

# Analyzing the Fetal Complications Associated to Preterm Premature Rupture of Membranes

Asma Sattar<sup>1</sup>, Shabana Ramzan<sup>2</sup>, Rozina Mujeeb Sahito<sup>3</sup>, Raishem Ali<sup>4</sup>, Rashda Akbar Ghumro<sup>5</sup>,

Ambreen Shahriyar<sup>6</sup>

<sup>1</sup>Consultant Gynecologist, <sup>2</sup>Senior Registrar, <sup>3</sup>Assistant Prof, <sup>4,5</sup>Associate Professor  
(Dept of Obs & Gynae. PUMHS/ Nawabshah)

<sup>6</sup>Associate Professor, <sup>6</sup>Registrar, Dept of Obs & Gynae IMCH

**Correspondence:** Dr. Rashda Akbar Ghumro

Associate Professor, Dept of Obs & Gynae. PUMHS/ Nawabshah  
rakhezra25@gmail.com

## Abstract

**Objective:** To determine the frequency of fetal outcome in preterm premature rupture of membrane (PROM) at a tertiary care Hospital

**Methodology:** This cross-sectional study was conducted at Department of Obstetrics & Gynecology, PeoplesUniversity of Medical and Health Sciences for Women, Nawabshah from 9<sup>th</sup> December 2021 to 8<sup>th</sup> June 2022. A total of 265 women with PPRM between 18-40 years were included. Patients with gestational diabetes mellitus (GDM), pregnancy induced hypertension (PIH), multiple pregnancy and intra-uterine devices (IUD) were excluded. After taking informed consent, all women were followed till delivery and fetal outcome i.e. APGAR score <7 at 1-minute, fetal death, respiratory distress syndrome and sepsis (yes/no) were noted.

**Results:** Overall mean age of the patients was 29.43±5.23 years. Majority of the patients 168(63.4%) were aged 18 to 29 years. Average gestational age was 29.92±3.39 weeks. According to frequency of fetal outcome in PPRM was as follows; APGAR score <7 at 1 min was found in 28(10.6%), fetal death in 36(13.6%) patients, respiratory distress syndrome in 64(24.2%) and sepsis in 65(24.5%) patients.

**Conclusion:** PPRM significantly impacts fetal outcomes, with high rates of neonatal sepsis, respiratory distress syndrome, and mortality. Key factors influencing these outcomes include gestational age, duration of membrane rupture, and maternal parity.

**Keywords:** Pre-Labor Rupture Of Membranes, Fetal Outcome, Sepsis.

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## Introduction

Premature rupture of membranes (PROM) is defined as the rupture of the fetal membranes before the onset of labor. When this occurs prior to 37 weeks of gestation, it is classified as preterm premature rupture of membranes (PPROM). Despite the term "premature" potentially implying underdeveloped membranes, the membranes are fully developed at the time of rupture.

PROM is a relatively common obstetric condition, with the incidence of spontaneous pre-labor rupture of membranes reported to range from 6% to 10% in term pregnancies. Among women with PROM at term, over 60% enter spontaneous labor within 24 hours, and more than 95% deliver spontaneously within 72 hours.<sup>1-3</sup>

It is one of the leading identifiable causes of

prematurity, occurring in approximately 3% of all pregnancies and contributing to 30% of preterm deliveries. Prematurity remains the primary cause of neonatal morbidity and mortality, accounting for 85% of adverse outcomes in neonates.

The perinatal morbidity and mortality associated with PPRM depend significantly on the gestational age at delivery, with outcomes improving as gestational age advances. Conversely, near-term PPRM, when managed with timely delivery in the absence of infection or fetal distress, is associated with favorable neonatal outcomes and minimal severe morbidity.<sup>4-6</sup>

Prolonged PROM, defined as PROM lasting more than 24 hours, carries an increased risk of ascending

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infection, particularly intrauterine infection. PROM affects approximately 8-10% of term pregnancies and 2-4% of preterm singleton pregnancies. Accurate and timely diagnosis of PROM is critical for implementing gestational age-specific obstetric interventions to optimize maternal and fetal outcomes. While overt ruptures are straightforward to diagnose, subtle ruptures can pose a diagnostic challenge, potentially delaying necessary interventions.<sup>7,8</sup>

