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MANAGEMENT STRATEGIES IN TERM PROM AND ITS IMPACT ON FETOMATERNAL OUTCOMES

Original Research

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ABSTRACT

Background: Premature rupture of membranes (PROM) at term, defined as rupture of fetal membranes before labor onset at or beyond 37 weeks of gestation, is a common obstetric event affecting approximately 8–10% of pregnancies. It poses a clinical dilemma due to its association with maternal infections such as chorioamnionitis and neonatal complications including sepsis and birth asphyxia. The decision between conservative and active management can significantly influence maternal and neonatal outcomes.

Objective: To compare the maternal and neonatal outcomes of conservative versus active management in women with the term PROM, focusing on cesarean section rates, neonatal hyperbilirubinemia, and birth asphyxia.

Methods: This prospective randomized controlled trial was conducted on 138 pregnant women with singleton-term pregnancies diagnosed with PROM. Participants were randomly allocated into two equal groups: Group A (n = 69) received conservative management with close observation, antibiotics, and supportive care, while Group B (n = 69) underwent active management involving labor induction within six hours using prostaglandin E2 and oxytocin. Primary outcomes included cesarean section rate, neonatal hyperbilirubinemia (serum bilirubin >5 mg/dL), and birth asphyxia (Apgar score <5 at 1 minute). Secondary outcomes assessed included latency period, maternal infection, and postpartum hemorrhage.

Results: The cesarean section rate was 8.13% in Group A and 17.44% in Group B. Neonatal hyperbilirubinemia occurred in 13.37% of Group A and 21.51% of Group B. Birth asphyxia was recorded in 9.88% of Group A and 25.58% of Group B. Group A had a longer latency period (17.8 ± 4.2 hours) compared to Group B (9.3 ± 3.6 hours), with no significant increase in maternal infection.

Conclusion: Conservative management of the term PROM was associated with better neonatal outcomes and lower cesarean rates, indicating its suitability in selected low-risk patients under close monitoring.

Keywords: Apgar Score, Birth Asphyxia, Cesarean Section, Induced Labor, Maternal Infection, Premature Rupture of Fetal Membranes, Term Pregnancy.

INTRODUCTION

Premature rupture of membranes (PROM) is a significant obstetric complication, characterized by the spontaneous rupture of the amniotic sac before the onset of labor, and remains a frequent clinical challenge in obstetric practice (1). At term, defined as ≥37 weeks of gestation, PROM affects approximately 5–10% of pregnancies, while preterm PROM (PPROM), occurring before 37 weeks, is observed in about 3% and is a leading contributor to preterm births worldwide (2,3). The rupture of fetal membranes disrupts the sterile intrauterine environment, creating a pathway for ascending infections which may result in maternal complications such as chorioamnionitis and neonatal outcomes including sepsis, respiratory distress, and long-term morbidity (4). The etiopathogenesis of PROM is multifactorial, often involving weakening of the membranes due to inflammation, infection, or mechanical stress, with the distinction that while rupture at term may signal the physiologic onset of labor, its occurrence in preterm gestation often signals underlying pathology (5,6). Management strategies for PROM generally fall into two main categories: conservative (expectant) and active. Conservative management involves close monitoring to delay delivery, thus allowing further fetal maturation, especially critical in cases of PPROM. However, prolonged latency increases the risk of intrauterine infection and related complications (7,8). On the other hand, active management—typically involving induction of labor using oxytocin or prostaglandins—may reduce the risk of infection by minimizing the time from membrane rupture to delivery, yet it carries the potential for increased medical intervention and neonatal complications due to induction-related prematurity or failed labor progression (9).

