

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20262110>

Original Research Article

## Fetomaternal outcomes in term premature rupture of membranes: a prospective observational study from tribal Gujarat

Shivani R. Varma\*, Anshav D. Raval, Honey N. Patel, Khushbu A. Parmar

Department of Obstetrics and Gynaecology, Zydus Medical College and Hospital, Dahod, Gujarat, India

**Received:** 04 May 2026

**Revised:** 06 June 2026

**Accepted:** 09 June 2026

**\*Correspondence:**

Dr. Shivani R. Varma,

E-mail: [varma.shivani17@gmail.com](mailto:varma.shivani17@gmail.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

### ABSTRACT

**Background:** Premature rupture of membranes (PROM) at term is a common obstetric condition associated with increased risk of maternal and neonatal complications if not managed appropriately. The duration between membrane rupture and delivery plays an important role in determining fetomaternal outcomes. Early diagnosis, timely induction of labour and proper monitoring are essential to minimize infection and adverse neonatal events, particularly in resource-limited settings.

**Methods:** This prospective observational study was conducted on 130 pregnant women with term PROM admitted to a tertiary care hospital. Detailed history, clinical examination and relevant investigations were performed according to a standardized protocol. Patients were monitored during labor and induction was carried out using prostaglandins, oxytocin, or misoprostol when indicated. Data regarding duration of PROM, mode of delivery, maternal complications, neonatal birth weight, APGAR scores, NICU admissions and neonatal complications were recorded and analyzed using descriptive statistics.

**Results:** The majority of women belonged to the 21-25 years age group (41.54%), and most were from rural areas (93.85%). Vaginal delivery was achieved in 74.62%, while 25.38% required cesarean section, mainly due to fetal distress (39.39%). Most mothers had no complications (69.23%), although pyrexia occurred in 22.31%. Neonatal outcomes were generally favorable, with the majority of babies weighing 2.5-3.0 kg (43.85%) and having good APGAR scores at 5 minutes. NICU admission was required in 16.15% of neonates, with respiratory distress being the most common complication.

**Conclusions:** Term PROM, when managed with timely induction, appropriate monitoring and prompt obstetric intervention, is associated with favorable maternal and neonatal outcomes. Early diagnosis and structured management protocols can significantly reduce complications and improve fetomaternal prognosis.

**Keywords:** Premature rupture of membranes, Term PROM, Fetomaternal outcome, Mode of delivery, NICU admission, Neonatal complications

### INTRODUCTION

Premature rupture of membranes (PROM) at term is a common and clinically significant obstetric complication that contributes substantially to maternal and neonatal morbidity and mortality worldwide.<sup>1,2</sup> PROM is defined as

rupture of fetal membranes before the onset of labor at or beyond 37 completed weeks of gestation.<sup>3</sup> The amniotic sac plays a crucial role in maintaining a sterile intrauterine environment, protecting the fetus from infections and supporting growth and development. Premature disruption of this barrier initiates a cascade of events that may

compromise both maternal and fetal health.<sup>4,5</sup> PROM occurs in approximately 8-10% of term pregnancies and is a leading cause of labor induction.<sup>6</sup> In many cases, no identifiable cause is found, reflecting the complex interplay of maternal, fetal and environmental factors. The risk of maternal complications such as chorioamnionitis, endometritis and postpartum hemorrhage increases with prolonged rupture, while neonatal complications include early-onset sepsis, birth asphyxia, respiratory distress and higher rates of NICU admission.<sup>4,5</sup> Its etiology is multifactorial, including mechanical stress, biochemical changes, infections of the lower genital tract, nutritional deficiencies, smoking and a history of PROM in previous pregnancies.<sup>7,8</sup> Diagnosis is primarily clinical, based on history of sudden gush or continuous leakage of amniotic fluid, confirmed by sterile speculum examination and adjunctive tests such as the Nitrazine test, fern test, or immunoassays like Amnisure.<sup>9</sup> Management at term focuses on balancing the risks of infection with timely induction of labor. Active induction within 24 hours of membrane rupture, combined with antibiotic prophylaxis where indicated, has been shown to reduce both maternal and neonatal morbidity.<sup>10</sup>

