

**A study of perinatal outcome in women with preterm premature rupture of membrane at a tertiary care hospital.**

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**Abstract**

**Introduction:** Preterm premature rupture of membranes complicates 3-8% of pregnancies and leads to one third of preterm deliveries. It is a leading cause for perinatal morbidities and mortality as well as maternal morbidity. This study was designed to find out the perinatal outcome in women presenting with preterm premature rupture of membrane.

**Material and method:** 125 women with gestational age between 28 to 36.6 weeks with PROM were included in the study after obtaining informed consent. All women were monitored throughout labour and delivery outcomes were noted in terms of birth weight, APGAR scores at 5th minutes, admission to Neonatal intensive care unit, perinatal mortality and maternal complications. Data were entered in MS Excel sheet and statistically analyzed.

**Results:** Mean age of the women was  $23.5 \pm 2.4$  years. Mean gestational age was  $33.8 \pm 2.1$  weeks. Mean latency period was  $31.9 \pm 22.6$  hours with a range 3 – 80 hours. The most common

maternal morbidity observed was puerperial pyrexia (12%) followed by chorioamnionitis (8.8%) and PPH (8%). 52% babies had APGAR 7 or more and 74.4% babies had birth weight 1.5 or more but less than 2.5 kg. 65.6% babies were admitted in NICU and perinatal death was seen in 44.8% babies. Commonest indication for NICU admission was septicemia (16.8%) followed by prematurity (14.4%) and jaundice (11.2%). Conclusion: Preterm Premature rupture of membranes is a common pregnancy complication and is associated with significant risks of morbidity and mortality. The management of pregnancies complicated by PPRM is challenging and should be individualized.

**Keywords:** preterm premature rupture of membrane, Preterm birth, perinatal morbidity, perinatal mortality.

**Introduction**

Premature rupture of membranes (PROM) is one of the most common and controversial issues in daily obstetrics practice. It refers to rupture of foetal membranes prior to the onset of

labour. Preterm premature rupture of membranes (PPROM) is defined as spontaneous rupture of foetal membranes prior to 37 weeks of gestation.<sup>1</sup> It affects approximately 3 – 4.5% of all pregnancies.<sup>2,3</sup> PPRM is one of the main causes of prematurity and its complications, such as newborn respiratory distress syndrome, neonatal sepsis, necrotizing enterocolitis, intraventricular hemorrhage, periventricular leukomalacia, varying degrees of hypoplasia and bronchopulmonary dysplasia, contributing greatly to an increase in neonatal morbidity and mortality.<sup>4,5</sup> In addition, PPRM is associated with increased risk of chorioamnionitis, dysfunctional labour, increased caesarean rates, postpartum haemorrhage and endometritis in the mother.<sup>6</sup>

The pathophysiologic mechanism of PPRM has not been clearly defined yet. It is multifactorial in etiology and several different risk factors that may be associated with PPRM. These include placental abruption, excessive collagen degradation or decreased membrane collagen content, localised membrane defects, excessive membrane stretch (uterine over distension), precocious programmed amniotic cell death and choriodecidual infection.<sup>1,7-9</sup>

Pregnancy outcome in cases of spontaneous PPRM depends on gestational age. Approximately 50% of patients deliver within a week after PPRM, latency in the other half depends on gestational age, fetal condition and presence of infection.<sup>7</sup> Depending on the gestational age, fetal and maternal condition, conservative management, including steroids administration, antibiotics and magnesium sulfate or active labor induction after steroids administration may be tried.<sup>10</sup>

The management of PPRM is controversial. Proper evaluation and management are necessary in order to improve neonatal outcomes. The major question regarding management of these patients is timely and accurate diagnosis because early and accurate diagnosis of preterm PROM would allow for gestational age-specific obstetric interventions designed to optimize perinatal outcome and minimize serious complications, such as cord prolapse and infectious morbidity (chorioamnionitis, neonatal sepsis)<sup>8,11</sup> Conversely, a false-positive diagnosis of preterm PROM may lead to unnecessary

obstetric interventions, including hospitalization, and induction of labor.<sup>12,13</sup> Corticosteroids are effective in reducing many neonatal complications, especially RDS and intraventricular haemorrhage. Antibiotics can be used effectively to increase the latency period. However, management of PPRM varies according to the gestational age of the fetus.<sup>14</sup> Keeping these in mind this study was done to find out perinatal outcome in women presenting with of preterm premature rupture of membrane in the Department of Ob- Gy.