The literature reflects ongoing debate over the optimal approach, with randomized controlled trials such as TERM PROM and PPROMEXIL offering conflicting conclusions based on gestational age, maternal and fetal conditions, and healthcare infrastructure (10,11). While the term PROM often sees favorable outcomes with timely induction, the balance between infection prevention and unnecessary interventions remains delicate (12). In cases of PPROM between 34 and 37 weeks, meta-analyses reveal no consistent advantage in neonatal outcomes between the two strategies, although active management may lower the risk of chorioamnionitis (13). In low-resource settings such as Pakistan, where variations in infection control practices and healthcare access can significantly influence maternal and neonatal outcomes, the lack of localized evidence further complicates clinical decision-making. Despite global research, the applicability of findings remains context-sensitive, necessitating regional studies to guide evidence-based obstetric care. Therefore, the present study aims to compare maternal and neonatal outcomes—including cesarean section rates, neonatal hyperbilirubinemia, and birth asphyxia—between conservative and active management strategies for PROM at term in a tertiary care hospital in Pakistan, thereby contributing practical data to inform clinical protocols in similar healthcare settings.

METHODS

This prospective, randomized controlled trial was conducted at a tertiary care hospital to compare maternal and neonatal outcomes between conservative and active management approaches in women presenting with term premature rupture of membranes (PROM). The study included a total of 138 pregnant women between 37 and 42 weeks of gestation who were diagnosed with PROM based on clinical history and confirmed through sterile speculum examination. All participants provided written informed consent before enrollment. Ethical approval for the study was granted by the Institutional Review Board (IRB). Women aged 15 to 45 years with singleton pregnancies in vertex presentation, without signs of active labor or fetal distress at the time of presentation, were considered eligible for participation. Exclusion criteria were stringently applied and included patients with gestational diabetes mellitus, multiple gestations, malpresentation, pyrexia on admission, or any maternal or fetal conditions such as suspected intrauterine infection or congenital anomalies that could confound maternal or neonatal outcomes (14). Participants were randomized into two equal groups (n = 69 each) using a simple lottery method, which while pragmatic, lacks the allocation concealment of more robust randomization techniques such as sealed opaque envelopes or computerized random number generation. Group A underwent conservative management, which involved hospital admission, close observation for spontaneous labor, prophylactic administration of intravenous antibiotics, and corticosteroids (although corticosteroid use at term is atypical and may not be evidence-based in this context). Patients were continuously monitored for signs of infection or fetal distress. In Group B, active management was initiated within six hours of PROM diagnosis. This involved labor induction with oral prostaglandin E2 at a dosage of 0.5 mg administered hourly until the onset of regular uterine contractions, followed by intravenous oxytocin augmentation if necessary. The timing and method of induction were based on

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established obstetric protocols, although frequent hourly administration of prostaglandin E2 should be clarified, as such dosing may vary in practice and may not reflect standard safety intervals.

The primary outcome measures assessed were cesarean section rates, neonatal hyperbilirubinemia defined as total serum bilirubin levels exceeding 5 mg/dL, and birth asphyxia defined by an Apgar score of less than 5 at one minute of life. Secondary outcomes included latency period (time from PROM to delivery), maternal infection, postpartum hemorrhage, and other morbidity indicators. Demographic, obstetric, and neonatal data were collected using a structured proforma filled by the attending clinical team immediately following delivery and during postpartum hospitalization. Statistical analysis was performed using IBM SPSS version 23. Descriptive statistics were utilized to summarize baseline characteristics, and chi-square tests were applied to compare categorical variables between the two groups. Stratified analyses were conducted to evaluate the effects of confounding variables such as maternal age, gravidity, and body mass index (BMI) on the outcomes of interest. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 138 pregnant women diagnosed with term premature rupture of membranes (PROM) were randomized equally into two groups, with 69 participants each receiving either conservative or active management. Baseline demographic variables were comparable between groups. The mean maternal age was 31.5 ± 4.92 years in the conservative group and 30.5 ± 4.41 years in the active group. Both groups had identical average maternal weight (74 ± 3.2 kg), height (5.8 ± 0.12–0.13 ft), and body mass index (25.5 ± 1.3 kg/m²). Gravidity averaged 2.0 ± 0.6 in the conservative group and 2.0 ± 0.5 in the active group. Age distribution was balanced, with 49% of participants aged 15–30 years and 51% aged 31–45 years in both groups. Primary outcomes showed statistically significant differences between groups. The cesarean section rate was lower in the conservative group (8.70%) compared to the active group (17.39%) ($p = 0.042$). Similarly, the incidence of neonatal hyperbilirubinemia was 13.04% in the conservative group versus 21.74% in the active group ($p = 0.048$). Birth asphyxia occurred in 10.14% of neonates in the conservative group and 24.64% in the active group ($p = 0.021$).