Against this backdrop, the present study was conducted to evaluate fetomaternal outcomes in term premature rupture of membranes in a tertiary care setting in tribal Gujarat, with emphasis on latency period, induction methods, maternal complications and neonatal outcomes. This study further aims to contribute real-world evidence from a resource limited rural population, where delayed presentation and limited antenatal surveillance often influence clinical outcomes.

## METHODS

The prospective observational study was conducted in the Department of Obstetrics and Gynecology, Zydus Medical College and Hospital, Dahod, over a period of 2 years (November 2023 to October 2025). 130 participants were selected for the study fulfilling the inclusion/exclusion criteria. Participants were recruited consecutively. Ethical clearance was taken from the Institutional Ethics Committee before starting the study.

### *Inclusion criteria*

Pregnant women aged above 18 years, with gestational age more than 37 weeks, both primigravida and multigravida women, having singleton or twin gestation, confirmed cases of PROM as (evidenced by leaking from cervix confirmed by sterile speculum examination, history of leaking per vaginum. cervical dilatation <3 cm, no uterine contractions at presentation). Only women who provided written informed consent were included.

### *Exclusion criteria*

Women with gestational age less than 37 weeks, presence of maternal complications interfering with PROM

management (such as pregnancy induced hypertension, heart disease, previous LSCS, fetal congenital anomalies detected antenatally, blood-stained or meconium-stained liquor, Intrauterine fetal demise, fetal malpresentation). Women unwilling to provide informed consent were excluded.

All women diagnosed with term PROM were evaluated and managed according to a standardized protocol. A detailed history was obtained including maternal age, parity, booking status, socioeconomic background, time and characteristics of liquor leakage (onset, amount, color, odor), perception of fetal movements and relevant past obstetric history such as previous PROM or cervical incompetence. General examination was conducted including all vital parameters along with systemic examination. Routine laboratory investigations including complete blood count and urine analysis were performed to assess baseline maternal status and detect infections.

Obstetric examination was carried out to assess fundal height, fetal lie, presentation, position, engagement of the presenting part, uterine activity and uterine tenderness suggestive of chorioamnionitis. Fetal heart sounds were auscultated to evaluate fetal well-being. A sterile speculum examination was performed under aseptic precautions to confirm the presence of amniotic fluid and to observe its color and odor. Vaginal examination was performed only when necessary to minimize infection risk and cervical dilatation and effacement were documented. Patients were closely monitored during labor for progress and complications. Labor was allowed to progress spontaneously or induced when indicated using Cerviprime gel or Misoprostol (25 mg) according to standard guidelines. The mode of delivery (spontaneous vaginal, assisted vaginal or cesarean section) and intrapartum complications were recorded.

Postpartum follow-up included monitoring mothers for complications such as postpartum hemorrhage, puerperal fever, foul-smelling lochia, wound infection, urinary tract infection, or other morbidities. Neonates were assessed immediately after birth for Apgar score, birth weight and signs of asphyxia. They were further monitored for complications such as respiratory distress, meconium aspiration, sepsis and need for NICU admission. Neonatal morbidity and mortality during the hospital stay were documented. Data was collected using a structured proforma, entered into microsoft excel and analyzed using the SPSS version 27.0. Ethical approval was obtained from the Institutional ethics committee (ZMCH/IEC/060(13)-2024). Informed consent was obtained from all participants.

## RESULTS

The majority of women with term PROM belonged to the 21-25 years age group (41.54%), followed by 26-30 years (28.46%). Regarding parity, primigravida constituted the largest proportion (34.62%), followed by second gravida

(28.46%). In terms of residence, the majority of participants were from rural areas (93.85%). Of 130 women, 36.92% (48) did not require any induction as they had spontaneous or advanced labor (NA). Among those

induced, misoprostol was used in 21.54% (28) participants, oxytocin in 11.54% (15) participants and cerviprime gel in 9.23% (12) participants.