### **Material and Methods**

The present study was a hospital based observational study carried out in department of Obstetrics and Gynaecology, S.M.S Medical College, Jaipur from July 2019 onwards. 125 woman with PROM and gestational age between 28 – 36.6 weeks, admitted in the labour room for delivery were included in the study after obtaining written informed consent. Women with GDM, hypertensive disorders or any other medical disorder, IUGR, congenital malformation or IUFD were excluded from the study. Detailed clinical history, examination, routine investigations and USG were done for all. PPRM was confirmed by: history, observation of pooling of amniotic fluid in posterior fornix of vagina or active leakage of amniotic fluid from cervix and fern test if required. Women were assessed by clinical signs and symptoms together with white blood cell count, C reactive protein and fetal heart rate monitoring to diagnose the presence of intrauterine infection. PPRM had been managed as per protocol. Antibiotics, steroid coverage was given and labour was induced if infection was suspected or when PPRM occurred at and after 34 weeks of gestation. All women were monitored throughout labour and delivery outcomes were noted in terms of mode of delivery, gender of the neonate, APGAR at 5 minutes, birth weight, need for NICU admission, and perinatal death were noted. Data were compiled and statistically analyzed.

### **Results**

Profile of the women presenting with PPRM is shown in Table 1. 64% women were below 25 years of age. Mean age of the women was 23.5±2.4 years. 55.2% women were primigravida. Mean weight and height of the women were 55.8±7.4 Kg and

154.8±4.7 cm respectively. 67.2% women had gestational age between 34 to <37 weeks. Mean gestational age was 33.8±2.1 weeks. In majority of women latency period was less than 24 hours. Mean latent period was 31.9±22.6 hours.

Table 2 shows outcome of labour with induction/augmentation of labour in women with PPRM. Out of 125 women with PPRM, 23 women (18.4%) went in to spontaneous labour, Induction of labour done by mesoprostal in 39 women (31.2%) and Augmentation of labour by oxytocin done in 63 women (50.4%). Delivery by cesarean section was required for 4.3%, 15.4% and 17.5% women with spontaneous, mesoprostal induction and oxytocin augmentation group respectively.

Maternal morbidity in women with PPRM is shown in table 3. Out of 125 women, 49 women (39.2%) had morbidity in the form of puerperal pyrexia (12.0%), chorioamnionitis (8.8%), PPH (8%), puerperal sepsis (4.8%), UTI (4%), and wound infection (1.6%)

Neonatal outcome in PPRM is shown in Table 4. 56% neonates were male and 44% neonates were females. 52% neonates had APGAR score 7 or more at 5min. Mean APGAR score was 6.4±0.8. 74.4% babies had birth weight 1.5 Kg or more. Mean birth weight of the babies was 1.7±1.6 Kg. 82 babies (65.6%) required NICU admission and perinatal death was seen in 44.8% babies.

Table 5 shows various reasons for NICU admission. The commonest reason for NICCU admission was birth asphyxia (25.6%) followed by septicemia (16.8%), Jaundice (11.2%) and RDS (8.8%).

### Discussion

PPROM is one of the common complications of pregnancy that has a major impact on the fetal and maternal outcome. It can lead to increased maternal complications, operative procedures, neonatal morbidity and mortality. Preterm PROM complicates approximately 3 percent of pregnancies and leads to one third of preterm births.<sup>15</sup> Following membrane rupture the preterm fetus is at risk of a number of complications such as prematurity, placental abruption, ascending infection, intrapartum fetal distress and cord prolapsed.<sup>16</sup>

PPROM was more common in age group of less than 25 years with an incidence of 64% in our study. Our results were consistent with the results of various studies done in the past.<sup>17-</sup>

