Induction Of Labour Versus Expectant Management For Prelabour Rupture Of Membranes At Term: A Comparative Study At Maternity And Children Hospital, Najran, Saudi Arabia

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ABSTRACT

Background: Prelabour rupture of membranes (PROM) at term remains a significant obstetric challenge with implications for both maternal and neonatal outcomes. While expectant management supports spontaneous vaginal delivery, it is associated with increased risks of chorioamnionitis and neonatal sepsis. Conversely, induction of labour reduces infection risk and expedites delivery but may raise the likelihood of caesarean section. A balanced understanding of each approach is critical to guide clinical decision-making.

Aim: To compare maternal and neonatal outcomes in term PROM cases managed expectantly versus those undergoing labour induction. The study seeks to contribute evidence-based recommendations for PROM management in tertiary care settings.

Methods: A retrospective cross-sectional study was conducted at Maternity and Children Hospital, Najran, Saudi Arabia, over 14 months (January 2024 – February 2025). A total of 400 women with term PROM were reviewed: 320 received expectant management, while 80 underwent labour induction. Data were extracted from medical records and analysed using SPSS, employing chi-square tests and logistic regression to examine differences in clinical outcomes.

Results: Expectant management resulted in higher vaginal delivery rates (83% vs. 70%, $p<0.05$) but was associated with increased rates of chorioamnionitis (14% vs. 9%) and neonatal sepsis (12% vs. 7%). Induction significantly reduced delivery duration (18 ± 6 vs. 48 ± 16 hours) and NICU admissions (6% vs. 16%) but had a higher caesarean rate (30% vs. 17%).

Conclusion: The findings highlight the clinical trade-offs in PROM management. Personalised decisions based on maternal and foetal risk profiles remain essential to optimise outcomes.

Abbreviations

EM – Expectant Management
IOL – Induction of Labour
MCH – Maternity and Children Hospital
NICU – Neonatal Intensive Care Unit
PROM – Prelabour Rupture of Membranes
RCOG – Royal College of Obstetricians and Gynaecologists

Introduction

Prelabour rupture of membranes (PROM) at term affects approximately 8–10% of pregnancies and is defined as rupture occurring before the onset of labour at or beyond 37 weeks' gestation [1]. It poses significant clinical challenges for both maternal and neonatal health. One major concern is the heightened risk of ascending infections such as chorioamnionitis, which involves inflammation of the foetal membranes—primarily bacterial in origin [2, 3]. Complications may include maternal fever, leucocytosis, uterine tenderness, and

foetal tachycardia. PROM is also associated with obstetric emergencies such as umbilical cord prolapse, where the cord precedes the presenting part of the foetus, threatening oxygenation and circulation [4, 5]. Delayed delivery further increases the risk of foetal distress, characterised by abnormal heart rate patterns, and raises the incidence of neonatal sepsis—an important contributor to early neonatal morbidity and mortality [6, 7].

The management of PROM at term remains controversial. International guidelines vary, with two principal approaches,expectant management (EM) and induction of labour (IOL) [8, 9]. IOL typically involves pharmacological methods (e.g. prostaglandins or oxytocin) or mechanical techniques such as Foley catheter insertion, aiming to shorten the interval between membrane rupture and delivery, thereby reducing infection risk [10].

Conversely, EM involves careful monitoring of maternal and foetal wellbeing while awaiting spontaneous labour, often within 24 to 48 hours. This strategy reduces medical interventions and may support more natural labour progression but carries increased risk of infection with longer latency [11, 12].

Clinical decision-making depends on multiple factors, including gestational age, parity, cervical status (e.g. Bishop score), institutional policy, and patient preference [13]. For example, guidelines from the American College of Obstetricians and Gynaecologists (ACOG) often advocate for IOL within 12–24 hours post-PROM to prevent infection [14]. In contrast, the Royal College of Obstetricians and Gynaecologists (RCOG) recommends a more extended observation period in select low-risk cases [15].