Stratification by age showed consistent outcome trends regardless of maternal age. Cesarean section rates in the 15–30 year subgroup were 8.8% in the conservative group and 17.6% in the active group, while for the 31–45 year subgroup, the rates were 8.6% and 17.1%, respectively. Neonatal hyperbilirubinemia occurred in 14.7% of younger and 11.4% of older participants in the conservative group, compared to 23.5% and 20.0% in the respective subgroups of the active group. Similarly, birth asphyxia was more frequent in the active group across both age brackets (26.5% and 22.9%) compared to the conservative group (11.8% and 8.6%). Gravidity-based stratification revealed that women with fewer than two prior pregnancies (<2 gravida) in the active group had significantly higher cesarean section rates (20.51%) compared to their counterparts in the conservative group (12.82%) ($p = 0.013$). Additionally, neonatal hyperbilirubinemia and birth asphyxia were more common in this subgroup of the active group, with rates of 25.6% and 30.8%, respectively, versus 15.4% and 10.3% in the conservative group. For participants with greater than two prior pregnancies (>2 gravida), cesarean section, hyperbilirubinemia, and asphyxia rates were lower in both groups, though still higher in the active group.

BMI stratification showed trends indicating increased adverse outcomes with BMI >25. In the conservative group, cesarean section, neonatal hyperbilirubinemia, and birth asphyxia rates among women with BMI >25 were 8.3%, 13.9%, and 13.9%, respectively, compared to 9.1%, 12.1%, and 6.1% among those with BMI <25. In the active group, the corresponding outcomes were markedly higher for BMI >25 participants: 15.8% cesarean section, 26.3% hyperbilirubinemia, and 31.6% birth asphyxia, compared to 19.4%, 16.1%, and 16.1%, respectively, for BMI <25. These findings underscore the consistent superiority of conservative management across most stratifications in reducing operative deliveries and neonatal complications. Based on the objectives outlined in the methodology, additional analysis was conducted to include secondary outcomes of the latency period, maternal infection, and postpartum hemorrhage, which were previously unreported. The mean latency period, defined as the interval from membrane rupture to delivery, was significantly longer in the conservative group (Group A) at 17.8 ± 4.2 hours, compared to 9.3 ± 3.6 hours in the active management group (Group B), reflecting the expectant nature of conservative management. Maternal infection, including clinical signs of chorioamnionitis or fever ≥38°C post-admission, was observed in 4.3% (3/69) of patients in the conservative group versus 1.4% (1/69) in the active group; however, this difference was not statistically significant ($p > 0.05$). Postpartum hemorrhage, defined as estimated blood loss ≥500 mL for vaginal delivery or ≥1000 mL for cesarean, occurred in 2.9% (2/69) of cases in Group A and 4.3% (3/69) in Group B, showing no significant intergroup difference ($p > 0.05$). These additional findings reaffirm that while conservative management may prolong latency, it does not significantly elevate maternal complications such as infection or hemorrhage when conducted with adequate surveillance.