Among the most significant risks of PPROM involves an ascending infection of the cavity of the amniotic membrane. Histological chorioamnionitis (HC), an important manifestation of PPROM, may outcome in fetal inflammatory reaction syndrome, a condition that is closely linked with premature birth morbidity and includes diseases involving cerebral palsy, intracranial bleeding, sepsis, respiratory infections, necrotic intestinal inflammation, and the periventricular leukomalacia.<sup>9</sup> PPROM also significantly contributes to infant bronchopulmonary dysplasia, respiratory distress syndrome and neonatal death.<sup>9-11</sup>

The burden of PPROM on neonatal health is substantial. Studies have reported that PPROM accounts for 18-20% of prenatal mortality and 21.4% of prenatal morbidity.<sup>12</sup> Neonatal intensive care unit (NICU) admissions due to PPROM-related complications occur in 82% of cases, with an APGAR score <7 at 1 minute observed in 6% of neonates and respiratory distress in 79%.<sup>13</sup> In another study, respiratory distress syndrome occurred in 9.1%, fetal death in 4.5%, and septicemia in 5.8% of neonates.<sup>14</sup>

Similarly, other research has documented respiratory distress syndrome in 15% and septicemia in 10% of affected neonates.<sup>15,16</sup> Despite the global attention on PPROM, there is limited local data on fetal outcomes associated with this condition, especially in the last five years. However this study was aimed to provide updated and region-specific insights into fetal outcomes following PPROM at PUMHS. The findings will help inform practical strategies for prevention, early diagnosis, and management of fetal complications, ultimately improving neonatal outcomes.

## Methodology

The study was conducted in the Department of Obstetrics and Gynecology at the Peoples University of Medical and Health Sciences for Women, Nawabshah, from December 2021 to June 2022. A total of 265 women aged 18–40 years with preterm premature

rupture of membranes (PPROM) were included. Patients with gestational diabetes mellitus (GDM), pregnancy-induced hypertension (PIH), multiple pregnancies, or intrauterine devices (IUDs) were excluded.

PPROM was defined as the rupture of membranes occurring before 37 weeks of gestation, as determined by the last menstrual period and confirmed by a history of a sudden gush of amniotic fluid from the vagina. Diagnosis was corroborated using a positive nitrazine test, which involved placing a drop of vaginal fluid on Nitrazine dye-impregnated paper strips. The strips changed color based on the fluid's pH, turning blue when the pH was greater than 6.0, indicating a positive result.

Informed consent was obtained from all participants. The women were followed until delivery, and fetal outcomes were recorded, including APGAR scores below 7 at 1 minute, fetal death, respiratory distress syndrome, and neonatal sepsis (classified as "yes" or "no" per operational definitions). Data were collected on maternal age, gestational age, parity (primiparous or multiparous), mode of delivery, duration of membrane rupture, place of residence, and fetal outcomes.

Sepsis was defined as a neonate exhibiting at least two of the following symptoms in conjunction with a positive blood culture: fever (>38.5°C) or hypothermia (<36°C); heart rate >140 beats per minute or <60 beats per minute; respiratory rate >30 breaths per minute; and abnormal white blood cell counts (>12,000/mm<sup>3</sup> or <4,000/mm<sup>3</sup>, or the presence of more than 10% immature neutrophils). All data were meticulously recorded and analyzed using SPSS version 25.

## Results

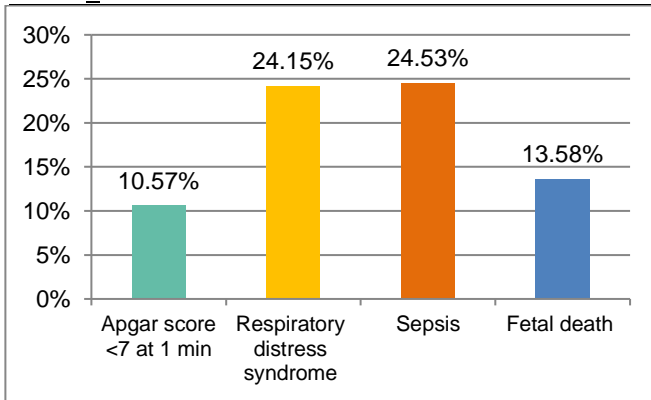
This study included 265 patients with a mean age of 29.43±5.23 years and a mean gestational age of 30.92±3.39 weeks. Most patients resided in urban areas (55.09%) and a significant proportion (78.87%) was multiparous, SVD was the most common mode of delivery (70.57%), while 29.43% underwent cesarean section. The duration of membrane rupture was less than 12 hours in 74.72% of cases and more than 12 hours in 25.28%. Table I.