Previous studies have produced mixed results. The Term PROM Study found benefits to IOL—including reduced maternal and neonatal infections—while other reviews warn that IOL may lead to higher caesarean delivery rates, especially when the cervix is unfavourable [20, 21, 22]. Additionally, research indicates that EM for up to 24 hours may be safe if close surveillance is maintained [23, 24].

Healthcare infrastructure further influences these decisions. Facilities lacking continuous maternal-foetal monitoring may opt for early induction to reduce the need for prolonged observation. Conversely, well-resourced centres may safely offer EM while monitoring for complications. As such, management practices are shaped by regional capacity, patient demographics, and clinical culture [25].

Given these complexities, context-specific research is essential. This study explores maternal and neonatal outcomes of term PROM at a tertiary care hospital in Najran, Saudi Arabia, with the aim of informing clinical protocols, guiding risk assessment, and optimising maternal and neonatal health outcomes.

Aim

To assess maternal and neonatal outcomes in cases of prelabour rupture of membranes (PROM) at term managed either through induction of labour or expectant management. The focus is on comparing clinical effectiveness, safety, and complication rates of both approaches. Specifically, the study aims to evaluate labour duration, caesarean section rates, maternal complications such as chorioamnionitis and postpartum haemorrhage, and neonatal indicators including NICU admissions, respiratory distress, and sepsis. Additionally, it seeks to identify areas for improvement in clinical documentation, data quality, and compliance with institutional protocols to support evidence-based decision-making, adherence to clinical guidelines, and overall patient safety.

Material and Methods: This research was conducted as a retrospective observational cross-sectional study examining maternal and neonatal outcomes in term PROM cases. The study took place at the Maternity and Children Hospital (MCH) in Najran, Saudi Arabia, over a 14-month period from January 2024 to February 2025. The cross-sectional design enabled the inclusion of a broad range of cases, offering insight into real-world management strategies and outcomes during the specified timeframe.

The retrospective approach allowed the use of comprehensive hospital records, facilitating access to a substantial dataset. Despite inherent limitations such as reliance on the accuracy and completeness of clinical

documentation, the design was instrumental in identifying outcome patterns, assessing associations between management approaches, and generating practical conclusions relevant to the institution.

Data Gathering: Patient information was retrieved retrospectively from both electronic and physical hospital medical records using standardised, pre-validated data extraction forms. The forms captured a wide range of variables, including demographic characteristics (age, parity, gravidity, residence), detailed obstetric history (previous deliveries, complications, antenatal care attendance), gestational age at PROM, and the timing and mode of delivery.

Maternal outcomes such as chorioamnionitis, postpartum haemorrhage, and mode of delivery (e.g. caesarean section, instrumental assistance) were recorded, alongside neonatal outcomes including Apgar scores, birth weight, NICU admission, and diagnoses such as respiratory distress syndrome and neonatal sepsis. Data collection was carried out by trained healthcare personnel, instructed in confidentiality protocols and ethical handling. An independent second reviewer validated the data to minimise errors and resolve discrepancies through consensus.

Study Setting

The Maternity and Children Hospital (MCH) in Najran is a publicly funded tertiary referral centre located in southern Saudi Arabia. The facility serves urban and rural populations across Najran and surrounding regions. It houses dedicated departments for obstetrics and gynaecology, neonatology, and maternal-foetal medicine, supported by diagnostic imaging, laboratory services, and an advanced NICU.

MCH is staffed by multidisciplinary teams, including consultants, residents, midwives, and nurses, and also functions as a teaching hospital for undergraduate and postgraduate medical trainees. As a public healthcare institution, it provides services regardless of socioeconomic background, enhancing the representativeness and generalisability of study findings within the local context.

Sampling

A convenience sampling technique was used to include all eligible women with term prelabour rupture of membranes (PROM) who presented to the Maternity and Children Hospital (MCH) during the study period. Eligibility included pregnant women aged 18–40 years, with singleton pregnancies between 37 and 41 weeks, and PROM confirmed through speculum examination, nitrazine test, and/or ferning.

