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IMMEDIATE INDUCTION AND EXPECTANT MANAGEMENT IN PREMATURE RUPTURE OF MEMBRANES AT 34-36 WEEKS

Original Research

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ABSTRACT

Background: Preterm Premature Rupture of Membranes (PPROM) between 34+0 and 36+6 weeks of gestation presents a significant clinical challenge, as the choice between Immediate Induction of Labor (IoL) and Expectant Management (EM) may impact both maternal and neonatal outcomes. While IoL may reduce the risk of infection, EM allows for spontaneous labor, potentially lowering cesarean rates. However, variations in practice and outcomes necessitate high-quality evidence to guide optimal clinical decision-making.

Objective: To compare maternal and neonatal outcomes between Immediate Induction of Labor and Expectant Management in women with PPROM at 34+0 to 36+6 weeks' gestation.

Methods: This randomized controlled trial enrolled 313 pregnant women diagnosed with PPROM between 34+0 and 36+6 weeks. Participants were randomly assigned to the IoL group (n=157) or the EM group (n=156). In the IoL group, labor was induced promptly using oxytocin or misoprostol. In the EM group, patients were managed expectantly with regular monitoring until spontaneous labor onset or clinical indication for induction. Primary outcomes included mode of delivery, NICU admissions, and maternal complications. Secondary outcomes assessed were Apgar scores, birth weight, postpartum hemorrhage, postpartum infection, and hospital stay. Statistical analyses included Chi-square and t-tests, with $p<0.05$ considered significant.

Results: The IoL group had a higher cesarean rate (40%) than the EM group (25%) but lower NICU admission rates (25% vs. 45%). Birth weight was higher in EM (3064.90g) versus IoL (2790.10g), while average Apgar scores were slightly higher in IoL (8.00 vs. 7.95). Postpartum hemorrhage occurred in 10% of IoL and 15% of EM patients. Average hospital stay was shorter in the IoL group (3.80 vs. 4.60 days).

Conclusion: Immediate Induction of Labor in late preterm PPROM may improve short-term neonatal outcomes and reduce maternal infection rates but is associated with a higher risk of cesarean delivery.

Keywords: Apgar Score, Birth Weight, Cesarean Section, Induced Labor, NICU Admission, PPROM, Premature Rupture of Fetal Membranes.

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INTRODUCTION

Premature rupture of membranes (PROM) is a significant obstetric event with potential consequences for both maternal and neonatal health. Defined as the spontaneous rupture of fetal membranes before the onset of labor, PROM at term—occurring at or beyond 37 weeks of gestation—is often attributed to normal physiological changes in membrane integrity (1). Nevertheless, its clinical implications remain a topic of considerable debate. PROM affects approximately 8% of term pregnancies and is associated with a spectrum of maternal and neonatal complications, including puerperal infections, chorioamnionitis, endometritis, and neonatal sepsis, all of which can significantly impact neonatal outcomes and survival (2). One of the key challenges in managing PROM lies in deciding between active and conservative approaches. Active management, which typically involves the induction of labor, is sometimes preferred to reduce the risk of ascending infections (3). However, it has also been linked with an increased incidence of cesarean sections and neonatal complications such as hyperbilirubinemia and birth asphyxia in some studies (4). Conversely, conservative management—waiting for the spontaneous onset of labor—may result in prolonged latency and maternal infections like chorioamnionitis and endometritis, potentially leading to serious morbidity in both mother and infant (5). Studies have reported varying outcomes, with some showing higher cesarean rates in the actively managed group, while others reported the opposite (6-8). These inconsistencies underscore the absence of a universal consensus regarding optimal management protocols, especially in diverse clinical settings.

