



ASSESSMENT OF DETERMINANTS OF PREMATURE RUPTURE OF MEMBRANES AND FETO-MATERNAL OUTCOME AMONG WOMEN ADMITTED IN LABOUR ROOM AT SELECTED GOVERNMENT HOSPITAL, WEST BENGAL.

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ABSTRACT

Premature rupture of membranes (PROM) is spontaneous rupture of membranes any time beyond 28th week of pregnancy but before onset of labour. A descriptive study was conducted among 100 women admitted in postnatal ward of Barasat district hospital, North 24 parganas selected through non-probability convenience sampling technique between 4th and 30th January 2021. Data were collected through structured interviews and were analysed by using descriptive and inferential statistics. The study revealed that the majority were in the age group of 18-23 years (57%), multipara (51%), with period of gestation <37 weeks (71%), antenatal clinic visits <4 times (61%), history of abortion (27%) and had UTI (32%). Majority of neonates were preterm and low birth weight (62%), had birth asphyxia needing resuscitation (34%) and required NICU (Neonatal Intensive Care Unit) admission (35%). The study emphasises in preventing modifiable determinants in obstetrics health care system to reduce PROM and improve feto-maternal outcome.

Key Words: Premature rupture of membranes (PROM), Determinants of PROM, Feto-maternal outcome, Perinatal complications

INTRODUCTION

Rupture of the fetal membranes is the integral part of the normal and abnormal parturition process. There are two types of premature rupture of membranes:

- a) Preterm Premature rupture of membranes: when membranes ruptures before 37 completed gestation weeks.
- b) Term Premature rupture of membranes: when membranes ruptures at and after 37 gestation weeks.

Background of the study

The bactericidal property of amniotic fluid plays protective role against infections; and decrease in the volume of amniotic fluid after PROM increases the patient's susceptibility to infections. It is seen to complicate 10% of pregnancies with infections (chorioamnionitis, postpartum endometritis, sepsis), postpartum haemorrhage, deep vein thrombosis. Fetal complications include fetal distress due to umbilical cord compression or placental abruption. The most common cause for neonatal morbidity was respiratory distress syndrome (14%), followed by jaundice (9%), septicemia (5%), IVH (3%). [1] Other serious perinatal morbidity includes long-term consequences like chronic lung disease, pulmonary hypoplasia, necrotising enterocolitis, electrolyte disturbances, visual or hearing difficulties, intellectual disabilities, developmental and motor delay, spastic paralysis or death. Preterm mortality is responsible for nearly 17 deaths per 1000 live births and 4.9 million neonatal deaths occur yearly due to birth asphyxia, representing 47% of deaths of children under 5 years of age according to the 2024 WHO estimation [2]. A Study conducted by Katti et al. found that PROM were observed across all age groups, with the highest incidence in the 21-25 years age group (38.9%), followed by 26-30 years (31.7%) and 31-35 years (17.8%). Cases were less frequent in those younger than 20 years (6.7%) and older than 35 years (5%). [3] As prevention of PROM is not easy due to its multifactorial aetiology, one has got to concentrate more on the management of PROM to reduce the complication [Assefa N.T et al, 2018.]. Preventing preterm related mortality in low resource setting requires identifying the determinants of PROM and feto-maternal outcomes.

Table 1: Socio-Demographic characteristics of respondents

Demographic variables	Category	Frequency	Percentage (%)
Age in years	18-23	57	57
	24-29	32	32
	30-35	11	11
Education	Illiterate	3	3
	Primary	23	23
	Secondary	51	51
	Higher secondary	15	15
	Graduate and above	8	8
Occupation	Homemaker	87	87
	Others (beautician, ayah, tailor)	13	13
Type of family	Nuclear	20	20
	Joint	80	80
Number of family members	2 to 4	51	51
	5 to 8	49	49
Social class per capita income (as per BG Prasad Scale)	Upper class(≥ 7533)	0	–
	Upper middle class (3766-7532)	21	21
	Middle class (2260-3765)	48	48
	Lower middle class(1130-2259)	26	26
	Lower(≤ 1129)	5	5

Data presented in Table 1 depicts that the majority (57%) of women were aged 18-23 years, (51%) were educated up to secondary level, and (87%) worked as homemakers. In terms of family characteristics, (80%) resided in a joint family, (51%) lived in a family of 2 to 4 persons, and (48%) belonged to the middle-class per capita income.