Women were excluded if they had multiple pregnancies, abnormal fetal presentations, placenta praevia, placental abruption, suspected infection prior to rupture, significant maternal comorbidities, or incomplete records.

Although convenience sampling may introduce selection bias and reduce external validity, it provided practical access to a relevant patient population. To ensure methodological rigour, all records were screened against predefined criteria, and any unclear cases were excluded following clinical review by the research team.

This retrospective study design relied on the feasibility of convenience sampling, which allowed for comprehensive inclusion of all qualifying women with term PROM during the study timeframe. While this non-probability approach can limit the generalizability of findings, it effectively captured a realistic snapshot of the clinical setting at MCH in Najran.

Eligible cases were identified through electronic and paper medical records, and cross-checked using the inclusion and exclusion criteria. To reduce bias and strengthen the reliability of findings, any ambiguous records were further reviewed and excluded when necessary. This approach aimed to balance scientific integrity with the practical constraints of a retrospective hospital-based study.

Data Analysis: Data were entered, cleaned, and analysed using IBM SPSS Statistics version 23.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics—including means, standard deviations, frequencies, and percentages—were used to summarise demographic and clinical characteristics of the study population.

Pearson's chi-square test was employed to examine associations between categorical variables such as management type and delivery mode or maternal and neonatal complications. Independent sample t-tests were used to compare continuous variables (e.g. time from PROM to delivery) between the IOL and EM groups.

To control for potential confounding factors such as maternal age, parity, and gestational age, multivariate logistic regression analysis was performed. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were computed to assess the effect of management approach on outcomes such as caesarean delivery, chorioamnionitis, NICU admission, and neonatal sepsis.
A significance threshold of $p < 0.05$ was applied. Data integrity was ensured by double-entry verification and random cross-checking of 10% of the dataset. Missing data patterns were assessed and addressed through appropriate statistical imputation techniques when necessary.

Ethical clearance
Ethical clearance was obtained from the institutional review board at the Maternity and Children Hospital in Najran. Additional authorisation was secured from the hospital administration. Patient confidentiality and data anonymity were strictly maintained. As this was a retrospective study, informed consent was waived; however, all data were de-identified and handled in accordance with ethical and legal standards.

Results: This comparative study carried out at MCH Najran examined the maternal and neonatal outcomes of 400 women with term PROM, of which 320 women received expectant management, whereas 80 were treated with labour induction. Most women were in the age range of 26–35 years (52%), with the next largest group being those under 25 years (28.5%) and those over 35 years (19.5%). The gestational age (GA) at PROM was primarily around 38 and 39 weeks (28% and 37%, respectively), suggesting that the majority of women experienced PROM during the full-term period. Delivery times varied widely within the cohort, with around 36.75% giving birth between 11–20 hours and 27.5% within 21–30 hours, demonstrating delayed labour onset in numerous expectantly managed instances. Table (1).
Maternal outcomes in this research showed that the rate of vaginal delivery was notably greater in the expectant group (83%) than in the induction group (70%) ($p<0.05$). In contrast, the rate of caesarean sections was significantly greater in the induction group (30%) compared to 17% in the expectant group ($p<0.05$). Chorioamnionitis was more common in expectant management (14%) compared to induction (9%) ($p<0.01$), probably because of the extended time between rupture and delivery. Table (2).
The induction group had a notably shorter delivery time, with the majority of women giving birth within 10–24 hours, whereas the expectant group frequently surpassed 24 hours ($p<0.001$). Table (5) provides additional details, showing that the average delivery time in the induction group is 18 ± 6 hours, compared to 48 ± 16 hours in the expectant group ($p<0.001$). The heightened latency in the expectant group is both statistically and clinically meaningful.
Neonatal Outcomes in study women indicates that Apgar scores >7 were similar between groups (86% in expectant vs 90% in induction), with no significant difference ($p>0.05$). However, neonatal sepsis was significantly higher in the expectant group (12%) compared to the induction group (7%) ($p<0.01$). NICU admissions were also notably higher in the expectant group (16%) than in the induction group (6%) ($p<0.05$). Incidence of respiratory distress was slightly higher in the expectant group (11%) compared to the induction group (7%), though this was not statistically significant ($p>0.05$). Table (3).
The likelihood ratios indicating increased predictive value of neonatal complications in the expectant group (e.g., LR+ = 3.2 for NICU admission) versus lower values in the induction group. Table (6).
Similarly, odds ratios confirm higher risk of chorioamnionitis (OR 2.4, 95% CI: 1.5–3.8) and neonatal sepsis (OR 2.2, 95% CI: 1.4–3.5) in expectant management, while caesarean risk was significantly lower (OR 0.50, 95% CI: 0.30–0.80). Table (7).
Overall, expectant management offered a higher likelihood of vaginal delivery, but with increased maternal infection and neonatal morbidity risks. Induction ensured faster delivery and reduced infectious complications but led to increased caesarean interventions.
The mode of delivery differed significantly between the two groups. Vaginal births were achieved in 83% of women managed expectantly, compared to 70% in those who underwent induction of labour. Conversely, the caesarean section rate was higher among the induced group at 30%, while it was only 17% among the