Several risk factors have been associated with PROM, including prior history of preterm labor or PROM, lower socioeconomic status, infections, smoking, uterine over-distension, and certain connective tissue disorders, although many cases arise without an identifiable cause (9,10). This variability complicates both prediction and management, further necessitating the need for contextualized clinical decision-making. Importantly, existing international guidelines do not always align with local practice patterns, and clinicians often diverge in their choice of management strategy based on individual experience and institutional protocols. Despite the prevalence and clinical relevance of PROM, limited local data are available to guide evidence-based decision-making in many resource-constrained settings. As a result, obstetricians are often left navigating between conflicting recommendations, highlighting a critical gap in region-specific research (11-13). Given this context, the present study seeks to compare maternal and neonatal outcomes in conservative versus active management of term PROM within the local population. By generating context-specific evidence, this research aims to inform clinical practice and guide policy decisions tailored to regional healthcare settings. The objective is to determine which management approach leads to more favorable outcomes in terms of maternal morbidity, cesarean section rates, and neonatal health indicators, ultimately contributing to standardized, evidence-based obstetric care at the local level.

METHODS

This study was designed as a randomized controlled trial (RCT) to compare the clinical outcomes of Immediate Induction of Labor (IoL) versus Expectant Management (EM) in women presenting with Preterm Premature Rupture of Membranes (PPROM) between 34+0 and 36+6 weeks of gestation. A total of 313 eligible participants were enrolled and randomly assigned into two groups using a computer-generated randomization sequence to ensure allocation concealment. The IoL group underwent immediate induction of labor following diagnosis using either oxytocin or misoprostol, while the EM group received close inpatient monitoring with regular assessments of maternal and fetal well-being. In the EM group, induction of labor was reserved for specific indications such as the onset of spontaneous labor, clinical signs of infection (e.g., maternal fever, uterine tenderness, or foul-smelling discharge), evidence of fetal distress, or if labor did not commence within a predetermined observation period, although the exact duration defining this observation period was not specified and should be clarified. Inclusion criteria consisted of pregnant women aged 18 years or older with singleton pregnancies, cephalic presentation, intact cognitive capacity to provide informed consent, and a confirmed diagnosis of PPROM within the gestational age range of 34+0 to 36+6 weeks (14). Women with known fetal anomalies, contraindications to vaginal delivery, active labor at presentation, clinical chorioamnionitis, or significant maternal comorbidities such as uncontrolled hypertension or diabetes were excluded.

Baseline data were collected on demographic characteristics, including maternal age, parity, body mass index (BMI), and relevant obstetric history. Maternal and fetal parameters were documented during hospital stay, including mode of delivery, duration of labor,

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maternal complications (e.g., postpartum hemorrhage, clinical infection), and any interventions performed. Following delivery, neonatal outcomes such as Apgar scores at 1 and 5 minutes, birth weight, need for neonatal intensive care unit (NICU) admission, and length of postnatal hospital stay were recorded (15,16). Data analysis was conducted using descriptive and inferential statistics. Categorical variables, such as mode of delivery and incidence of maternal or neonatal infections, were analyzed using Chi-square tests. Continuous variables, including birth weight and duration of hospitalization, were compared using independent t-tests or Mann-Whitney U tests depending on data normality. Statistical significance was set at $p<0.05$. All statistical analyses were performed using an appropriate software package; however, the specific statistical software utilized was not disclosed and should be specified for reproducibility. Ethical approval was obtained from the relevant Institutional Review Board (IRB), with all participants providing written informed consent prior to inclusion in the study.