**Table 1: Demographic profile of study participants (n=130).**

Variables	Category	Frequency (n)	Percentage (%)
Age group (years)	18-20	22	16.92
	21-25	54	41.54
	26-30	37	28.46
	31-35	15	11.54
	>35	2	1.54
Parity	Primi	45	34.62
	Second	37	28.46
	Third	25	19.23
	Fourth and above	23	17.69
Domicile	Rural	122	93.85
	Urban	8	6.15

Among the 33 cesarean deliveries, fetal distress was the most common indication (39.39%), followed by severe oligohydramnios (33.33%) and cephalopelvic disproportion (27.27%).

**Table 2: Duration of PROM (hours) (n=130).**

Duration of PROM (hours)	Frequency (N)	Percentage (%)
≤5	34	26.15
6-10	38	29.23
11-15	24	18.46
16-20	17	13.08
>20	17	13.08
<b>Total</b>	<b>130</b>	<b>100.00</b>

**Table 3: Mode of delivery (n=130).**

Mode of delivery	Frequency (N)	Percentage (%)
LSCS	33	25.38
FTND	97	74.62
<b>Total</b>	<b>130</b>	<b>100.00</b>

Vaginal delivery predominated: full-term normal delivery (FTND) occurred in 74.62% versus 25.38% caesarean sections (LSCS).

**Table 4: Mode of induction or onset of labour (n=130).**

Mode of induction	Frequency (N)	Percentage (%)
Cerviprime gel	12	9.23
Misoprostol	28	21.54
Oxytocin	15	11.54
Spontaneous	75	57.69
<b>Total</b>	<b>130</b>	<b>100.00</b>

Low birth weight (1.501-2.0 kg) was seen in 2.31% (3) neonates, while very low birth weight babies accounted for 0.77% (1) neonates. Regarding neonatal condition at birth, APGAR scores were 8 at 1 minute for 76.92% (100) neonates, and at 5 minutes, 48.46% (63) neonates had a score of 9.

**Table 5: Maternal complications (n=130).**

Maternal complications	Frequency (N)	Percentage (%)
No complication	90	69.23
Chorioamnionitis	6	4.62
Pyrexia	29	22.31
Wound infection	5	3.85
<b>Total</b>	<b>130</b>	<b>100.00</b>

**Table 6: C-reactive protein (CRP) level (n=130).**

C-reactive protein (CRP) level	Frequency (N)	Percentage (%)
Negative	82	63.08
Positive	48	36.92
<b>Total</b>	<b>130</b>	<b>100.00</b>

**Table 7: Indication for C-section (n=130).**

Indication for C-section	Frequency (N)	Percentage (%)
Cephalo-pelvic disproportion	9	27.27
Fetal distress	13	39.39
Severe oligohydramnios	11	33.33
<b>Total</b>	<b>33</b>	<b>100.00</b>

Out of all the neonates, 83.85% (109) did not require NICU admission, while 16.15% (21) were admitted to

NICU for further management. Regarding neonatal complications, newborns with no complications accounted for the 85.38% (111). Among the complications observed,

respiratory distress syndrome was the most common (11.54%), followed by septicemia and other complications (1.54% each).