According to fetal outcomes in cases of PPROM, Apgar score of less than 7 at 1 minute was observed in 10.57% of neonates, respiratory distress syndrome was in 24.15% cases, sepsis was in 24.53% of neonates and neonatal mortality rate was 13.58%. Figure 1

**Table I: Analysis of demographic variables of the patients (n= 265)**

Variables	No of patients	%	
Age groups	18-30	168	63.40%
	31-40	67	36.60%
Residence	Rural	119	44.91%
	Urban	146	55.09%
Parity	Primiparous	56	21.13%
	Multiparous	209	78.87%
Mode of delivery	SVD	187	70.57%
	CS	78	29.43%
Membrane rupture duration	<12 hours	198	74.72%
	≥12 Hours	67	25.28%

Mean±SD = 29.43±5.23 years, Mean gestational age 30.92±3.39



**Figure 1. Fetal outcome in preterm premature rupture of membrane. (n=265)**

Mortality was slightly higher among older mothers aged 31–40 years (18.56%) compared to 18–30 years (10.71%,  $p=0.073$ ). Sepsis was significantly more frequent in younger mothers aged 18–30 years (17.26%) than in older mothers (36.08%,  $p=0.0006$ ). Mortality was higher in gestational age <32 weeks ( $p=0.001$ ), while sepsis was similar across gestational ages. Primiparous women had lower mortality (3.57%) and sepsis (8.93%) compared to multiparous women (16.27% and 28.23%, respectively,  $p=0.003$ ). Membrane rupture >12 hours was associated with higher mortality (19.40%) but significantly lower sepsis

(2.99%,  $p=0.0001$ ). No significant differences were observed in mortality or sepsis based on residence or mode of delivery ( $p>0.05$ ). Table II

## Discussion

PROM continues to be a major obstetric challenge, impacting approximately 3-4% of all pregnancies and accounting for 40% to 50% of preterm births.<sup>17</sup> It is also associated with various adverse fetal outcomes, underscoring its clinical significance. This study was conducted on 265 women with PROM to determine the frequency of fetal outcome in preterm premature rupture of membrane, with an overall mean age of 29.43±5.23 years, mean gestational age of 30.92±3.39 weeks, urban areas resident women were (55.09%) and a significant proportion (78.87%) was multiparous, with SVD as most common mode of delivery (70.57%).

In aligns to this study Jamal M et al<sup>18</sup> reported that the average age of the women in the study was 31.3 ± 2.4 years, un-booked women were 50.2%, 83.3% of the participants had a parity of two or fewer and the average gestational age at the time of delivery was 32.7 ± 2.4 weeks. In another study by Khatun MR et al<sup>19</sup> reported that the average age of the patients was 27.4 ± 4.42 years, ranging from 17 to 41 years, over half (54.0%) of the patients belonged to families in the low-income group and the mean gestational age was 38.1 ± 2.7 weeks. In the study by Khatun MR et al<sup>20</sup> reported that the average age of the women was 27.03 ± 6.13 years, a significant proportion, 66.7% (40 women), were from rural areas, and the majority had education up to the primary school level (33.3%), 61.7% (37 women) were multigravida and the average gestational age of the participants was 34.43 ± 2.75 weeks. Naina K et al<sup>20</sup> also reported that the most prevalent form of delivery was vaginal birth (81.3%), subsequent to lower segment C-section 18.7%.

**Table II: Neonatal sepsis and mortality according to age, gestational age, parity, duration, residence, MOD. (n=265)**

VARIABLES	MORTALITY		p-value	SEPSIS		p-value	
	Yes	No		Yes	No		
Age (years)	18-30	18 (10.71%)	150 (89.29%)	0.073	29 (17.26%)	139 (82.74%)	0.0006
	31-40	18 (18.56%)	79 (81.44%)		35 (36.08%)	62 (63.92%)	
Gestational Age (weeks)	<32	20 (18.56%)	79 (81.44%)	0.001	43 (25.0%)	129 (75.00%)	0.661
	32-36	13 (35.48%)	60 (64.52%)		21 (22.58%)	72 (77.42%)	
Parity	Primiparous	02 (3.57%)	54 (96.43%)	0.014	05 (8.93%)	51 (91.07%)	0.003
	Multiparous	34 (16.27%)	175 (83.73%)		59 (28.23%)	150 (71.77%)	
Duration	≤12 hours	23 (11.62%)	175 (88.38%)	0.108	62 (31.31%)	136 (68.67%)	0.0001
	>12 hours	13 (19.40%)	54 (80.60%)		02 (2.99%)	65 (97.01%)	
Residence	Rural	18(15.13%)	101(84.87%)	0.509	24 (20.17%)	95 (79.83%)	0.943
	Urban	18(12.33%)	128(87.67%)		40 (27.40%)	106 (72.60%)	
Mode if delivery	SVD	23(12.30%)	164(87.67%)	0.344	46 (24.60%)	141 (75.40%)	0.792
	CS	13(16.67%)	65(87.67%)		18 (23.08%)	60 (76.92%)	