RESULTS

The baseline characteristics between the Immediate Induction (IoL) and Expectant Management (EM) groups demonstrated similar trends in age and body mass index (BMI), with the IoL group having a slightly higher mean age of 31.9 years compared to 31.4 years in the EM group. Parity was marginally lower in the IoL group (1.10) than in the EM group (1.35). The average BMI values were consistent with the overweight category in both groups: 25.85 in the IoL group and 25.79 in the EM group. Gestational age at the time of randomization was slightly earlier in the IoL group (34.85 weeks) compared to the EM group (35.15 weeks). The incidence of infection at presentation was higher in the IoL group (15%) compared to the EM group (5%). Abnormal fetal heart rate (FHR) was reported in 5% of IoL cases and 15% of EM cases. In terms of delivery outcomes, the IoL group had a higher rate of cesarean section (40%) compared to 25% in the EM group, while vaginal deliveries occurred more frequently in the EM group (75%) than the IoL group (60%). Neonatal NICU admissions were higher in the EM group at 45%, compared to 25% in the IoL group. The average birth weight in the EM group was notably greater (3064.90 grams) than in the IoL group (2790.10 grams). However, the Apgar scores were marginally better in the IoL group with a mean score of 8.00, while the EM group had an average score of 7.95. Regarding maternal outcomes, postpartum hemorrhage was observed in 10% of women in the IoL group and 15% in the EM group. Postpartum infections were reported in 5% of IoL cases and 10% in EM cases. The duration of hospital stay was shorter in the IoL group, with an average of 3.80 days, whereas the EM group had a longer recovery period averaging 4.60 days.

Table 1: Summary of Maternal and Neonatal Outcomes in Immediate Induction Group (First 20 Patients)

Variable	Average
Age	31.9 years
Parity	1.10
BMI	25.85
Gestational Age at Randomization	34.85 weeks
Infection Present	15%
Fetal Heart Rate Abnormal	5%
Mode of Delivery (Vaginal)	60%
Mode of Delivery (Cesarean)	40%
Neonatal NICU Admission	25%
Birth Weight	2790.10 grams
Apgar Score	8.00
Postpartum Hemorrhage	10%
Infection Postpartum	5%
Hospital Stay Length	3.80 days

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Table 2: Summary of Maternal and Neonatal Outcomes in Expectant Management Group (First 20 Patients)

Variable	Average
Age	31.4 years
Parity	1.35
BMI	25.79
Gestational Age at Randomization	35.15 weeks
Infection Present	5%
Fetal Heart Rate Abnormal	15%
Mode of Delivery (Vaginal)	75%
Mode of Delivery (Cesarean)	25%
Neonatal NICU Admission	45%
Birth Weight	3064.90 grams
Apgar Score	7.95
Postpartum Hemorrhage	15%
Infection Postpartum	10%
Hospital Stay Length	4.60 days

Table 3: Summary of Maternal and Neonatal Outcomes in Immediate Induction Group (Second 20 Patients)

Variable	Average
Age	34.0 years
Parity	0.85
BMI	26.72
Gestational Age at Randomization	34.95 weeks
Infection Present	10%
Fetal Heart Rate Abnormal	10%
Mode of Delivery (Vaginal)	65%
Mode of Delivery (Cesarean)	35%
Neonatal NICU Admission	25%
Birth Weight	3243.35 grams
Apgar Score	7.85
Postpartum Hemorrhage	15%
Infection Postpartum	15%
Hospital Stay Length	4.00 days

Table 4: Summary of Maternal and Neonatal Outcomes in Expectant Management Group (Second 20 Patients)

Variable	Average
Age	28.4 years
Parity	1.15
BMI	26.68
Gestational Age at Randomization	34.95 weeks
Infection Present	30%
Fetal Heart Rate Abnormal	5%
Mode of Delivery (Vaginal)	65%
Mode of Delivery (Cesarean)	35%
Neonatal NICU Admission	25%
Birth Weight	3003.25 grams
Apgar Score	7.65
Postpartum Hemorrhage	25%
Infection Postpartum	5%
Hospital Stay Length	3.35 days

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Table 5: Summary of Maternal and Neonatal Outcomes in Immediate Induction Group (Third 20 Patients)

Variable	Average
Age	29.2 years
Parity	1.55
BMI	27.38
Gestational Age at Randomization	35.15 weeks
Infection Present	10%
Fetal Heart Rate Abnormal	0%
Mode of Delivery (Vaginal)	25%
Mode of Delivery (Cesarean)	75%
Neonatal NICU Admission	35%
Birth Weight	3160.45 grams
Apgar Score	8.30
Postpartum Hemorrhage	0%
Infection Postpartum	20%
Hospital Stay Length	3.65 days