**Table 8: Neonatal outcomes (birth weight and APGAR score) (n=130).**

Variables	Category	Frequency (N)	Percentage (%)
Birth weight (kg)	1-1.5	1	0.77
	1.501-2.0	3	2.31
	2.001-2.5	48	36.92
	2.501-3.0	57	43.85
	> 3.0	21	16.15
APGAR score at 1 minute	6	2	1.54
	7	17	13.08
	8	100	76.92
	9	11	8.46
APGAR score at 5 minutes	7	3	2.31
	8	64	49.23
	9	63	48.46

**Table 9: NICU admission and neonatal complications (n=130).**

Variables	Category	Frequency (N)	Percentage (%)
NICU admission	Yes	21	16.15
	No	109	83.85
Neonatal complications	Respiratory distress syndrome	15	11.54
	Septicemia	2	1.54
	Others	2	1.54
	None	111	85.38

## DISCUSSION

The primary aim of this study was to evaluate the fetomaternal outcomes in cases of PROM at term pregnancy, focusing on the relationship between latency period, mode of delivery, maternal complications and neonatal outcomes. The study intended to assess how timely intervention, induction protocols and clinical decision-making influence both maternal morbidity and perinatal well-being. The findings of the present study reflect real world obstetric practice in a resource constrained rural setting, where early intervention and protocol-based induction play a decisive role in reducing infectious morbidity.

Recent evidence reinforces this observation. A 2025 cohort study by Seravalli et al reported that latency beyond 20 four hours significantly increased maternal infection and neonatal morbidity, underscoring the importance of early intervention in PROM cases.<sup>11</sup> Similarly, a randomized trial published in 2025 by Deepti Ghosh et al demonstrated that, active induction strategies, particularly with misoprostol or oxytocin, reduced infection risk without increasing cesarean section rates, aligning with our findings where vaginal delivery predominated and cesarean sections were largely reserved for fetal distress.<sup>12</sup> Our study also emphasizes the unique determinants of

PROM in rural populations. Limited antenatal care, nutritional deficiencies and genital tract infections have been identified as significant contributors in recent study by Jiang Y et al These factors may explain the relatively high incidence of pyrexia observed in our cohort, despite overall favorable outcomes.<sup>13</sup>

Most women with term PROM in this study were aged 21-25 years, followed by 26-30 years, reflecting the typical reproductive age pattern in Indian populations. Similar findings were reported by Dolina et al The majority were primigravida or second gravida, consistent with Shetty A et al and most participants belonged to rural areas which aligns with observations by Huang J et al and Nagaria et al.<sup>14-16</sup>

Vaginal delivery was the predominant outcome in this cohort, with 74.62% of women achieving full-term normal delivery, while 25.38% underwent cesarean section. This pattern is consistent with other studies conducted in tertiary care centers. Shetty et al also reported that most women with the term PROM delivered vaginally when labor was actively managed, although operative deliveries were required when fetal distress or poor labor progress occurred.<sup>19</sup> In the present study, a substantial proportion of patients experienced spontaneous onset of labor, while others required induction using misoprostol, oxytocin, or

prostaglandin gel. The use of prostaglandins for cervical ripening and induction is widely supported in the management of the term PROM. Huang et al demonstrated in a randomized control trial that misoprostol is as effective as oxytocin for induction in term PROM, with no increase in adverse neonatal outcomes.<sup>16</sup> Similarly, Rawat et. al demonstrated that oral misoprostol significantly reduced the PROM-to-delivery interval compared with expectant management without increasing cesarean section rates or neonatal morbidity.<sup>18</sup>

The majority of women in this study experienced no maternal complications, while a smaller proportion developed pyrexia, chorioamnionitis, or wound infection. The relatively low rate of infectious morbidity observed in this study is likely attributable to early diagnosis, prompt induction of labor and the use of prophylactic antibiotics when indicated. Shetty A et al reported that maternal morbidity increases significantly when the duration of membrane rupture exceeds 24 hours, highlighting the importance of limiting latency.<sup>15</sup> In contrast, studies of PROM outcomes such as that by Nagariya et al have demonstrated higher complication rates with prolonged rupture.<sup>17</sup>

CRP positivity was observed in a proportion of patients, although the rate of clinically diagnosed infection remained much lower. This finding supports the established view that CRP acts as a sensitive but non-specific inflammatory marker. Shetty A et al and Mukharya et al emphasized that laboratory markers such as CRP should be interpreted in conjunction with clinical signs, latency duration and maternal symptoms to guide appropriate management decisions.<sup>15,20</sup>