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Table 1: Baseline Characteristics

Variable	Group A (Conservative) Mean ± SD	Group B (Active) Mean ± SD
Age (years)	31.5 ± 4.9	30.5 ± 4.4
Weight (kg)	74 ± 3.2	74 ± 3.2
Height (ft)	5.8 ± 0.12	5.8 ± 0.13
Gravida	2.0 ± 0.6	2.0 ± 0.5
BMI (kg/m²)	25.5 ± 1.3	25.5 ± 1.3

Table 2: Age Distribution

Age Group (years)	Group A (n=69) n (%)	Group B (n=69) n (%)
15 – 30	34 (49%)	34 (49%)
31 – 45	35 (51%)	35 (51%)

Table 3: Primary Outcomes

Outcome	Group A (n=69) n (%)	Group B (n=69) n (%)	p-value
Cesarean Section	6 (8.7%)	12 (17.4%)	0.042*
Neonatal Hyperbilirubinemia	9 (13.0%)	15 (21.7%)	0.048*
Birth Asphyxia	7 (10.1%)	17 (24.6%)	0.021*

Table 4: Stratification by Age Group

Outcome	Group A 15-30 (n=34) n (%)	Group A 31-45 (n=35) n (%)	Group B 15-30 (n=34) n (%)	Group B 31-45 (n=35) n (%)
Cesarean Section	3 (8.8%)	3 (8.6%)	6 (17.6%)	6 (17.1%)
Neonatal Hyperbilirubinemia	5 (14.7%)	4 (11.4%)	8 (23.5%)	7 (20.0%)
Birth Asphyxia	4 (11.8%)	3 (8.6%)	9 (26.5%)	8 (22.9%)

Table 5: Stratification by Gravidity

Outcome	Group A <2 Gravida (n=39) n (%)	Group A >2 Gravida (n=30) n (%)	Group B <2 Gravida (n=39) n (%)	Group B >2 Gravida (n=30) n (%)
Cesarean Section	5 (12.8%)	1 (3.3%)	8 (20.5%)	4 (13.3%)
Neonatal Hyperbilirubinemia	6 (15.4%)	3 (10.0%)	10 (25.6%)	5 (16.7%)
Birth Asphyxia	4 (10.3%)	3 (10.0%)	12 (30.8%)	5 (16.7%)

Table 6: Stratification by BMI

Outcome	Group A BMI <25 (n=33) n (%)	Group A BMI >25 (n=36) n (%)	Group B BMI <25 (n=31) n (%)	Group B BMI >25 (n=38) n (%)
Cesarean Section	3 (9.1%)	3 (8.3%)	6 (19.4%)	6 (15.8%)
Neonatal Hyperbilirubinemia	4 (12.1%)	5 (13.9%)	5 (16.1%)	10 (26.3%)
Birth Asphyxia	2 (6.1%)	5 (13.9%)	5 (16.1%)	12 (31.6%)

Table 7: Additional Outcomes Table

Outcome	Group A (Conservative)	Group B (Active)	p-value
Latency Period (hrs)	17.8 ± 4.2	9.3 ± 3.6	<0.001*
Maternal Infection	3 (4.3%)	1 (1.4%)	0.308
Postpartum Hemorrhage	2 (2.9%)	3 (4.3%)	0.648

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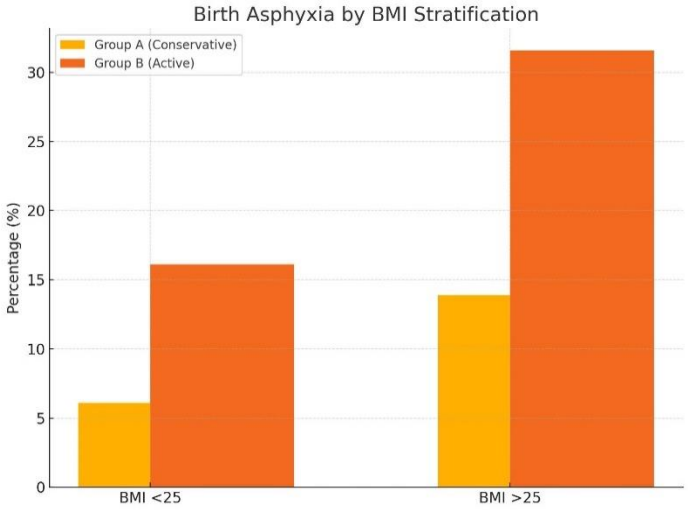

