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Original Article

Fetomaternal Outcome of Pregnancies with Preterm Prelabor Rupture of Membranes

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Abstract

Background: Preterm premature rupture of membranes defines spontaneous rupture of fetal membranes before 37 completed weeks and before labor onset. Preterm premature rupture of membranes complicates approximately 3% of all birth but accounts for 30% of neonatal morbidity and mortality among premature gestations. It has been seen that in women with preterm prelabor rupture of membranes (PPROM), 50% will go in labor within 24–48 h and 70–90% within 7 days. Latency period is defined as interval between rupture of membranes and delivery.

Aims and Objectives: This study aimed to predict the fetomaternal outcome of pregnancies complicated by preterm premature rupture of membranes between 30 and 37 weeks of gestation.

Materials and Methods: We conducted a prospective observational study of women with singleton pregnancies who presented with rupture of membranes. A total of 65 women presenting with PPROM from 30 weeks were included in the study. The rupture of membranes was confirmed by per speculum examination. The period of gestation was confirmed by accurate dating or first-trimester ultrasound. Only low-risk patients were included in the study. Age of patient gestational age at presentation, latency period, mode of delivery, and maternal infection whether present or not were recorded. The patients were given antibiotics and corticosteroids during the latency period. Maternal infection was determined in terms of positive C-reactive protein and temperature of >100°C.

Results: Maternal outcome: Majority of the patients with PPROM belonged to the age group of 30–34 years (49.2%). Primigravidas were found to have increased chances of PPROM (56.9%). the gestational age of patients with PPROM was 32–33 weeks in 41.5%, followed by 30.8% in 30–31 weeks and ≥ 34 weeks in 27.7%. Majority of the patients (49.2%) delivered within 48 h of premature rupture of membranes. Maternal infection was found to be present in 38.5% of study patients. Urinary tract infection was present in 72.3% of patients. Majority of the patients delivered via vaginal route (58.5%). Fetal outcome: 61.5% of patients delivered babies with APGAR score >7.47.7% delivered babies of birth weight 1.5–2.4 kg. 55.4% of babies were admitted to NICU and 18.5% had respiratory distress syndrome (RDS). The overall perinatal mortality was 27.7% among the study group. 71.9% of those admitted to NICU, 43.8% of those with perinatal mortality, and 31.3% of those with RDS delivered within 48 h of admission.

Conclusion: Antenatal diagnosis to prevent PPROM by identifying the risk factors is an important tool in management. Steroids for fetal lung maturity, antibiotics to prevent fetal and maternal infection, and tocolytics can be given to delay delivery to reduce NICU admission.

Keywords: Preterm premature rupture of membranes, Latency period, Maternal infection, Preterm birth and neonatal outcome

INTRODUCTION

Preterm premature rupture of membranes is defined as spontaneous rupture of fetal membranes before 37 completed weeks and before labor onset. Preterm premature rupture of membranes complicates approximately 3% of all births but accounts for 30% of neonatal morbidity and mortality.[1,2] The main reason is thought to be prematurity and infections. The frequency of intra-amniotic infection in patients with preterm PROM in the absence of labor is 20–40%.[3,4-14] Premature rupture of membranes results from accelerated membrane weakening by various factors through an increase in local cytokines and an imbalance between metalloproteinase and increased protease and collagenase activity and factors that cause increased intrauterine pressure.[3] The various risk factors associated

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with preterm prelabor rupture of membranes (PPROM) are low socioeconomic status, smoking, genital tract infection, increasing intrauterine pressure, incompetent cervix, and others.[2] It has been seen that in women with PPROM, 50% will go in labor within 24–48 h and 70–90% within 7 days.[1] Latency period is defined as the interval between rupture of membranes and delivery.[1] Expectant management of PPROM includes the use of antibiotic treatment and steroids.[1] The basic aim of expectant management is to prolong the pregnancy for longer durations because of strong association between perinatal outcome and gestational age.