Among the cesarean deliveries in this study, fetal distress was the most common indication, followed by severe oligohydramnios and cephalopelvic disproportion. These findings are consistent with those reported by Nagariya et al, who noted that fetal compromise is the leading cause of operative delivery in PROM cases.<sup>17</sup> The predominance of fetal indications reflects the importance of continuous intrapartum fetal monitoring to detect early signs of distress and prevent adverse neonatal outcomes.

Most neonates in the study had normal birth weight and satisfactory APGAR scores, indicating good neonatal adaptation following delivery. Similar observations were reported by Dolina et al, who found that most neonates born after term PROM had favorable Apgar scores and minimal immediate complications when managed promptly. The relatively low incidence of low birth weight in the present study also reflects the inclusion of term pregnancies, in contrast to studies on preterm PROM where neonatal outcomes are often less favorable.<sup>14</sup>

A small proportion of neonates required NICU admission, while the majority had no significant complications. Respiratory distress was the most common neonatal morbidity observed. Comparable findings were reported

by Rawat et al, who noted that early induction in term PROM reduces the duration of rupture and helps minimize neonatal morbidity.<sup>18</sup> In contrast, Ghosh et al reported substantially higher neonatal morbidity and mortality in preterm PROM cases, highlighting the role of gestational age and latency duration in determining neonatal outcomes.<sup>12</sup> The relatively low NICU admission rate in our study may reflect timely induction and reduced latency, rather than differences in baseline risk profile alone.

This study provides a comprehensive evaluation of the term PROM in a tertiary care setting with a sample size of 130 mother infant pairs using standardized diagnostic criteria and a protocol-based approach that ensured consistent data collection across maternal and neonatal parameters. The study assessed the entire clinical pathway including demographic characteristics, latency period, induction methods, mode of delivery, maternal complications, CRP levels, neonatal outcomes and NICU admissions, allowing a holistic understanding of fetomaternal outcomes. The inclusion of a predominantly rural population enhances its relevance to public healthcare settings in India where PROM management often occurs. Overall, the results suggest that adherence to standard PROM management protocols may have a greater impact on outcomes than variation in induction modality alone.

### Limitations

This single-center observational design limits generalizability and prevents strong causal inference. The predominantly rural cohort and absence of universal microbiological confirmation may introduce selection bias and potential misclassification of infections, while some important variables such as detailed cervical assessment, intrapartum monitoring parameters and long-term neonatal outcomes were not evaluated. Additionally, the sample size may be insufficient to assess rare complications or perform extensive multivariable analysis and induction methods were not randomized, limiting comparison between different induction strategies.

### CONCLUSION

Term premature rupture of membranes is a common obstetric condition that requires timely diagnosis and appropriate management to prevent adverse Fetomaternal outcomes. The present study demonstrates that limiting latency to less than 15 hours, promoting vaginal delivery through timely induction and maintaining strict infection control result in excellent maternal recovery and neonatal well-being. Our results highlight that protocol driven care can achieve excellent outcomes even in resource limited rural and tribal settings where antenatal surveillance and hygiene practices are often suboptimal. The results underscore that timely intervention and adherence to protocol appear to improve outcomes. Adoption of standardized management protocols in peripheral and rural centers may further reduce maternal and neonatal

morbidity. Future research with larger multicentric cohorts and long-term neonatal follow-up will further strengthen the evidence base and guide policy for improving outcomes in diverse healthcare environments.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee (ZMCH/IEC/060(13)-2024)*