Table 2: Maternal profile of premature rupture of membranes

Determinants variables	Category	Frequency	Percentage (%)
Parity	Primipara	49	49
	Multipara	51	51
Gestational age	<37 weeks	71	71
	≥ 37 weeks	29	29
Time of antenatal visit	<4 times	61	61
	≥ 4 times	39	39
History of abortion	Yes	27	27
	No	73	73
History of urinary tract infection	Yes	32	32
	No	68	68
History of vaginal bleeding during pregnancy	Yes	2	2
	No	98	98
History of pelvic surgery	Yes	3	3
	No	97	97
Intake of regular iron and folic acid (IFA) tablets consumption	Yes	65	65
	No	35	35
History of smoking or chewing tobacco	Yes	9	9
	No	91	91

History of hypertension	Yes	25	25
	No	75	75
History of diabetes	Yes	9	9
	No	91	91
Disorder of thyroid during pregnancy	Yes	27	27
	No	73	73
Presence of premature contractions	Yes	46	46
	No	54	54
Presence of placenta previa	Yes	0	–
	No	100	100
Presence of any STD	Yes	0	–
	No	100	100
Presence of vulvovaginal infections	Yes	0	–
	No	100	100
Presence of any congenital anomalies in foetus	Yes	0	–
	No	100	100

Data in Table 2 depicts that majority of women were multipara (51%), and were < 37 weeks of gestation (71%). Most participants had visited ANC <4 times (61%), took regular iron folic acid tablets (65%) and reported no experience of premature contractions (54%), abortion (73%), urinary tract infections (68%), any bleeding during pregnancy (98%), any pelvic surgery (97%) or smoking and chewing tobacco (91%). Additionally, majority of women did not have any comorbidity like hypertension (75%), diabetes (91%), and thyroid disorders (73%). And none of the women presented with placenta previa, STD, vulvovaginal infections, or any foetal congenital anomalies.

Table 3: Maternal outcomes of Premature rupture of membranes

Variables	Category	Frequency	Percentage (%)
Types of delivery	Normal vaginal	45	45
	LSCS (lower segment caesarean section)	54	54
	Instrumental	1	1
Preterm birth	Yes	71	71
	No	29	29
Before birth elevation of temperature	Yes	8	8
	No	92	92
Occurrence of PPH (Post-partum haemorrhage)	Yes	6	6
	No	94	94
Occurrence of puerperal sepsis	Yes	0	–
	No	100	100
Separation of placenta	Spontaneous	97	97
	Retained	3	3
Received antibiotic treatment	Yes	100	100
	No	0	–
Elevation of WBC count	Yes	4	4
	No	96	96

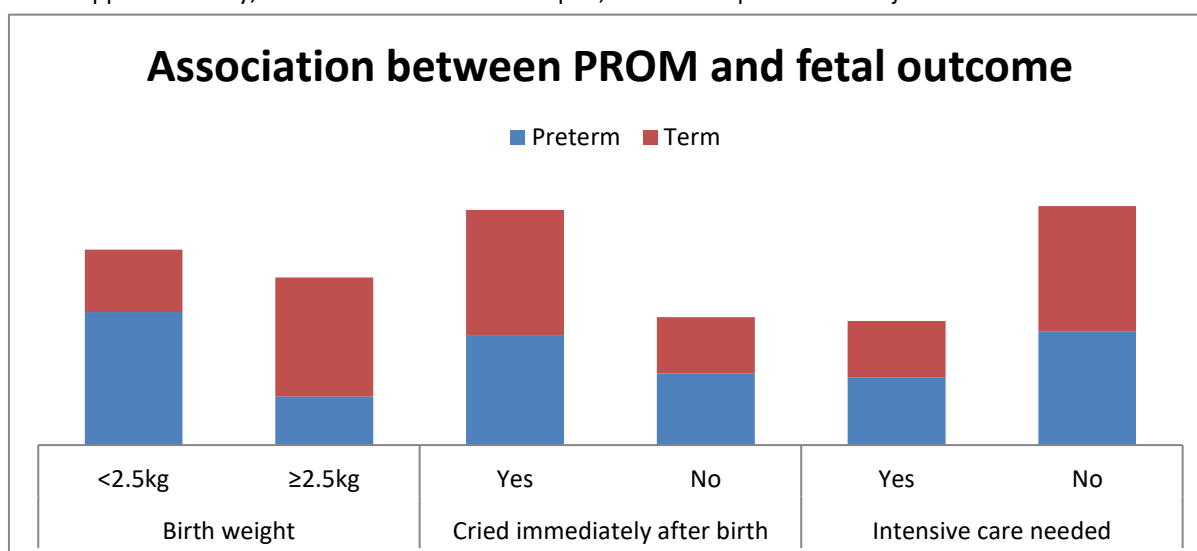
Data presented in Table 3 depicts that majority of women had normal clinical outcomes, including normal temperature (92%), spontaneous placental separation (97%), no post-partum haemorrhage (94%), normal WBC count (96%) and zero case of puerperal sepsis (0%). But there was high prevalence of LSCS (lower segment caesarean section) delivery (54%), and preterm births (71%). Also, every woman (100%) received antibiotic treatment.

Table 4: Foetal outcome of premature rupture of membranes

Variables	Category	Frequency	Percentage (%)
Presence of meconium stained liquor	Yes	10	10
	No	90	90
Foetal tachycardia	Yes	27	27
	No	73	73
Neonatal outcome	Alive	96	96
	Still birth	4	4
Cried immediately after birth	Yes	63	63
	No	37	37

Data presented in Table 4 depicts that vast majority of neonates were alive (96%), not meconium stained (90%), had a normal heart rate (73%), and cried immediately after birth (63%).