<sup>19</sup> Mean age of the women in our study was 23.5±2.4 years which was consistent with mean age observed by Chaudhuri S et al<sup>20</sup> Majority of the women with PPRM in our study had their height 155 cm or more which mimics with the result of Okeke TC et al<sup>21</sup>. Most of women never received antenatal care and were admitted as unbooked cases (63.2%). Our results were similar to that of Nagaria T et al<sup>22</sup> study where majority of the women were unbooked. It is believed that in unbooked cases there is lack of antenatal care leading to lack of identification of recurrent risk factors like PPRM, preterm delivery, induced abortions and their managements. Also urogenital infections are not detected and treated due to lack of antenatal care leading to PPRM.<sup>6</sup> PPRM was more common in low and middle socio-economic class with an incidence of 71.2% which is comparable with the study by Mohokar SA et<sup>6</sup> and Noor S et al<sup>18</sup>. It is believed that low socio-economic status is associated with factors like malnutrition, over exertion, poor hygiene, stress, high parity, recurrent genitourinary infection and anaemia. The risk of PPRM increases with decrease antibacterial activity in the amniotic fluid of patients with low socioeconomic status.<sup>6</sup>

We observed that PPRM was more common in primigravidae with an incidence of 55.2% which is comparable to various studies done in the past where it was observed that PPRM was more frequent in primigravida.<sup>19,23,24</sup> (Swathi Pandey , Poovathi M et al and Fatemeh Tavassoli, Iran<sup>5</sup>, Endale T)

The gestational age at birth is the main determinant of neonatal weight, neonatal complication, need for resuscitation and survival rate in neonates.<sup>25</sup> In present study 67.2% women with PPRM had gestational age between 34-36.6 weeks and 32.8% had gestational age <34 weeks which is in contrast with the results of Msomi G et al<sup>26</sup> who reported that 48% women had gestational age between 34 and 36 weeks.

In our study 18.4% women developed spontaneous labour and 81.6% needed induction or augmentation. Our result is comparable to that of Kadikar et al<sup>27</sup> where 62% of the patients required induction but in contrast to that of Mohokar SA<sup>6</sup> where

55% women required induction. According to studies Maternal foetal medicine network<sup>28</sup> induction has several benefits including a shorter time to delivery (14 vs 36 hours), shorter maternal hospital stay and less chorioamnionitis. Neonatal hospital stay was also shorter and hence neonatal sepsis in the induction group was less.

The literature reports that PROM is associated with an increased risk of cesarean delivery<sup>29</sup>. In present study 85.6% of patients had delivered vaginally and 14.4% had delivered by LSCS which is comparable with that observed by Noor et al<sup>18</sup> and Kadikar et al<sup>27</sup>. Rate of cesarean section in PPRM varied from 16% to as high as 49 as observed by various authors in their studies.<sup>6,17,18,19,25,30,31</sup>

Most of the neonatal complications of PPRM are because of preterm labor, prolonging the interval between rupture of the membrane and labor by appropriate interventions may reduce prenatal mortality and morbidity. Latency period (interval from PROM to delivery) in our study was <24 hours in 47.2% and >48 hours in 28.8% women. Msomi G et al<sup>26</sup> in their study observed latency period of <24 hours in 24% women. Similarly J liu et al<sup>31</sup> observe latency period of <24 hours in 43% cases. Mean latent period was 31.9±22.6 hours in our study. Ibishi VA et al<sup>32</sup> in their study observed mean latency period as 20.86 ± 12.6 hours.

The rate of maternal morbidity of 39.2% reported in our study. Maternal morbidity was about 20% in the study done by Okeke TC et al<sup>21</sup>. The most serious complication of PPRM is chorioamnionitis, which is often associated with adverse maternal and neonatal outcomes related to the infection. Chorioamnionitis was reported in women with PPRM in our study as 8.8%. Chorioamnionitis was reported in 13%-60% females with PROM in the study by Medina TM and Hill DA<sup>15</sup> and 12.7% in the study by Boskabadi et al<sup>33</sup>. Women who had preterm delivery were most likely to carry a male fetus in comparison with low risk full term pregnancy according to Melamed et al<sup>34</sup> and similar observation was observed in our study. The fetal membranes serve as a barrier to ascending infection. Once the membranes rupture, there is significant maternal, fetal and neonatal risks. A number of studies have

demonstrated that PROM may be strongly associated with the subsequent development of adverse neonatal outcomes such as neonatal death, periventricular leukomalacia (PVL), periventricular-intraventricular hemorrhage (PIVH), cerebral palsy and bronchopulmonary dysplasia, especially among children of women who develop chorioamnionitis after PROM.<sup>35</sup>

In our study 74.4% neonates had birth weight 1.5Kg or more which is in agreement with that observed by Mohokar SA<sup>6</sup>. Mean birth weight of the babies 1.7±1.6 Kg ) in our study was less than mean weight observed by J Liu et al<sup>31</sup> in their study.

