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Original Research Article

Study of feto-maternal outcome in premature rupture of membranes at term pregnancy in a tertiary care institute

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ABSTRACT

Background: Premature rupture of membranes (PROM) is defined as the spontaneous rupture of membranes before the onset of labor. It is associated with various adverse outcomes including maternal and perinatal morbidity and mortality. Chorio-amnionitis, placental abruption, post-partum hemorrhage, puerperal sepsis, oligohydramnios, cord prolapse, fetal distress, intra-uterine death, perinatal infections are some of the complications associated with it.

Objective : To evaluate the feto-maternal outcome in PROM.

Materials and Methods: It was a prospective cohort study conducted in the Department of Obstetrics and Gynaecology, Regional Institute of Medical Sciences, Imphal, Manipur for one and half years from January, 2021 to June, 2022. A total of 170 pregnant women were included in the study- 85 women with PROM and 85 without PROM. Inclusion criteria includes gestational age of at least 37 completed weeks, lack of uterine contractions for at least one hour after PROM, cervical dilatation less than 3 cm, single live pregnancy in vertex presentation, and PROM confirmed by direct visualization under speculum examination. Exclusion criteria includes mal-presentation, multiple gestation, meconium stained liquor, cephalo-pelvic disproportion.

Results: Respiratory distress syndrome was found to be more in babies born to women with PROM, as compared to the babies born to women without PROM, with a relative risk of 1.5. There was no statistically significant association of PROM with neonatal sepsis, NICU admission of new-borns, APGAR score of babies, chorio-amnionitis, or puerperal sepsis.

Conclusion: This prospective study was carried out to suggest some strategies for proper screening of high-risk cases, correct diagnosis and effective management and thus improvement of maternal and neonatal outcome. Although early diagnosis and proper management can be helpful in decreasing prenatal morbidities in cases of PROM, more randomized controlled trials involving larger sample size is required to draw further conclusions.

1. Introduction

Premature rupture of membranes (PROM) is defined as the spontaneous rupture of membranes before the onset of labor. It is a condition associated with various adverse outcomes including maternal and perinatal morbidity and mortality.[1] It occurs in approximately 10% of all pregnancies and 80% of them occurs at term.[1,2] Approximately 80-90% of patients with PROM enter spontaneous labor within 24 hours.[3] The “Latent period” is the interval between membrane rupture and onset of labour.[4] Prolongation of latency >18hours is associated with increased incidence of chorio- amnionitis and neonatal sepsis.

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Under normal circumstances, foetal membranes rupture during the active phase of labour. Once the membranes rupture, the integrity of pregnancy is in jeopardy. It is a common obstetric problem and one of the most common clinical events where a traditional pregnancy can turn into a high-risk pregnancy for mother as well as fetus.[5]

Two-third of PROM occurs for unknown reasons. Among the maternal risk factors, mention can be made of history of PROM in the previous pregnancy, preterm labor, genital tract infections, bacterial vaginosis, h/o abortion, cigarette smoking, drug abuse, low socio-economic status, low Body Mass Index (BMI), nutritional deficiencies, long-term use of steroids, collagen vascular diseases, Systemic Lupus Erythematosus, trauma, hypertension, Gestational Diabetes Mellitus or overt diabetes.[6,7] Utero-placental factors include uterine abnormalities, placental abruption (10% to 15% of premature rupture of the membranes), cervical incompetence, cervical cerclage, poly-hydramnios, chorio-amnionitis.[7,8] Multiple pregnancies (7%-10% of twin pregnancies), malposition, and big baby[9,10] are among the common fetal factors.

The diagnosis of spontaneous rupture of the membranes is best achieved by maternal history followed by a sterile speculum examination. Ultrasound examination is useful in some cases to add in the diagnosis. Digital vaginal examination should be restricted if preterm pre-labour rupture of membranes (PPROM) is suspected.[11]

Maternal complications associated with PROM are chorio-amnionitis, placental abruption, post-partum hemorrhage (PPH), Disseminated Intravascular Coagulation (DIC), puerperal sepsis, endometritis, wound site infection etc.[12] Fetal complications include cord compression due to oligohydramnios, cord prolapse, foetal distress, Intra-uterine Death (IUD), perinatal infections etc.

2. Objective

To evaluate the foetal-maternal outcome in PROM.

3. Materials and Methods

It was a cohort study conducted in the Department of Obstetrics and Gynaecology, Regional Institute of Medical Sciences, Imphal, Manipur for one and half years from January, 2021 to June, 2022.