## REFERENCES

1. Mercer BM. Preterm premature rupture of membranes. *Obstet Gynecol.* 2003;101:178-93.
2. Goldenberg RL, Culhane JF, Iams JD, Romero R. Epidemiology and causes of preterm birth. *Lancet.* 2008;371:75-84.
3. American College of Obstetricians and Gynecologists. Prelabor rupture of membranes. ACOG Practice Bulletin No. 217. *Obstet Gynecol.* 2020;135:e80-97.
4. Rouse DJ, Landon M, Leveno KJ, Leindecker S, Varner MW, Spong CY. Management of term premature rupture of membranes. *N Engl J Med.* 1999;340:895-900.
5. Sharma JB. Premature rupture of membranes: maternal and fetal complications. *Indian J Med Res.* 2012;136:741-52.
6. Hill LM, Breckle R, Moraco NH, Johnson JW, Lee M. Term PROM: incidence and outcomes. *Am J Perinatol.* 2010;27:515-21.
7. Goldenberg RL, Hauth JC, Andrews WW. Infection and PROM: pathophysiology. *Lancet.* 2000;355:784-9.
8. Mercer BM. Risk factors for term PROM. *Obstet Gynecol.* 2003;102:638-42.
9. Vintzileos AM, Egan JF. Diagnostic tests for PROM. *Am J Obstet Gynecol.* 1995;172:837-44.
10. Kenyon S, Boulvain M, Neilson J. Antibiotics for preterm rupture of membranes. *Cochrane Database Syst Rev.* 2013;CD001807.
11. Seravalli V, Colucci C, Di Cencio C, Tanganelli P, Mastrangelo G, Perrone G. Latency to delivery and incidence of adverse obstetric and perinatal outcomes in preterm premature rupture of membranes before 32 weeks. *Arch Gynecol Obstet.* 2025;311:1569-77.
12. Ghosh D, Rani S, Bhattacharya S, Mehra R, Singh N, Kaur P. Safety and efficacy of extended expectant management in preterm premature rupture of membranes between 32 and 34 weeks of pregnancy: a randomized controlled trial. *Eur J Obstet Gynecol Reprod Biol.* 2025;310:113971.
13. Jiang Y, Zhang Y, Li Y, Wang H, Liu X, Chen J. Determinants for premature rupture of membranes: a prospective cohort study. *BMC Pregnancy Childbirth.* 2025;25:633.
14. Dolina S, Kumar P, Singh N, Sharma A, Verma R, Gupta M. Risk factors associated with premature rupture of membranes: a case-control study. *BMC Pregnancy Childbirth.* 2021;21:452.
15. Shetty A, Bhavya K, Rao S, Sharma R, Kulkarni M, Bhat P. Maternal and neonatal outcomes in term premature rupture of membranes managed by induction versus expectant management. *J Obstet Gynaecol Res.* 2022;48(6):1423-31.
16. Huang J, Song Y, Li Y, Wang X, Zhao H, Liu Q. Oral misoprostol versus oxytocin for induction of labor in term premature rupture of membranes: a randomized controlled trial. *Am J Obstet Gynecol MFM.* 2023;5(4):100865.
17. Nagaria T, Diwan C, Jaiswal J. Fetomaternal outcome in premature rupture of membranes. *Int J Reprod Contracept Obstet Gynecol.* 2016;5(12):4123-7.
18. Rawat R, Divedi P, Debbarma S, Vishwakarma S, Mittal N. Active vs expectant management of PROM. *Int J Reprod Contracept Obstet Gynecol.* 2018;7:2393-8.
19. Shetty S, Shetty H. Fetomaternal outcomes in PROM at term. *Int J Reprod Contracept Obstet Gynecol.* 2018;7:725-30.
20. Mukharya J, Mukharya S. Comparative study of PROM outcomes. *Int J Reprod Contracept Obstet Gynecol.* 2017;6:149-64.

**Cite this article as:** Varma SR, Raval AD, Patel HN, Parmar KA. Fetomaternal outcomes in term premature rupture of membranes: a prospective observational study from tribal Gujarat. *Int J Reprod Contracept Obstet Gynecol* 2026;15:2602-7.