65.6% babies needed NICU admission in our study while in the study done by Usha Rani Set al<sup>17</sup> and Poovathi M et al<sup>19</sup> 77% and 82% babies respectively required NICU admission. Perinatal death (44.8%) in our study was very high in comparison to Usha Rani S et al<sup>17</sup> study. This difference could be because of difference in study design, local pediatric practice and relatively small sample size of our study.

Majority of neonatal morbidity noted in present study was birth asphyxia (25.6%), septicemia (16.8%), Jaundice (11.2%) and RDS (8.8%). J liu et al<sup>31</sup> in their study observed RDS in 9.8% , septicemia in 12.7% infants. Perinatal mortality in our study was 44.8%. which is quite high than that reported by previous studies.<sup>6,18,19,21,23</sup> Reports from Saudi Arabia showed that the incidence of neonatal mortality was 5.5%, respiratory distress was 15.9%, neonatal sepsis was 7.7% and necrotizing enterocolitis was 3.1% in patients with PROM,<sup>36</sup> while results from France showed the incidences of neonatal mortality to be 11.7%, neonatal sepsis 15%, bronchopulmonary dysplasia 8.4% and cerebral injury 11.7% in cases with PPRM between 24 and 34 weeks gestation.<sup>37</sup>

### Conclusion

From the above study, it can be concluded that PPRM is a big challenge to the obstetricians and neonatologists as it is associated with poor fetomaternal outcome. PPRM is a significant cause of perinatal morbidity (65.6%) and perinatal mortality (44.8%). Careful antenatal monitoring, detection and prompt treatment of infection is necessary. Strict aseptic precautions, appropriate therapy and timely induction of labour

are important factors for better outcome of mother and baby. PPRM requires individualized management depending on the gestational age, duration of PROM, presence of infection and varies from expectant management to aggressive treatment.

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**Legends Tables**

Table 1: Profile of women with PPRM

Variables		Number of cases	Percentage
Age	<25	80	64.0
	≥25	45	36.0
Height (cm)	<155	57	45.6
	≥155	68	54.4
Weight (Kg)	<55	49	39.2
	≥55	76	60.8
Booking status	Booked	46	36.8
	Unbooked	79	63.2
Socio-economic status	Low	47	37.6
	Middle	42	33.6
	Upper	36	28.8
Parity	Primigravida	69	55.2
	Multigravida	56	44.8
Gestational age	<34	41	32.8
	34 - <37 weeks	84	67.2
Latency period	<24	59	47.2
	24 - 48	30	24.0
	>48	36	28.8

Table 2: Outcome with induction/augmentation of labour in women with PPRM

Type of Induction/ Augmentation	Number of cases (n = 125)	Normal vaginal delivery		LSCS	
		Number	%	Normal	%
Spontaneous	23 (18.4%)	22	95.7	1	4.3
Mesoprostal induction	39 (31.2%)	33	84.6	6	15.4
Oxytocin augmentation	63 (50.4%)	52	82.5	11	17.5

Table 3: Maternal morbidity in women with PPRM.

Maternal morbidity	Number of cases (n = 125)	Percentage
Chorioamnionitis	11	8.8
Puerperal Pyrexia	15	12.0
Puerperal Sepsis	6	4.8

UTI	5	4.0
PPH	10	8.0
Wound infection	2	1.6
Total	49	39.2

Table 4: Neonatal outcome in PPRM

Variables	Number of cases (n = 125)	Percentage
Gender of the baby		
Male	70	56.0
Femal	55	44.0
APGAR		
<7	60	48.0
≥7	65	52.0
Birth weight		
<1.5	32	25.6
≥1.5	93	74.4
NICU admission	82	65.6
Perinatal death	56	44.8

Table 5: Reasons for NICU admission

Reasons for NICU admission	Number of cases (n = 125)	Percentage
Birth asphyxia	32	25.6
septicemia	21	16.8
jaundice	14	11.2
Convulsions	5	4.0
RDS	11	8.8
IVH	3	2.4
HYpoglycemia	7	5.6
Hypothermia	3	2.4
Total	82	65.6

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