24 hrs which was statistically significant (p value – 0.001) (Table 5).

80% of the neonates born to mothers with latency period more than 24 hours were admitted in NICU which was found to be statistically significant (p value <0.001) (Table 6).

Table 6: Association between duration of rupture of membranes to delivery and admission of neonate in NICU (n = 200).

Duration of rupture of membranes to delivery (in hours)	Neonate admitted in NICU		Total n (%)	p value*
	Yes n (%)	No n (%)		
<12	21(23.9)	67(76.1)	88(100.0)	<0.001
12-24	34(39.1)	5(60.9)	87(100.0)	
24-36	15(75.0)	5(25.0)	20(100.0)	
36-48	2(100.0)	0(0.0)	2(100.0)	
>48	3(100.0)	0(0.0)	3(100.0)	
Total	75(37.5)	125(62.5)	200(100.0)	

*Chi square test was applied



Among the study participants who had LSCS, 55.7% of the neonates were admitted in NICU as compared to SVD and this association was found to be statistically significant (p value <0.001) (Figure 7).

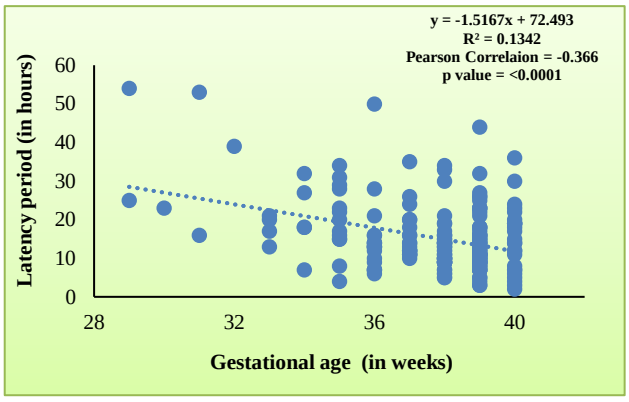


Figure 8: Correlation between duration of rupture of membranes to delivery and gestational age (n=200).

A statistically significant inversely proportional relationship was observed between gestational age and latency period (p value<0.001) (Figure 8).

74.4% of neonates of the study participants with preterm gestation were found to have Respiratory Distress

Syndrome which was statistically significant (p value <0.001) (Table 7).

Table 7: Association between gestational age and presence of RDS in neonate (n = 200).

Gestational age (in weeks)	RDS		Total n (%)	p value*
	Present n (%)	Absent n (%)		
29-32	6(100.0)	0(0.0)	6(100.0)	<0.001
33-36	29(70.7)	12(29.3)	41(100.0)	
37-40	38(24.8)	115(75.2)	153(100.0)	
Total	73(36.5)	127(63.5)	200(100.0)	

*Chi square test was applied

63.3% of the neonates with birth weight less than 2.5kg were found to have Respiratory Distress Syndrome and was statistically significant (p value <0.001) (Table 8).

Table 8: Association between birth weight and presence of RDS in neonate (n = 200).

Birth Weight (in Kg)	RDS		Total n (%)	p value*
	Present n (%)	Absent n (%)		
<2.0	12(100.0)	0(0.0)	12(100.0)	<0.001
2.0-2.5	19(51.4)	18(48.6)	37(100.0)	
2.5-3.0	28(29.5)	67(70.5)	95(100.0)	
3.0-4.0	14(25.0)	42(75.0)	56(100.0)	
Total	73(36.5)	127(63.5)	200(100.0)	

*Chi square test was applied

DISCUSSION

The present study was carried out as a descriptive cross sectional study among 200 women with prelabour rupture of membranes (PROM) from August 2015 to July 2016 in the department of obstetrics and gynecology at Rajiv Gandhi Government Women and Children Hospital, Puducherry with an aim to identify the risk factors causing prelabour rupture of membranes and to study the labour outcome, maternal morbidity, perinatal morbidity and mortality associated with prelabour rupture of membranes (PROM).

Patients belonging to all age groups were in this study as no age is immune to PROM. In the present study 44.5% of study population belonged to the age group 21 – 25 years. In a study conducted by Gandhi M et al, 59.4% belonged to the same age group.[7] 52.1% of the study population in the study done by Vishwakarma K et al belonged to the same age group.[8] In a study done by Patil S et al, 49% belonged to age group 21-25 years.[4]

In the present study 76.5% of the patients belonged to term population and 23.5% belonged to preterm population between 28 to 36.6 weeks of gestation. In a study conducted by Gandhi M et al 88.5% belonged to term population and 11.5% belonged to preterm population while in a study conducted by Vishwakarma K et al 82.1% belonged to term population and 17.6% to preterm population.[7,8]

Among 200 women, 139 (69.5%) delivered by normal vaginal delivery and 61 (30.5%) women delivered by caesarian section, fetal distress being the commonest indication followed by failed induction and severe oligohydraminos.