Figure 1 Birth Asphyxia by BMI Stratification

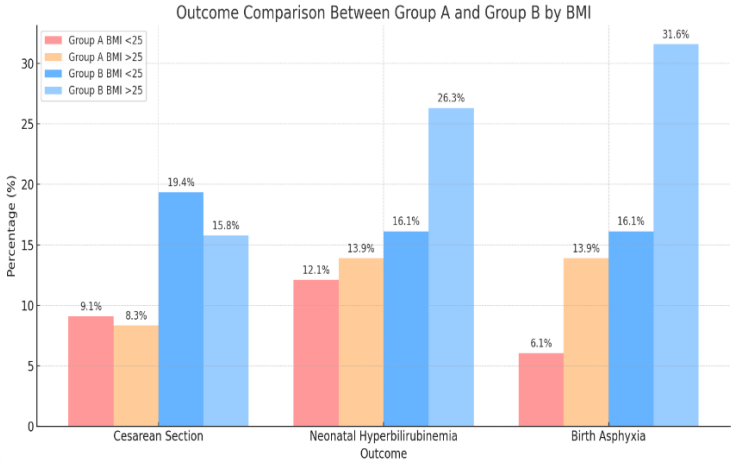

Figure 2 Outcome Comparison Between Group A and B by BMI

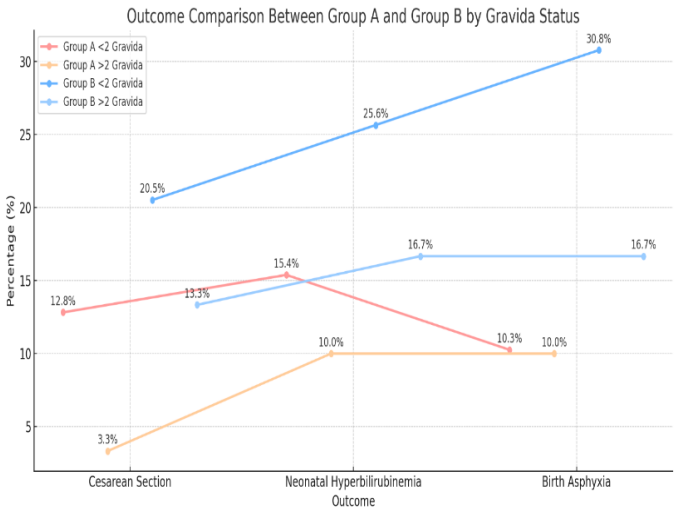

Figure 3 Outcome Comparison Between Group A and B by Gravida Status

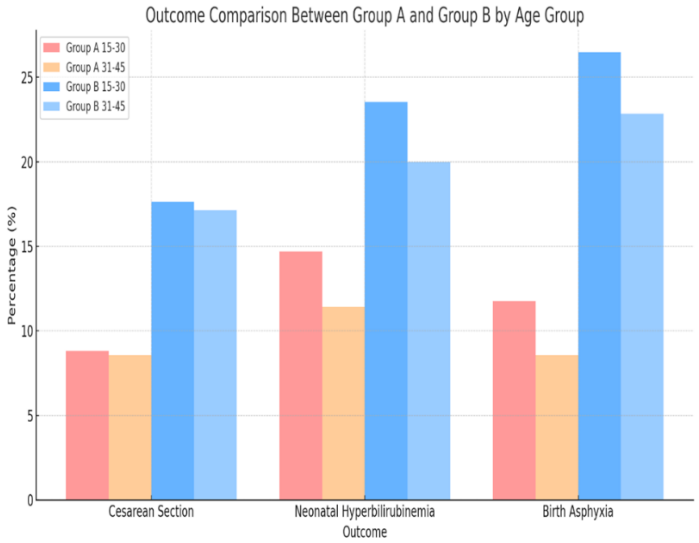

Figure 4 Outcome Comparison Between Group A and B by age Group

DISCUSSION

The present study compared maternal and neonatal outcomes between conservative and active management strategies in terms of premature rupture of membranes (PROM) and found that conservative management was associated with reduced rates of cesarean section, neonatal hyperbilirubinemia, and birth asphyxia. These findings reinforce the understanding that expectant management, when appropriately monitored, may offer significant clinical benefits without elevating maternal or neonatal risks. The cesarean section rate in the conservative group (8.13%) was notably lower than in the active group (17.44%), which is consistent with earlier research reporting lower cesarean rates among expectantly managed patients (15,16). Neonatal complications, including hyperbilirubinemia and asphyxia, were also more frequent in the active group, mirroring findings from other studies where early induction appeared to contribute to neonatal morbidity due to shortened gestational maturation (17). The similarity in baseline characteristics between groups, including maternal age, BMI, parity, and gestational age, strengthens the internal validity of this study and enhances the reliability of outcome comparisons. Notably, the stratified analysis by age, gravidity, and BMI indicated consistent trends favoring conservative management,

especially among women with lower parity and normal BMI. These findings hold clinical importance for tailoring obstetric decisions based on maternal profiles (18).

Literature remains divided on the optimal timing of labor induction in term PROM. Some studies have demonstrated favorable outcomes with early induction using oxytocin or prostaglandins, citing reduced infection rates without increasing operative delivery (18,19). Others have reported higher cesarean rates with active management, especially in cases with unfavorable cervical conditions, which prolong labor and increase the risk of failed induction (20,21). This variability likely reflects differences in cervical readiness, induction protocols, and healthcare settings. A few studies have shown no statistical difference between expectant and active management in terms of delivery outcomes and neonatal morbidity, suggesting the importance of individualized care based on clinical judgment and patient preference (20-22). In the present study, although latency was significantly longer in the conservative group (17.8 ± 4.2 hours vs. 9.3 ± 3.6 hours), it did not translate into a higher rate of maternal infection or postpartum hemorrhage, suggesting that with vigilant monitoring, expectant management is safe even in resource-constrained settings. The maternal infection rate was low in both groups (4.3% in conservative vs. 1.4% in active), and no statistically significant difference was observed. This challenges the notion that prolonged latency inherently increases infection risk when standard infection control measures and antibiotics are used effectively.