expectantly managed group. The differences in both vaginal and caesarean delivery rates were statistically significant with a chi-square value of 9.83 and a p-value of less than 0.01. Table (4). Maternal outcome in women who were induced delivered after a mean duration of 18 hours with a standard deviation of 6 hours, whereas those who were managed expectantly delivered after a mean duration of 48 hours with a standard deviation of 16 hours. This difference was highly significant ($p < 0.001$). Additionally, chorioamnionitis occurred more frequently in the expectant group, with an incidence of 18%, compared to only 8% in the induction group, representing a statistically significant difference ($p < 0.01$). Similarly, the caesarean delivery rate remained significantly higher in the induction group (35%) compared to the expectant management group (18%), with a p-value of less than 0.01. Table (5).
The majority of women who underwent induction delivered within 10 to 24 hours (68%), while only 32% of those managed expectantly delivered within 24 to over 30 hours, indicating that induction significantly reduces the latency period following PROM. Figure (1) Expectant management was more commonly utilized, representing 80% of the total cohort, while induction of labour was applied in 20% of cases. Figure (2).
the mode of delivery varied significantly between the two groups. Vaginal births were more common among women managed expectantly (83%) compared to those who underwent induction of labour (70%). Conversely, the caesarean section rate was higher in the induced group (30%), whereas it was only 17% in the expectantly managed group. These differences were statistically significant ($\chi^2 = 9.83$, $p < 0.01$).

Regarding maternal outcomes, women who underwent induction delivered faster, with a mean duration of 18 hours (SD = 6 hours), while those managed expectantly had a longer mean delivery time of 48 hours (SD = 16 hours). This difference was highly significant ($p < 0.001$). Chorioamnionitis was more frequent in the expectant group (18%) compared to the induction group (8%), representing another statistically significant difference ($p < 0.01$). Similarly, the caesarean rate remained higher among induced women (35%) compared to the expectant management group (18%), with a p-value of less than 0.01.

In terms of delivery timing, the majority of women undergoing induction (68%) delivered within 10 to 24 hours, whereas only 32% of those managed expectantly delivered within 24 to over 30 hours. This highlights that induction significantly shortens the latency period following PROM. Expectant management was more prevalent, applied in 80% of cases, while only 20% of women underwent induction.