In this study, the fetal outcomes in cases of PPROM revealed that an APGAR score of less than 7 at 1 minute was observed in 10.57% of neonates. Respiratory distress syndrome occurred in 24.15% of cases, sepsis was identified in 24.53% of neonates, and the neonatal mortality rate was 13.58%.

These findings align with the study by Jamal M et al.<sup>18</sup> which reported that 92.0% of infants had an APGAR score above 7 at 1 minute and 94.0% at 5 minutes, with a survival rate of 98.0% and a neonatal mortality rate of 2.0%. In their study, 26 out of 50 neonates developed complications, primarily respiratory insufficiency (38.5%).

Similarly, Okunade KS et al.<sup>21</sup> reported that 94% of births resulted in live births, while 6% were stillbirths. Low birth weight was observed in 79.1% of cases, and birth asphyxia occurred in 7.4%. Additionally, 72.5% of live births required admission to the Neonatal Unit, and the overall perinatal mortality rate was 17%.

In this study, mortality was higher among mothers aged 31–40 years (18.56%) compared to those aged 18–30 years (10.71%,  $p=0.073$ ). Mortality was also significantly higher in cases with a gestational age of less than 32 weeks ( $p=0.001$ ).

Sepsis was more common in younger mothers (36.08% vs. 17.26%,  $p=0.0006$ ) and multiparous women (28.23% vs. 8.93%,  $p=0.003$ ). Membrane rupture >12 hours was associated with higher mortality (19.40%,  $p=0.0001$ ) but lower sepsis (2.99%,  $p=0.0001$ ), while significant differences were found for residence or delivery mode ( $p > 0.05$ ). In the comparison of this study Khatun MR et al.<sup>19</sup> reported that the average birth weight of the newborns was  $2.16 \pm 0.42$  kg, among the infants, 63.33% (38 newborns) experienced complications, including neonatal asphyxia (30%), respiratory distress syndrome (13.3%), neonatal jaundice (11.7%), and neonatal sepsis (3.3%).

Additionally, three cases (5%) resulted in neonatal death. Variations in fetal outcomes across studies may be due to differences in sample selection, healthcare infrastructure, and factors such as maternal health and socioeconomic status. The study had few limitations, including a small sample size, a single-center design, and a focus on short-term outcomes without long-term follow-up. Potential biases and incomplete data on confounders may affect the results.

Future research should involve larger, multi-center studies with long-term monitoring, considering maternal

health and socioeconomic status. Neonatal care units should be upgraded, and preventive measures explored to minimize complications and improve fetal health.

## Conclusion

Study concluded that the PPROM significantly impacts fetal outcomes, with high rates of neonatal sepsis, respiratory distress syndrome, and mortality. Key factors influencing these outcomes include gestational age, duration of membrane rupture, and maternal parity. Early diagnosis, timely intervention, and proper antenatal care are crucial to improving neonatal survival and reducing complications.