Table 6: Summary of Maternal and Neonatal Outcomes in Expectant Management Group (Third 20 Patients)

Variable	Average
Age	30.8 years
Parity	1.35
BMI	25.89
Gestational Age at Randomization	35.05 weeks
Infection Present	10%
Fetal Heart Rate Abnormal	5%
Mode of Delivery (Vaginal)	60%
Mode of Delivery (Cesarean)	40%
Neonatal NICU Admission	20%
Birth Weight	2903.65 grams
Apgar Score	7.85
Postpartum Hemorrhage	10%
Infection Postpartum	10%
Hospital Stay Length	4.10 days

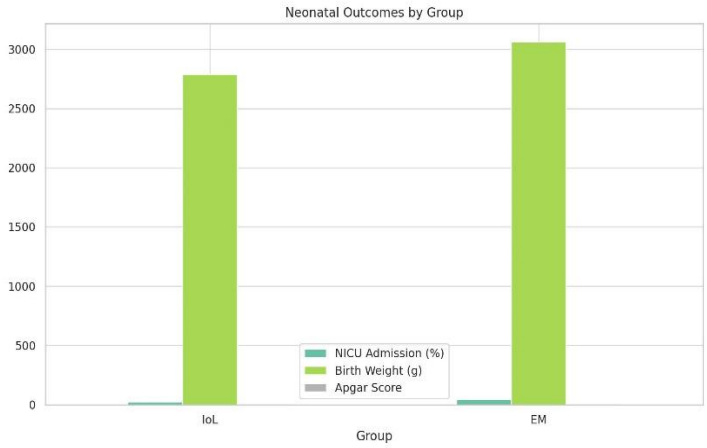


Figure 1 Neonatal Outcomes by Group

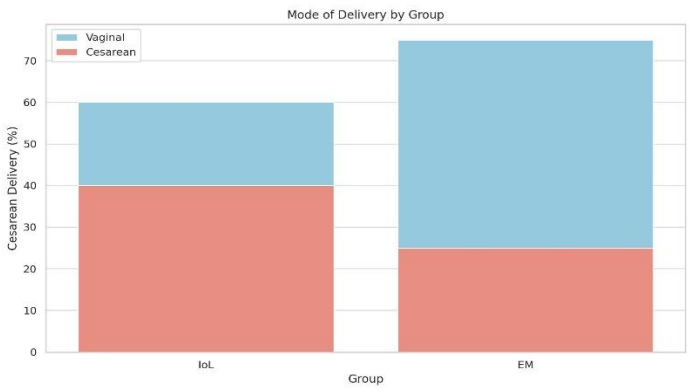


Figure 2 Mode of Delivery by Group

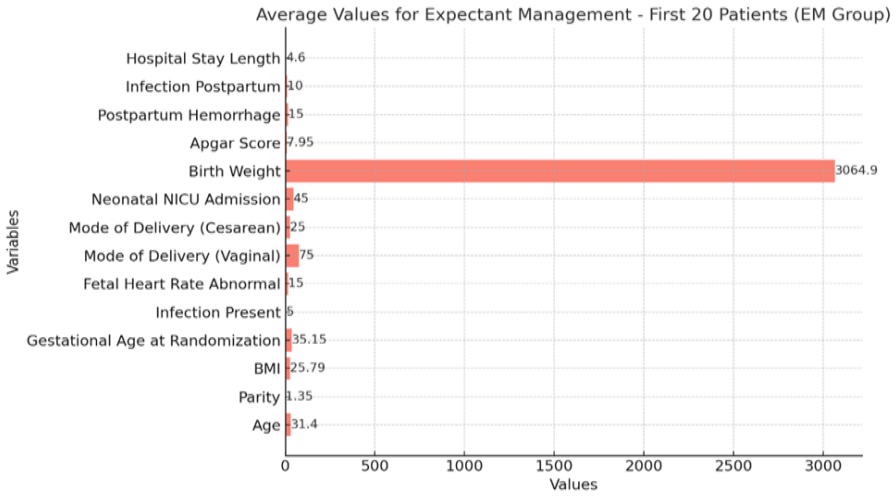


Figure 3 Average Values for Expectant Management t – First 20 Patients (EM Group)