MATERIALS AND METHODS

A prospective observational study of 65 pregnant women, presenting with PPROM before 37-week gestation, was conducted in the year March–October 2022 at LDH, Srinagar, Kashmir. All patients with gestational age between 30 and 37 weeks with PPROM confirmed by ultrasound and clinical examination regardless of their age were included in the study. Exclusion criteria were all women with PPROM presenting before 30-week gestation; those with multiple gestations, preeclampsia, gestational diabetes, previous lower segment cesarean section (LSCS), or other types of preterm deliveries were excluded from the study. Detailed workup including history, general physical examination, abdomen and pelvic examination, and relevant specific investigations was noted. Gestational age was confirmed from the last menstrual period or dating scan. A sterile speculum examination was done and liquor draining from cervical os was observed for certain characteristics such as color and smell and cough test was done to confirm the rupture of membranes. High vaginal swab was taken and sent for culture sensitivity. All baseline investigations, CRP, and routine urine examination were done. All patients were given prophylactic antibiotics and steroid cover. Latency period, induction method, and mode of delivery were noted.

Soon after delivery APGAR score at 1 min and 5 min, birth weight, immediate complications, birth asphyxia, meconium aspiration, sepsis, and other complications were noted. Blood culture and sensitivity were taken in neonates. Neonatal sepsis was considered if blood culture was positive within the first 48 h of birth.

RESULTS

Maternal Outcome

Majority of the patients with PPROM belonged to the age group of 30–34 years [Table 1]. Primigravidas were found to have increased chances of PPROM (56.9%) as compared to multigravidas (43.1%) [Table 2]. The gestational age of patients with PPROM was 32–33 weeks in 41.5%, followed by 30.8% in 30–31 weeks and ≥34 weeks in 27.7% [Table 3]. 49.2% of the patients delivered in <48 h, 35.4% between 48 h–1 week, and 15.4% after 1 week [Table 4]. Maternal infection was found to be present in 38.5% of study patients [Table 5]. Urinary tract infection was present in 72.3% of patients [Table 6]. Majority of the patients delivered via vaginal route – 58.5% and 41.5% delivered through cesarean section [Table 7].

Fetal Outcome

61.5% of patients delivered babies with APGAR score >7and 38.5% with APGAR score <7. 47.7% delivered babies of birth weight 1.5–2.4 kg and 40% with >2.5 kg [Table 8]; 12.3 delivered <1.5 kg babies. 55.4% of babies were admitted to NICU and 10.8% had respiratory distress syndrome (RDS) [Table 8]. The overall perinatal mortality was 27.7% among the study group. 71.9% of those admitted to NICU, 43.8% of those with perinatal mortality, and 31.3% of those with RDS delivered within 48 h of premature rupture of membranes [Table 9].

Statistical Methods

The recorded data were compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as mean ± SD and categorical variables were summarized as frequencies and percentages. Graphically, the data were presented by bar and pie diagrams. Chi-square test or Fisher's exact test, whichever appropriate, was employed for comparison of neonatal complications according to latency period. $P < 0.05$ was considered statistically significant.

DISCUSSION

The present study entitled "Fetomaternal outcome in preterm premature rupture of membranes" is a prospective observational study done in Government Lalla Ded Hospital, Srinagar, between March and October 2022. A total of 65 patients were included in the study. PPROM or rupture of membranes before onset of labor is seen in 10% of all deliveries which makes the fetus and intrauterine contents more vulnerable to bacterial infection. It can lead to increased maternal complications neonatal morbidity and mortality.

In our study, cases were selected from all age groups. The mean age of patients with PPROM is 31.6 years which is comparable to the study conducted by Yasmin and Barakat where they found the average age of patients with PPROM to be 28.2 years.[15]

Table 1: Age distribution of study patients

Age (years)	Number	Percentage
25–29	19	29.2
30–34	32	49.2
≥35	14	21.5
Total	65	100

Mean±SD (range)=31.6±3.62 (25–40 years)