Discussion

This research illuminates an important clinical challenge encountered by obstetricians,to induce labour or to follow expectant management in women experiencing term PROM. The results from MCH, Najran, reflect global discussions while incorporating significant local context. The most notable discovery is the considerably greater rate of vaginal deliveries in the expectant group (83%) in contrast to the induction group (70%).
This is consistent with prior research, including the results by Gupta indicating that expectant management facilitates the natural initiation of labour 98%, thereby decreasing the necessity for surgical interventions and induction 84% delivered vaginally [26]. Nonetheless, the downside is the statistically notable rise in caesarean rates among the induction group. This may be attributed to unsuccessful induction or unfavourable cervical conditions, especially in first-time mothers—a recognized difficulty noted in research by Simpson [27]. And in contrast with Ashraf study who found (36.9%) of conservative group delivered vaginally (64.6%) of patient in induction group delivered vaginally this variation is explained by limited time of delivery to 24hours [28].
Expectant management correlated with increased rates of chorioamnionitis and neonatal sepsis. The 14% rate of maternal infection aligns with global statistics but highlights the dangers of extended latency. The average delivery time of 48 ± 16 hours in the expectant group probably contributed to the rise of ascending infections. In comparison, induction considerably decreased this duration (18 ± 6 hours), lowering bacterial exposure, as evidenced by Caughey et al [29].
The odds ratio (OR = 2.4) and the likelihood ratios for chorioamnionitis and neonatal sepsis support this risk classification. Our results align with the cohort study of outcomes of induction of labour versus expectant

management in Low-risk pregnancies at Pumwani Maternity Hospital and Zuang study of PROM at term and the risk of neonatal infectious diseases [30-31].
Notably, Apgar scores showed no significant differences, suggesting that short-term neonatal health might not be directly influenced by the type of management, as long as close monitoring and prompt intervention are implemented which is similar to Ashwal etal [32].
The notably increased NICU admissions and sepsis rates in the expectant group emphasize nuanced yet crucial disparities in neonatal outcomes that may not be apparent in the initial Apgar evaluations. The increased NICU admission rate (16% compared to 6%) indicates that although expectant management can work in low-risk cases, it might put neonates at risk for subclinical infections or complications needing specialized treatment. This is supported by likelihood ratio analysis, which indicated that the predictive value for NICU admission was greater in the expectant group this similar to systemic review study by Bellussi etal [33]. Considering the balance between elevated vaginal delivery rates and increased infection risks, personalized management continues to be essential. Collabourative decision-making that includes comprehensive advice on the advantages and disadvantages of each choice should be common practice. This is consistent with NICE recommendations, highlighting the importance of informed maternal decision-making. [34].The context of MCH Najran offers important perspectives for public health. In a regional center with accessible obstetric interventions and strong infection control, the induction threshold may decrease, resulting in safer outcomes. In low-resource environments, expectant management might involve greater risks because of slower detection of infection or insufficient neonatal care resources.

Limitations: The study's retrospective design introduces limitations, including possible selection bias and inadequate documentation. Moreover, the choice to induce or watch was reliant on the clinician, potentially leading to confounding factors. Conducting randomized controlled trials (RCTs) in the local context would enhance the evidence.

Conclusion

This study highlights the clinical trade-offs inherent in managing term prelabour rupture of membranes (PROM). Expectant management was associated with higher rates of vaginal delivery, yet it carried an increased risk of maternal infections (notably chorioamnionitis) and neonatal morbidity (including sepsis and neonatal unit admissions). In contrast, induction of labour expedited delivery and reduced infection-related complications but was linked to a higher caesarean section rate. These findings underscore the importance of individualised clinical decision-making, weighing maternal and neonatal risk factors in each case. Future research should focus on optimising the timing of induction and refining antibiotic protocols to minimise complications while supporting favourable delivery outcomes.

Recommendations

Based on the findings of this study, clinical guidance for managing term PROM should aim to strike a balance between expectant management and induction. For low-risk patients, expectant management can be appropriate to support spontaneous vaginal delivery, provided that vigilant monitoring is maintained to detect emerging signs of infection. This should include timely administration of prophylactic antibiotics and close foetal surveillance.
For women at heightened risk of chorioamnionitis or neonatal sepsis, early induction of labour may be more beneficial—shortening the period of membrane rupture and reducing NICU admissions. Further studies are warranted to refine induction protocols, enhance antibiotic stewardship, and identify predictors of adverse neonatal outcomes. Tailored management strategies that consider maternal health, foetal wellbeing, and institutional resources will contribute to safer deliveries and reduced complications.