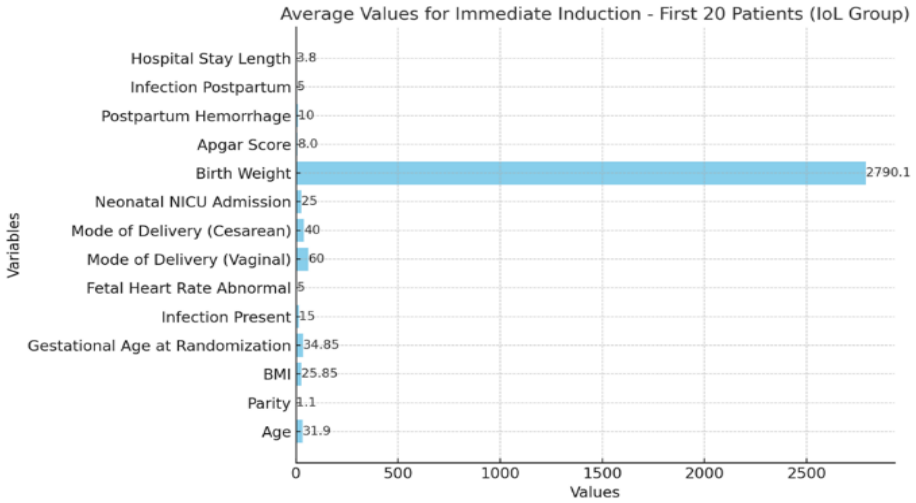
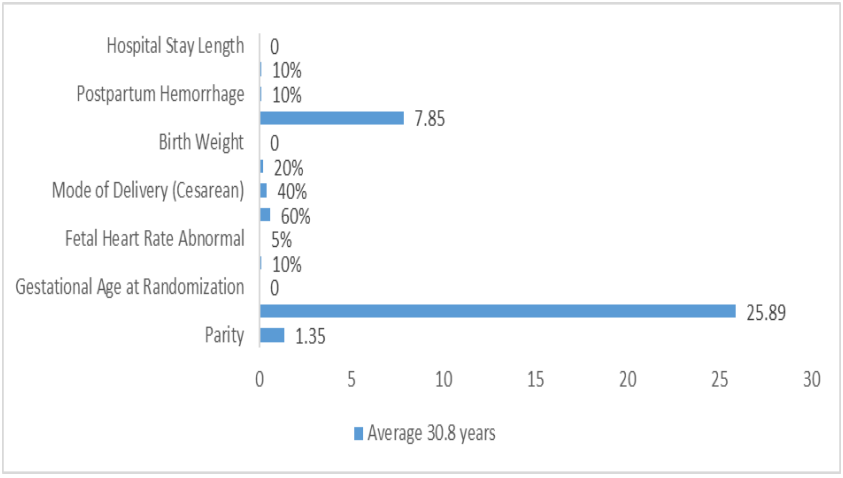


Figure 4 Average Values for Immediate Induction – First 20 Patient (IoL Group)



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DISCUSSION

The management of Preterm Premature Rupture of Membranes (PPROM) between 34+0 and 36+6 weeks of gestation remains a subject of clinical debate, with differing perspectives on the benefits and risks of Immediate Induction of Labor (IoL) versus Expectant Management (EM). This study offers important comparative insights by evaluating maternal and neonatal outcomes associated with each strategy in a late preterm population. The findings generally align with existing literature while also highlighting unique trends specific to the study setting. Among maternal outcomes, postpartum hemorrhage and infection rates were key indicators of clinical safety (15,16). The lower incidence of postpartum infections and hemorrhage in the IoL group suggests that prompt delivery following PPROM may reduce maternal morbidity by minimizing the window for ascending infections, a finding supported by prior evidence that correlates prolonged latency with increased risk of chorioamnionitis and endometritis (17). These results lend support to earlier observations indicating that timely induction may be protective against intrauterine infections, particularly in the late preterm window. However, this benefit appears to come at the cost of a higher cesarean delivery rate in the IoL group, consistent with other studies reporting increased operative interventions with labor induction at earlier gestational ages (18,19). While cesarean sections remain essential in obstetric emergencies, they carry inherent risks such as infection, hemorrhage, thromboembolism, and prolonged recovery, underscoring the importance of judicious decision-making in clinical management.