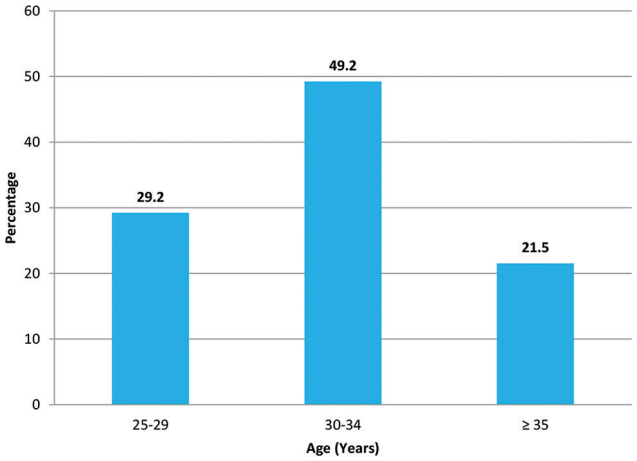
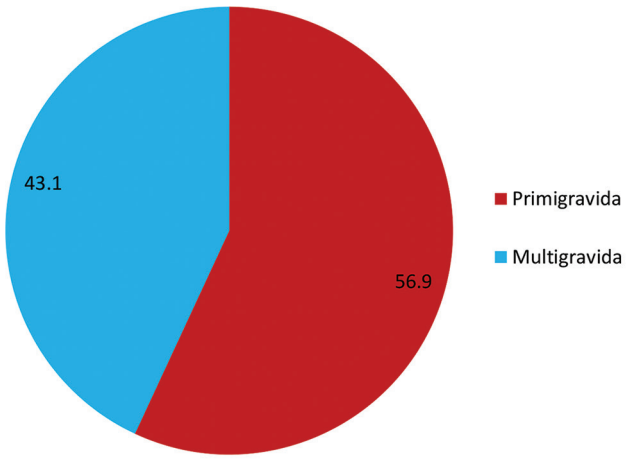


Table 2: Parity of study patients

Parity	Number	Percentage
Primigravida	37	56.9
Multigravida	28	43.1
Total	65	100



In our study, 56.9% of the study population were primigravidas. This finding correlates with a study of Akhtar *et al.* where 45% of women with PPROM were primigravidas.[16] Majority of the study patients had a gestational age of 32–33 weeks at presentation (41.6%) while 30% were <32 weeks of gestation. Adeniji and Atanda and Biswas *et al.* found that most of the patients with PPROM belonged to the gestational age of >36 weeks which is not comparable with our study.[17,18]

Table 3: Gestational age at admission among study patients

Gestational age (weeks)	Number	Percentage
30–31 weeks	20	30.8
32–33 weeks	27	41.5
≥34 weeks	18	27.7
Total	65	100

Mean±SD (range)=33.7±2.24 (20–36 weeks)

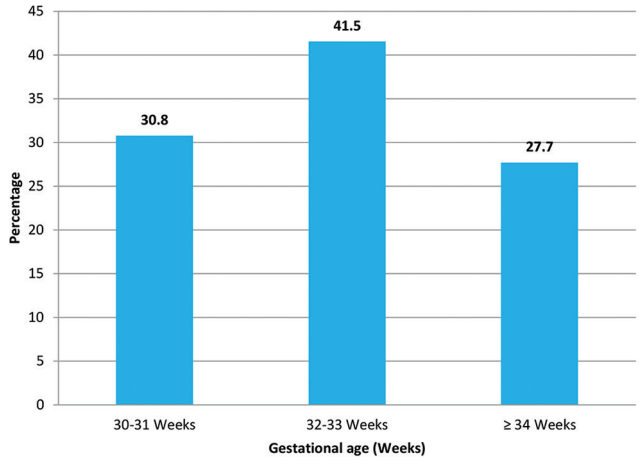
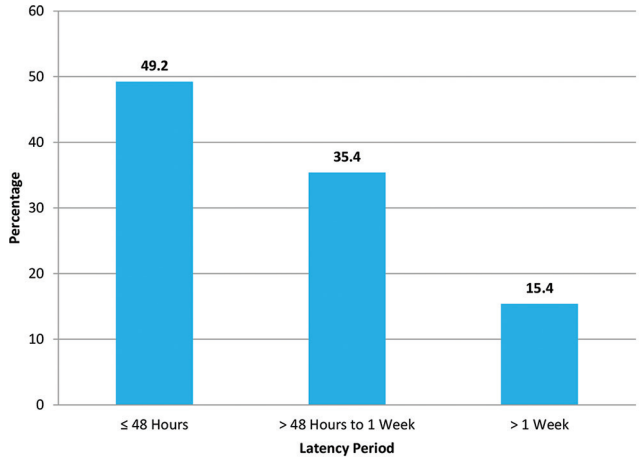