Out of the 96 neonates that were alive, 65.63% neonates did not experience birth asphyxia or required resuscitation, 98.96% neonates maintained normal body temperature and 64.55% did not need any Intensive care support. Notably, there were zero cases of sepsis, neonatal sepsis or birth injuries.


Figure 1: Bar diagram showing association between PROM and fetal outcome.

The data in Figure 1 reveals that 73.24% preterm and 34.48% term neonates weighed <2.5 kg at birth, 60.56% preterm neonates and 68.96% term neonates cried immediately after birth. Also among neonates that were alive, 37.32% preterm neonates and 68.96% term neonates did not require intensive care.

Table 5: Association between birth weight and gestational age, ANC visits and Iron Folic Acid (IFA) tablet consumptions

Demographic Information	Chi square value(χ^2)	Result
Gestational age	11.78***	Significant association
ANC visits	0.246	No significant association
IFA tablet consumption	2.552	No significant association

The data presented in Table 5 demonstrates a statistically significant association between birth weight of neonates and gestational age ($\chi^2=11.78$, at $p<0.001$, df (1) =10.83 level of significance). And, no statistically significant association found between birth weight of neonates and either ANC visits ($\chi^2=0.246$ at $p\geq0.05$, df (1) =3.84 level of significance) or maternal IFA tablet consumption ($\chi^2=2.552$, at $p\geq0.05$, df (1) =3.84 level of significance).



METHODS

In this study, total sample size was 100 women admitted with premature rupture of membranes at labour room and followed up at postnatal ward. The sample size was calculated using Descriptive Study Formula:

$n = \frac{Z^2 pq}{d^2}$ Where, n= sample size, z=confidence interval (at 95%, Z=1.96), p=population proportion (50%), q=(1-p) and d= margin of error (10%). According to calculation, sample size was 96, which was approximated to 100. Sampling was done by non-probability convenience sampling technique. Content validity was evaluated by seven experts in Department of Obstetrics and Gynaecology Nursing specialists using a criteria checklist. The demographic tool and the semi-structured interview schedule (assessing PROM) achieved 93.86% and 93% agreement respectively. Based on feedback, one unrelated item was removed and key maternal factors were added. Tool equivalence was established through simultaneous and independent administration by two investigators (including an M.Sc. Nursing student) to 15 subjects. The interrater reliability was 100% making the tool dependable.

DISCUSSION

This study indicates that majority of women were middle-class homemakers of 18-23 years with secondary education. Most participants were multipara, delivered preterm at <37 weeks of gestation via LSCS; though 27% had abortion history and 32% had urinary tract infections. While most neonates cried immediately after birth, 34.37% neonates required resuscitation for birth asphyxia, and 37.32% needed intensive care. Neonatal birth weight significantly correlated with gestational age and premature rupture of membranes, but no association was seen with ANC visits or IFA tablet consumption.

A study conducted by Abebe Alene et al. found that history of the previous adverse birth outcome, residence, urinary tract infection, anemia, and inter-pregnancy interval had an association with adverse birth outcomes. [4]. In another study conducted by Banhishikha Sircar et al., it was seen that 30.6% neonates born to women with PROM developed respiratory distress syndrome that is similar to this study but only 14.1% of them required admission to NICU (Neonatal Intensive Care Unit) which is quite less in comparison to this study. [5] These findings emphasises the critical need to identify the contributing factors and upgrade quality of antenatal care, maternal and neonatal care skills.

Limitations

Among the several methodological limitations of the study, the primary concern is the small sample size of only 100 participants that restricts the generalisability of the findings to a broader population. Secondly, the utilisation of a non-randomised sampling strategy introduces potential selection bias. Finally, the absence of a pre-existing standardised measurement tool for data collection led to the development of a bespoke instrument by the researcher, which relied strictly on a comprehensive review of relevant existing literature and was refined through expert advisory consultation.

RECOMMENDATIONS

- A comparative study can be conducted between primipara and multipara on this area
- Similar study can be done with larger sample size to generalize the findings of the study.
- A study can be done to find out occurrence of premature rupture of membranes in relation to selected variables, as in the present study.

CONCLUSION

This study assesses the various determinants of premature rupture of membranes and reveals that it is associated with serious morbidity and mortality of mothers, fetuses as well as neonates. Early detection of premature rupture of membranes and proper aseptic precautions during labour can improve the fetomaternal outcomes.

This study suggests the need for awareness among women and family members about early registration, ≥4 antenatal check-ups, consumption of 180 IFA tablets, early detection of complications and follow-up care. It emphasises nurses in conducting campaigns to promote institutional deliveries and quality care to reduce premature rupture of membranes. And, provide respectful maternity care to all pregnant women, increase the facility based birth and essential newborn care to ensure early identification and management of premature rupture of membranes to improve fetomaternal outcomes.



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