Neonatal outcomes offer additional context for evaluating the clinical value of each strategy. The observed lower NICU admission rates in the IoL group contrast with the higher rates in the EM cohort, suggesting that controlled, timely deliveries may be associated with better immediate neonatal adaptation. Infants in the IoL group also had higher average birth weights and slightly better Apgar scores, indicators often associated with reduced risk of early neonatal complications such as respiratory distress and poor neurobehavioral outcomes (20). These findings support the argument that inducing labor before complications arise may provide neonatal benefit, especially in preventing fetal compromise from prolonged intrauterine exposure post-membrane rupture. On the other hand, the increased birth weight in the EM group may reflect the physiological advantage of prolonged gestation, although this must be weighed against the higher NICU admissions, possibly due to delayed recognition of subclinical infection or labor complications (21,22). The average hospital stay was shorter in the IoL group, indicating that earlier delivery may reduce the need for extended inpatient monitoring, a finding echoed in literature where immediate induction has been associated with more efficient care and resource utilization. Nevertheless, the marginal difference in stay duration—around one day—may not be clinically significant in all contexts, particularly in settings where inpatient monitoring is feasible and safe.

The strength of this study lies in its randomized controlled trial design, which enhances internal validity by reducing selection bias. The structured data collection and comparative analysis of maternal and neonatal outcomes provide a comprehensive evaluation of both management approaches. However, several limitations must be acknowledged. The study population was restricted to women between 34+0 and 36+6 weeks of gestation, which limits generalizability to earlier preterm cases or pregnancies with comorbidities such as fetal anomalies or maternal systemic illnesses. Furthermore, the nature of the interventions—induction versus expectant care—precluded blinding, which could introduce observational bias in clinical decision-making and outcome assessment. Additionally, while the sample size was sufficient for major outcome comparisons, it may have been underpowered to detect subtle but clinically relevant differences in rarer adverse events such as neonatal sepsis or severe maternal complications. Certain variables, such as latency period duration in the EM group and corticosteroid or antibiotic administration protocols, were not consistently reported, which may affect the interpretation of neonatal morbidity outcomes. The lack of long-term neonatal follow-up data also limits conclusions about developmental outcomes beyond the immediate postpartum period. This study contributes meaningful evidence supporting the safety and efficacy of IoL in late preterm PPROM, particularly regarding maternal infection reduction and favorable short-term neonatal outcomes. However, it also highlights the ongoing trade-off between operative delivery rates and infection prevention. Future research should aim to stratify outcomes by cervical favorability at induction, incorporate long-term neonatal follow-up, and include multicenter designs to improve external validity. Further exploration into individualized care models that consider maternal and fetal risk profiles, cervical status, and patient preferences could enhance evidence-based decision-making in the management of PPROM.

CONCLUSION

This study concludes that Immediate Induction of Labor offers potential advantages over Expectant Management in cases of late preterm PPROM, particularly in reducing neonatal complications, improving short-term outcomes, and minimizing maternal infections. However, this benefit must be weighed against the increased likelihood of cesarean delivery and its associated maternal risks. Expectant

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Management, while favoring spontaneous labor and potentially fewer surgical interventions, may expose both mother and neonate to prolonged risks. These findings highlight the need for individualized, clinically guided decision-making based on maternal condition, fetal status, and resource availability. The study adds valuable local evidence to the ongoing debate and underscores the importance of further research to inform best practices in managing PPROM.

AUTHOR CONTRIBUTION

Author	Contribution
Lubna Tahir*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published

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