Table 4: Distribution of study patients as per latency period

Latency period	Number	Percentage
≤48 h	32	49.2
>48 h to 1 week	23	35.4
>1 week	10	15.4
Total	65	100



41.5% of patients in our study delivered via LSCS while 58.5% had normal vaginal delivery (VD). Tavassoli *et al.* in their study found 32% of patients with PPROM delivered through LSCS which is comparable with our study[19] Pasquier *et al.* also found the LSCS rate to be 58.7% in study patients which is also comparable to our study.[20] In

Table 5: Maternal infection in study patients

Maternal infection	Number	Percentage
Yes	25	38.5
No	40	61.5
Total	65	100

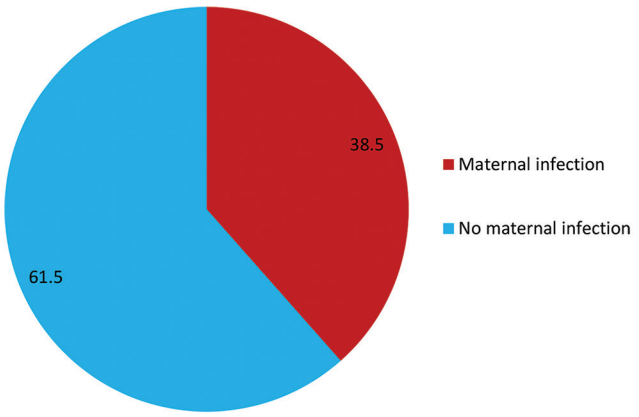


Table 6: Urine infection in study patients

Urine infection	Number	Percentage
Yes	47	72.3
No	18	27.7
Total	65	100

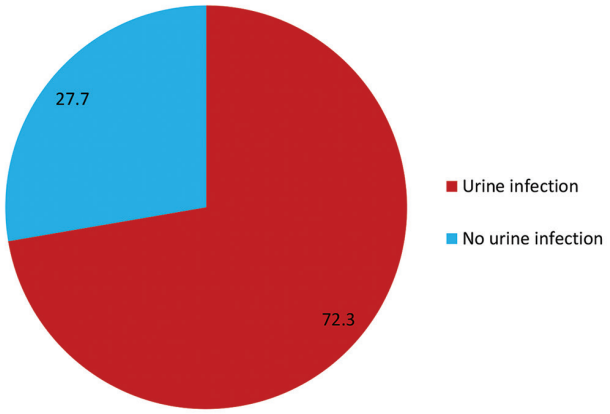


Table 7: Mode of delivery among study patients

Mode of delivery	Number	Percentage
Lower segment cesarean section	27	41.5
Vaginal delivery	38	58.5
Total	65	100

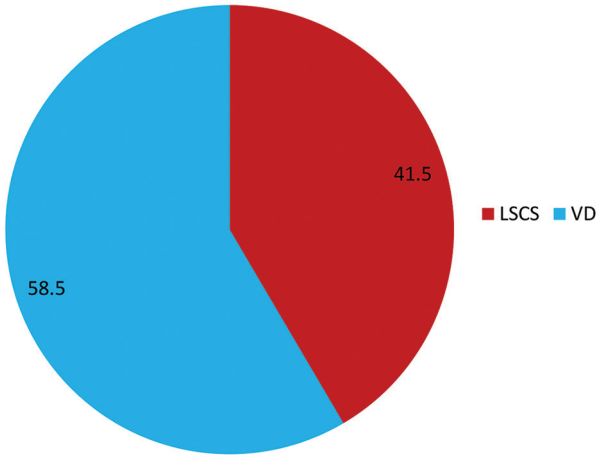
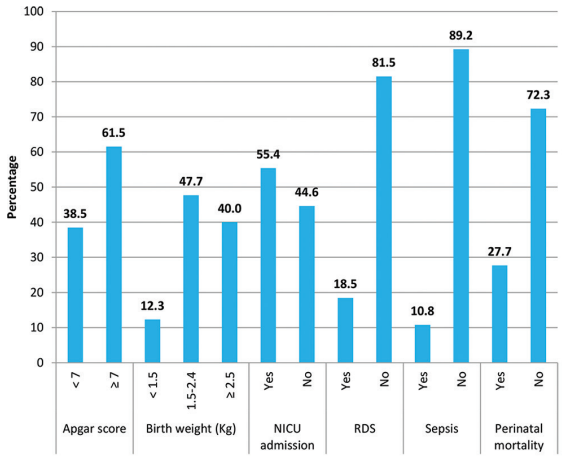