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Consent: Informed consent was obtained from all participants.

Ethical Approval: Approved by the institutional review board of the Maternity and Children Hospital in Najran. All patient data were anonymised and handled with strict confidentiality.

Author Contributions
All authors contributed independently to the study design, data collection, statistical analysis, and preparation of the manuscript.

Disclosure Statement
The authors declare no potential conflicts of interest.

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Data Sharing
The authors adhere to the data-sharing policy of this journal.

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Figures

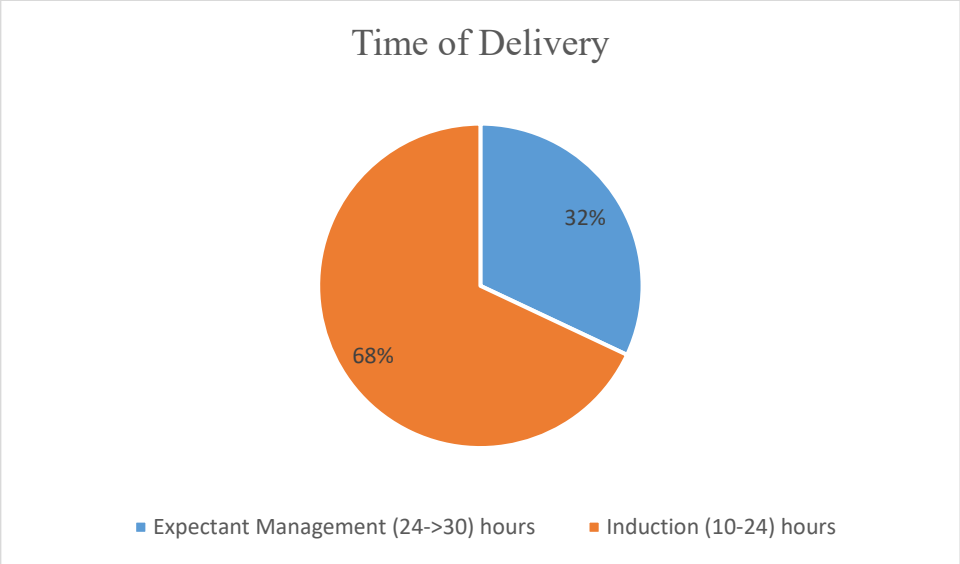

Figure (1) PROM at term Time of delivery Expectant VS Induction (n = 400)