Sample size (N) was calculated using the formula

$N = \frac{P1(100-P1)+P2(100-P2)}{e^2}$ (Based on study by Shetty S et al[13])

Where, P_1 = % of perinatal morbidity in cases = 20%

P_2 = % of perinatal morbidity in control = 2.7%

e = standard error = L/2,

$N = \frac{20(100-20)+2.7(100-2.7)}{5^2}$ (taking L=10)

= ((20 x 80) + (2.7 x 97.3))/25

= 74.5 in each group + 10% attrition bias

= 81.95

Eighty five participants each from 'women with PROM' group and 'women without PROM' group were recruited, using convenient sampling from among the women admitted in the antenatal ward in the department of Obstetrics and Gynaecology, Regional Institute of Medical Sciences, Imphal, Manipur, India. Inclusion criteria for 'women with PROM' group includes women in any gravida with gestational age of at least 37 completed weeks, lack of uterine contractions for at least one hour after PROM, cervical dilatation less than 3 cm, single live pregnancy in vertex presentation, and PROM confirmed by direct visualization under speculum examination. For comparison, in the 'women without PROM' group, 85 women with comparable socio-demographic characteristics in term pregnancy with intact membranes were taken. Exclusion criteria for both the groups includes malpresentation, multiple gestation, meconium stained liquor, cephalo-pelvic disproportion. Informed written consent was taken from each participant. Approval from the Research Ethics Board, RIMS, Imphal was obtained.

Participants' socio-demographic characteristics; mode of delivery; maternal complications like Post-partum haemorrhage, abruption, chorioamnionitis, sepsis; perinatal complications like neonatal sepsis, respiratory distress syndrome, low birth weight, NICU admission, stillbirth, APGAR score were noted down. The data were analysed in SSPS version 21.0 IBM. Descriptive terms like mean, standard deviation, percentage and proportions were used. Maternal and fetal complications were analysed using chi-square test, and the obtained data were expressed on frequency and percentages. P value <0.05 was considered as significant.

4. Results

A total of 170 pregnant women were included in the study-85 women with PROM and 85 without PROM.

As shown in Table 1, majority of the participants (77.6% of women with PROM and 65.9% of women without PROM) belonged to the age group of 19-34 years. Sixty seven percent of women with PROM and 55.2% of women without PROM were primigravida, while the rest were multigravida. In the women with PROM group, 47% of participants belonged to 40-41 weeks of gestation, 43.5% belonged to $37\text{-}39^{+6}$ weeks of gestation, and the remaining 9.5% of the women belonged to 42 weeks and above, while in the women without PROM group, it was 30.5%, 67%, and 2.5% respectively. The difference was found to be clinically significant (0.004).

As shown in Table 2, the percentage of respiratory distress syndrome was found to be more in babies born to 'women with PROM' (30.5%), as compared to the babies born to 'women without PROM' (15.2%), with a relative risk of 1.5. The finding was statistically significant (p-value 0.027). Low APGAR score, and the NICU admission

Table 1: Baseline characteristics of the two groups

Variables	Categories	With PROM (n=85)	Without PROM (n=85)	p-value
Age (in years)	<18	8 (9.4%)	16 (18.9%)	0.161
	19-34	66 (77.6%)	56 (65.9%)	
	35 and above	11 (13%)	13 (15.2%)	
Gravida	Primigravida	57 (67%)	47 (55.2%)	0.078
	Multigravida	28 (33%)	38 (44.8%)	
Period of gestation	37- 39^{+6} weeks	37 (43.5%)	57 (67%)	0.004
	40– 41^{+6} weeks	40 (47%)	26 (30.5%)	
	42 weeks and above	8 (9.5%)	2 (2.5%)	
Socio-economic status	Lower class	8 (9.5%)	3 (3.5%)	0.342
	Lower middle	40 (47%)	41 (48.2%)	
	Upper middle	36 (42.3%)	38 (44.8%)	
	Upper	1 (1.2%)	3 (3.5%)	
Religion	Hindu	42 (49.4%)	49 (57.6%)	0.432
	Christian	9 (10.6%)	4 (4.8%)	
	Muslim	14 (16.5%)	15 (17.6%)	
	Others	20 (23.5%)	17 (20%)	

Table 2: Comparison of various outcome variables between women with PROM and women without PROM

Variables	Categories	Women with PROM	Women without PROM	p- value
Neonatal sepsis	Yes	7 (8.2%)	4 (4.7%)	0.350
	No	78 (91.8%)	81 (95.3%)	
New-born respiratory distress syndrome	Yes	26 (30.5%)	13 (15.2%)	**0.027**
	No	59 (69.5%)	72 (84.8%)	
NICU admission	Yes	12 (14.1%)	9 (10.6%)	0.484
	No	73 (85.9%)	76 (89.4%)	
APGAR at 1 min<7	Yes	26 (30.6%)	14 (16.5%)	0.075
	No	59 (69.4%)	71 (83.5%)	
Successful vaginal birth	Yes	50 (58.8%)	57 (67.1%)	0.532
	No	35 (41.2%)	28 (32.9%)	
Chorio-amnionitis	Yes	2 (2.4%)	0 (0)	0.155
	No	83 (97.6%)	85 (100%)	
Puerperal Sepsis	Yes	4 (4.7%)	1 (1.2%)	0.173
	No	81 (95.3%)	84 (98.8%)	

occurred more often to the babies born to the 'women with PROM' group (30.6%, and 14.1% respectively), as compared to babies born to 'women without PROM' group (16.5%, and 10.6%), but the findings were not significant. Chorio-amnionitis, and puerperal sepsis were seen more commonly in 'women with PROM' group (2.4%, and 4.7% respectively), as compared to 'women without PROM' group (0%, and 1.2% respectively). But, the findings were not significant.