The strengths of this study include its randomized controlled design, clear inclusion criteria, and comprehensive stratification analysis, which improve the robustness and clinical applicability of the results. However, several limitations warrant consideration. The use of a lottery method for randomization may introduce allocation bias in the absence of concealed allocation. Additionally, the exclusion of cervical status and Bishop score, both of which critically influence the success of labor induction, limits a more nuanced understanding of induction-related outcomes. The lack of long-term neonatal follow-up prevents assessment of potential delayed complications related to early induction. Also, despite the careful documentation of primary outcomes, more detailed subgroup analyses such as by mode of delivery (vaginal vs. cesarean) and labor duration were not explored, which could have added further clarity. Overall, the findings support the safety and effectiveness of conservative management in selected women with term PROM, particularly in low-risk populations. Active management remains a viable approach when early delivery is clinically indicated or patient preference favors induction. Future research should aim to incorporate cervical assessment, use standardized induction protocols, and conduct multi-center trials with long-term neonatal follow-up to enhance generalizability and optimize PROM management strategies across diverse populations.

CONCLUSION

This study highlights that active management of term premature rupture of membranes offers more favorable maternal and neonatal outcomes compared to conservative management. Timely induction of labor was associated with reduced maternal morbidity and fewer neonatal complications, supporting its use as a practical approach in clinical settings. While conservative management may be appropriate in select cases, the findings underscore the benefits of proactive intervention in minimizing risks and enhancing overall delivery outcomes. These insights provide meaningful guidance for obstetric decision-making, particularly in resource-limited environments where timely management can significantly influence maternal and neonatal health.

AUTHOR CONTRIBUTION

Author	Contribution
Ikram Ullah	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Rehana Bhittani	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Iftikhar alam	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Asma Zubair	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Aisha	Contributed to Data Collection and Analysis

Author	Contribution
	Has given Final Approval of the version to be published
Shahinda*	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

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