87.5% of the study population in the present study delivered within 24 hrs of rupture of membranes and the remaining 12.5% delivered after 24 hrs. 44% of the study participants with latency period more than 24 hrs were delivered by LSCS but this was statistically insignificant. An inversely proportional relationship was observed between gestational age and latency period which found to be statistically significant. In a study conducted by Abdul R et al 65.5% of the study population delivered within 24 hours and 64% of the study population delivered within 24 hrs in a study conducted by Patil S et al.[4,9]

In the present study 14.5% of the study population had lower genital tract infection. Candida was the most common organism isolated followed by *Klebsiella* and *Staphylococcus aureus*. In a study conducted by Mohokar SA et al[10], 23% of the study participants had lower genital tract infection, of which *E Coli* was the commonest organism isolated.[10] In a study conducted by Lalwani et al 22% of the patients had lower genital tract infection, E Coli being the commonest followed by *Klebsiella* and *Staphylococcus aureus*.[11] 12% of the patients had lower genital tract infection in a study done by Akter S et al.[12] In a study conducted by Revathi V et al[13] 10% of the study population had lower genital infection.

In the present study 15.5% of the population had Amniotic Fluid Index less than five. 45.2% of the study participants with AFI less than five were found to have urinary tract infection which was statistically significant. Also 19.4% of the study participants with Amniotic Fluid Index less than five had lower genital tract infection which was statistically significant. In a study done by Mohokar SA et al 33% of the patients were found to have oligohydraminos ie AFI less than five.[10]

In the present study 16.4% of the study population had some or the other type of morbidity. Puerperal pyrexia being the commonest accounted for 10.4% of the study participants followed by wound infection which was found to be 3%. Morbidity was seen in 68% of the study participants with latency period more than 24 hrs which was statistically significant.

In a study conducted by Mohokar SA et al the maternal morbidity was found to be 16%, in that puerperal pyrexia accounted for 12% of the study participants.[10] 21.5% of the patients had morbidity in a study done by Abdul et al, where 7% of the study participants had puerperal pyrexia.

Nearly 15% of the patients had morbidity in a study done by Vishwakarma K et al.[8,9]

In the present study 24.5 % of the neonates had low birth weight, of which 6% of the neonates had birth weight less than 2 kg. In a study done by Gandhi M et al 7.55% of the neonates had birth weight less than 2 kg.[7] 31% of the neonates were found to be less than 2 kg in a study done by Patil S et al.[4] In a study conducted by Mohokar SA et al as much as 50% of the neonates had birth weight less than 2 kg.[10]

In the present study 37.5% of the neonates were found to have some or the other type of morbidity and were admitted in NICU. Among the study participants who had LSCS, 55.7% of the neonates got admitted in NICU as compared to normal vaginal delivery and was found to be statistically significant. 80% of the neonates born to mothers whose latency period was more than 24 hours were found to have some or the other type of morbidity which was statistically significant. In a study done by Mohokar SA et al neonatal morbidity was found to be nearly 33% where as in a study done by Abdul R et al neonatal morbidity was 24.5%.[9,10] Neonatal morbidity was 13% as quoted by Gandhi M et al in their study.[7]

Among the neonatal morbidity, Respiratory Distress Syndrome (RDS) was found to be the commonest morbidity involving 36.5% of the neonates in the present study. 58.1% of the study population with Amniotic Fluid Index less than five were found to have neonates with Respiratory distress syndrome which was statistically significant. 74.4% of neonates of the study participants with preterm gestation were found to have Respiratory Distress Syndrome which was statistically significant. 63.3% of the neonates with birth weight less than 2.5kg were found to have Respiratory Distress Syndrome and was statistically significant. In a study done by Patil S et al 26% of the neonates had Respiratory Distress Syndrome while 21% of the neonates had Respiratory Distress Syndrome in a study done by Mohokar SA et al.[4,10]

In a study done by Akter S et al 11.1% of the neonates had Respiratory Distress Syndrome.[12] 3.5% of the neonates presented with neonatal sepsis in the present study. In a study done by Anjana D et al it was found that 11.5% of the neonates had neonatal sepsis where as 24% of the neonates had neonatal sepsis in a study conducted by Shreshtha SR et al.[14,15]

In the present study, neonatal mortality was 2% which was similar to a study conducted by Gandhi M et al where the neonatal mortality was found to be 2.86%. In a study done by Abdul R et al neonatal mortality was found to be 13%.[7,9] Neonatal mortality was 7% in a study done by Patil S et al which was slightly higher when compared to a study done by Revathi V et al where the neonatal mortality was found to be 5%.[4,13]

CONCLUSION

Prelabour rupture of membranes contribute significantly to maternal morbidity, neonatal morbidity and perinatal mortality. PROM is significantly associated with low socioeconomic status, genitourinary tract infections, anaemia and history of PROM and preterm labour in the previous pregnancy. A statistically significant inversely proportional relationship was observed between gestational age and latency period. There is a strong correlation between latency period and maternal and neonatal morbidity and perinatal mortality. Also, neonatal morbidity and mortality were high in prematurity and low birth weight babies. Close antenatal monitoring, good hygine, nutritious diet, early identification of risk factors and health education can decrease the incidence of PROM. In managing PROM, timely use of proper antibiotics, steroids and induction or augmentation of labour, reduce the hospital stay and ultimately reduce neonatal and maternal complications.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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