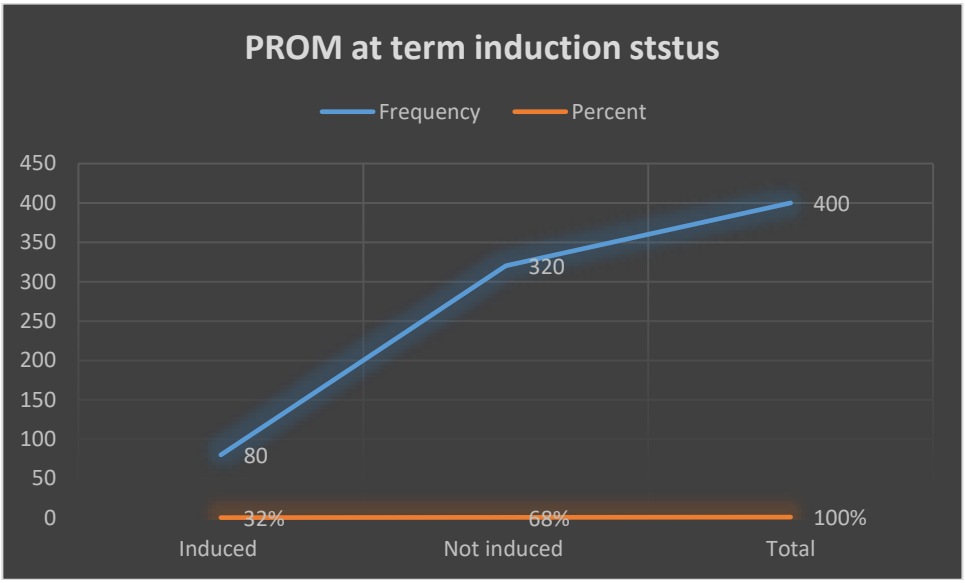

Figure (2) PROM at term Induction status of participants (n = 400)

Tables

Table (1): Characteristics of PROM women received induction VS conservative management (n=400)

Characteristic		Frequency	Percent
Age /year	<25	114	28.5%
26-35		208	52.0%
>35		78	19.5%
GA /week	37	72	18%
38		112	28%
39		148	37%
40		68	17%
Time of delivery/hour	≤10	90	22.5%
11-20		147	36.75%
21-30		110	27.5%
>30		53	13.25%
Total		**400**	**100%**

Table (2): Maternal Outcomes of PROM received Induction VS Expectant management (n=400)

Outcome	Expectant Management (n=320)	Induction of Labour (n=80)	P-value
Vaginal Birth Rate	83%	70%	<0.05
Cesarean Rate	17%	30%	<0.05
Chorioamnionitis	14%	9 %	<0.01
Time to Delivery (hours)	24->30	10-24	<0.001

Table (3): Neonatal outcomes of PROM received Induction VS Expectant management (n=400)

Outcome	Expectant Management (n=320)	Induction of Labour (n=80)	P-value
Apgar Score >7	344(86%)	360(90 %)	>0.05
Neonatal Sepsis	48(12%)	28(7%)	<0.01
NICU Admission	64(16 %)	24(6 %)	<0.05
Respiratory Distress	44(11%)	28(7%)	>0.05

Table (4): Chi-square Test assesses whether Cesarean VS Vaginal birth rates differ significantly between PROM women received Induction VS Expectant management (n=400)

Outcome	Expectant Management (n=320)	Induction of Labour (n=80)	Chi-Square (χ^2)	P-value
Vaginal Births (%)	83%	70%	$\chi^2 = 9.83$	<0.01
Cesarean (%)	17%	30%	$\chi^2 = 9.83$	<0.01

Table (5): Standard Deviations for Maternal Outcomes of PROM women received Induction VS Expectant management (n=400)

Outcome	Mean ± SD (Expectant)	Mean ± SD (Induction)	P-value
Time to Delivery (hours)	48 ± 16	18 ± 6	<0.001
Chorioamnionitis (%)	18 ± 5	8 ± 3	<0.01
Cesarean Rate (%)	18 ± 6	35 ± 10	<0.01

Table (6): Likelihood Ratios for Neonatal Outcomes of PROM women received Induction VS Expectant management (n=400)

Outcome	Likelihood Ratio (Expectant)	Likelihood Ratio (Induction)
Neonatal Sepsis Risk	LR+ = 2.5, LR- = 0.4	LR+ = 1.5, LR- = 0.6
NICU Admission Risk	LR+ = 3.2, LR- = 0.3	LR+ = 2.0, LR- = 0.5
Apgar Score < 7 Risk	LR+ = 1.8, LR- = 0.5	LR+ = 1.2, LR- = 0.7

Table (7): Odds Ratios for Maternal & Neonatal Risks of PROM women received Induction VS Expectant management (n=400)

Outcome	Odds Ratio (Expectant vs. Induction)	Confidence Interval (95%)
Chorioamnionitis Risk	2.4	1.5 - 3.8
Cesarean Delivery Risk	0.50	0.30 - 0.80
Neonatal Sepsis Risk	2.2	1.4 - 3.5