Table 8: Fetal outcome of study neonates

Parameter	Number	Percentage
APGAR score		
<7	25	38.5
≥7	40	61.5
Birth weight (kg)		
<1.5	8	12.3
1.5–2.4	31	47.7
≥2.5	26	40.0
NICU admission		
Yes	36	55.4
No	29	44.6
Respiratory distress syndrome		
Yes	12	18.5
No	53	81.5
Sepsis		
Yes	7	10.8
No	58	89.2
Perinatal mortality		
Yes	18	27.7
No	47	72.3



the study conducted by Tahir *et al.*, only 14% of patients with PPROM delivered via LSCS while 86% delivered via normal VD which is not comparable with our study.[21] Eleje *et al.* and Ibishi and Isjanovska in their study found that only 23% and 28% of study patients delivered via LSCS, respectively. These findings were not comparable with our study.[22,23]

The incidence of maternal infection (clinical chorioamnionitis) in our study was 38.5% which is higher than the study conducted by Seo *et al.* where they found the maternal infection in 26.3% of PPROM.[24] The higher incidence could be attributed to multiple digital

Table 9: Neonatal complications according to latency period

Neonatal complications	Latency period						*P*-value
	≤48 h [*n*=32]		>48 h–1 week [*n*=23]		>1 week [*n*=10]		
	No.	% age	No.	% age	No.	% age	
Respiratory distress syndrome	10	31.3	2	8.7	0	0	0.027*
Sepsis	4	12.5	1	4.3	1	10	0.586
Perinatal mortality	14	43.8	3	13.0	1	10	0.017*
NICU admission	23	71.9	10	43.5	3	30	0.024*
APGAR score<7	15	46.9	8	34.8	2	20	0.282
Low birth weight	20	62.5	14	60.9	5	50	0.776

*Statistically significant difference (*P*<0.05)

examinations. The most important risk factor in PPROM in our study is urinary tract infection found in 71.2% of study patients. Begum *et al.* in their study found urinary tract infection in 33.33% of PPROM patients which is not comparable with our study.[25,26]

In our study among 65 cases, 18.5% born had RDS which is higher than the findings of Akter *et al.* where they found RDS in 8.16 of those born to mothers with PPROM.[27]. Perinatal mortality in our study was 27.7% which was higher than the study conducted by Tavassoli *et al.* where they found perinatal mortality in 8.8% of study patients.[19] This higher incidence could be attributed to the fact that most of the infants delivered within 48 h of rupture of membranes. In our study, the survival rate was 72.3% of study infants which is comparable to the study conducted by Moretti and Sibai who reported a survival rate of 50–70%.[28]

In our study, 47.7% had birth weight of 1.5–2.4 kg which is comparable to the study conducted by Adhikary *et al.* where they found that 45.83% of babies had birth weight of 1.5–2.4 kg[29]

In our study, APGAR score of >7 was present in 61.5% of babies delivered to mothers with PPROM which is comparable with the study conducted by Adhikary *et al.* where they found APGAR score of >7 in 54.16% of babies.[29]

CONCLUSION

Antenatal diagnosis to prevent PPROM by identifying the risk factors is an important tool in management. Steroids for fetal lung maturity, antibiotics to prevent fetal and maternal infection, and tocolytics can be given to delay delivery to reduce NICU admission.

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