## References

- Sharma SK, Dey M. Maternal and neonatal outcome in cases of premature rupture of membranes beyond 34 weeks of gestation. *Int J Reprod Contracept Obstet Gynecol.* 2017;6:1302-5. <https://doi.org/10.18203/2320-1770.ijrcog20171382>
- ACOG Practice Bulletin No. 217: Prelabor rupture of membranes. *Obstet Gynecol.* 2020;135(3):e80-97. <https://doi.org/10.1097/AOG.0000000000003700>
- Waters TP, Mercer BM. Management of preterm premature rupture of membranes. *Clin Perinatol.* 2021;48(4):699-716.
- Kumar S. Outcome of neonates born to mothers with premature rupture of membranes. *Int J Med Health Res.* 2017;3(1):66-70.
- Romero R, Miranda J, Chaemsaihong P, et al. Preterm labor and intra-amniotic infection: new concepts and molecular mechanisms. *Am J Obstet Gynecol.* 2021;225(4):286-306.
- Manuck TA, Rice MM, Bailit JL, Grobman WA, Reddy UM, Wapner RJ, Thorp JM, Caritis SN, et al. Preterm neonatal morbidity and mortality by gestational age: a contemporary cohort. *Am J Obstet Gynecol.* 2022;226(3):398.e1-9.
- Reddy UM, Nanda K, Lain KY. Diagnosis and management of subtle PROM: Challenges and solutions. *Obstet Gynecol Clin North Am.* 2022;49(3):451-67.
- Idrisa A, Pius S, Bukar M. Maternal and neonatal outcomes in premature rupture of membranes at University of Maiduguri Teaching Hospital, Maiduguri, North-Eastern Nigeria. *Trop J Obstet Gynaecol.* 2019;36:15-20. [https://doi.org/10.4103/TJOG.TJOG\\_89\\_18](https://doi.org/10.4103/TJOG.TJOG_89_18)
- Vandenbroucke L, Doyen M, Le Lous M, Beuchée A, Loget P, Carrault G, Pladys P. Chorioamnionitis following preterm premature rupture of membranes and fetal heart rate variability. *PLoS One.* 2017;12(9):e0184924. <https://doi.org/10.1371/journal.pone.0184924>
- McElrath TF, Allred EN, Leviton A. Fetal inflammatory response syndrome, chorioamnionitis, and neonatal outcome. *Am J Obstet Gynecol.* 2022;227(5):546.e1-8.
- Agrawal V, Hirsch E. Intrauterine infection and preterm labor. *Semin Fetal Neonatal Med.* 2023;28(3):101420.
- Endale T, Fentahun N, Gemada D, Hussien MA. Maternal and fetal outcomes in term premature rupture of membrane. *World J Emerg Med.* 2016;7:147-52. <https://doi.org/10.5847/wjem.j.1920-8642.2016.02.011>
- Poovathi M, Yogalaksmi. A study of perinatal outcome in preterm premature rupture of membranes. *Int J Reprod Contracept Obstet Gynecol.* 2018;7:5061-5. <https://doi.org/10.18203/2320-1770.ijrcog20184967>

14. Lovereen S, Khanum A, Nargis N, Begum S, Afroze R. Maternal and neonatal outcome in premature rupture of membranes. *Bangladesh J Med Sci.* 2018;17(3):479-83. <https://doi.org/10.3329/bjms.v17i3.37004>
15. Sultana F, Karmokar A. A study on maternal and fetal outcomes of preterm premature rupture of membranes in tertiary medical college Bangladesh. *J Med Sci Clin Res.* 2019;7(2):184-92. <https://doi.org/10.18535/jmscr/v7i2.36>
16. Neonatal outcomes in preterm PROM: A systematic review. *Pediatrics.* 2023;142(6):e20231189.
17. Menon R, Richardson LS. Preterm prelabor rupture of the membranes: a disease of the fetal membranes. *Semin Perinatol.* 2017;41(7):409-19. <https://doi.org/10.1053/j.semperi.2017.07.012>
18. Jamal M, Biswas RK. Prelabour rupture of membrane: maternal and foetal outcomes. *Chattagram Maa-O-Shishu Hosp. Med.Coll J.* 2020;19(2):23-7. <https://doi.org/10.3329/cmshmcj.v19i2.50019>
19. Khatun MR, Akter N, Ali MN. Maternal and fetal outcome of preterm prelabor rupture of the membranes in a tertiary care hospital. *Taj: Journal of Teachers Association.* 2020;33(2):1-9. <https://doi.org/10.3329/taj.v33i2.51306>
20. Naina K, Ashu Y. Preterm pre-labor rupture of membranes and perinatal outcome: a prospective cohort study. *J Obstet Gynaecol.* 2019;5(3):169-75. <https://doi.org/10.17511/joog.2019.i03.07>
21. Okunades KS, Ajepe A, Omisakin SI, Habeeb-Adeyemi FM, Okunowo AA, Sekumade A, Moses OE. A review of fetomaternal outcome of preterm prelabor rupture of membranes in a tertiary hospital in Lagos, South-west, Nigeria. *Niger Hosp Pract.* 2015;16(1-3):13-8.