More than half (50.6%) of the women with PROM underwent induction of labour, as compared to only 20% of the women without PROM, and it was clinically significant with a p-value of <0.05 (Table 3).

Further, 58.8% (50 out of 85) of the women with PROM had a successful vaginal birth, as compared to 67.1% (57 out of 85) of the women without PROM, with 3.5% being instrumental delivery in both groups, but the finding was not significant (Tables 2 and 4). The remaining participants underwent caesarean section.

As shown in Table 5, most of the women with PROM (44.2%) delivered within 5-10 hours of induction of labour, followed by 23.3% delivering within 11-15 hours of induction, 18.6% in the first 5 hours of induction, and 13.9% within 16-20 hours of labour induction. In the 'women without PROM' group, the percentages were 47.1% within 11-15 hours, followed by 29.4% within 5-10 hours, 17.6% within the first 5 hours, and 5.9% within 16-20 hours of labour induction.

5. Discussion

In our study, 26 babies (30.6%) born to women with PROM, and 13 babies (15.3%) born to women without PROM developed Respiratory distress syndrome. This was significantly higher than the 8% of babies born to women with PROM having birth asphyxia in a study done by Gupta et al.[14] He had also found that 4% babies had neonatal sepsis, and 26% required admission to NICU. In our study,

Table 3: Induction of labour done among the women with PROM and women without PROM

Induction of labour	Participants		Total	p-value
	With PROM	Without PROM		
Yes	43 (50.6%)	17 (20%)	60	
No	42 (49.4%)	68 (80%)	109	<0.05
Total	85	85	170	

Table 4: Comparison of mode of delivery between women with PROM and women without PROM

Mode of delivery	Participants		Total	p- value
	With PROM	Without PROM		
Uncomplicated vaginal delivery	47 (55.3%)	54 (63.6%)	101	
Caesarean section	35 (41.2%)	28 (32.9%)	63	0.532
Instrumental delivery	3 (3.5%)	3 (3.5%)	6	
Total	85	85	170	

Table 5: Comparison of induction to delivery interval between women with PROM and women without PROM

Induction to delivery interval	Women with induction of labour		Total	p- value
	With PROM	Without PROM		
<5 hours	8 (18.6%)	3 (17.6%)	11	
5-10 hours	19 (44.2%)	5 (29.4%)	24	
11-15 hours	10 (23.3%)	8 (47.1%)	18	0.30
16-20 hours	6 (13.9%)	1 (5.9%)	7	
Total	43	17	60	

12 babies (14.1%) in the PROM group, 9(10.6%) born to women without PROM required NICU admission, and 7 babies (8.2%) born to women with PROM developed neonatal sepsis. Again, 26 babies (30.6%) born to women with PROM and 14 babies (16.5%) born to women without PROM had APGAR score at birth below 7, which is similar to the findings from Endale et al.[15] Kumari et al[16] had also found that 12% of babies born to women with PROM had APGAR score less than 8.

Further in our study, it was found that caesarean section was required for 41.2% (35) of women with PROM, which was found to be much higher than the 20.09% seen in a similar study done by Lovereen S et al.[17] Kasliwal A et al,[18] in a study, had found the common complications to the mother after PROM included puerperal pyrexia (12%), chorio-amnionitis (8%), puerperal sepsis (3%), wound infection (1%), and PPH (2%). In our study, 2 women (2.4%) with PROM, and none of the women without PROM developed chorio-amnionitis. Similar results were also found by Mehrotra L et al.[19]

6. Conclusion

PROM is linked to significant maternal and foetal mortality and morbidity. It occurs in approximately 10% of all pregnancies. The condition affects both fetus and mother as prematurity, infection and its sequelae endanger the fetus, while risk of infection with an amnionitis is a threat to both fetus and mother. The use of antibiotics in the latent period can reduce the maternal complications like chorio-amnionitis and puerperal pyrexia. Septicemia in the neonates can also be prevented by the use of prophylactic antibiotics. Proper aseptic precautions during labour can help to decrease incidence of neonatal sepsis.

This prospective study was carried out to suggest some strategies for proper screening of high-risk cases, correct diagnosis and effective management and thus improvement of maternal and neonatal outcome and increase the rate vaginal deliveries successfully. As the etiology of PROM remains obscure, prevention is difficult and so one has to concentrate more on its management. Although early diagnosis and proper management can be helpful in decreasing prenatal morbidities in cases of PROM, more randomised controlled trials involving larger sample size is required to draw further conclusions.

7. Source of Funding

None.

8. Conflict of Interest

None.

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