Risk Factors Associated with Failed Induction of Labour – A Cross-Sectional Study

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ABSTRACT

Background: Induction of labour (IOL) is a commonly practiced obstetric intervention aimed at initiating uterine contractions before the onset of spontaneous labour. While it is generally safe, failed inductions can lead to increased maternal and neonatal morbidity. Understanding the risk factors associated with failed induction is critical for improving obstetric outcomes. **Objective:** This study aimed to identify and analyze the maternal, fetal, and procedural risk factors associated with failed induction of labour at a tertiary care hospital in Bangladesh. **Methods & Materials:** This cross-sectional study was conducted on 60 pregnant women who underwent IOL. Data on demographic factors, medical indications, induction methods, and outcomes were collected and analyzed using statistical software. Inclusion and exclusion criteria were predefined. **Results:**The failure rate of induction was found to be 36.7%. Significant risk factors associated with failed induction included nulliparity, advanced maternal age (≥35 years), and non-favorable Bishop scores. The most common indication for induction was post-dated pregnancy (33.3%), and prostaglandins were the most frequently used method. **Conclusion:**Identifying women at higher risk of failed induction can enhance decision-making and reduce complications. Individualized assessment and preparedness for potential surgical intervention are advised in high-risk cases.

Keywords: *Failed Induction, Risk Factors, Labour, Pregnancy, Maternal Outcomes, Cross-Sectional Study*

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Introduction

Induction of labour (IOL) refers to the medical or surgical initiation of uterine contractions before their spontaneous onset, with the aim of achieving vaginal delivery. This practice is increasingly common worldwide, particularly in tertiary healthcare settings, and is often undertaken when the continuation of pregnancy poses a greater risk to maternal or fetal health than delivery itself. Common medical indications include post-term pregnancy, premature rupture of membranes (PROM), gestational diabetes mellitus (GDM), hypertensive disorders, and intrauterine growth restriction (IUGR) [1,2]. In recent years, elective IOL has also become more frequent due to logistical and psychosocial considerations, though its safety and effectiveness are still widely debated [3].Despite being a well-established intervention, IOL does not always result in successful vaginal delivery. Failed induction is typically defined as the inability to establish active labour or failure to achieve delivery despite adequate uterine contractions within a specified timeframe. Failure of induction not only increases the likelihood of emergency cesarean section but also elevates the risk of maternal complications such as uterine hyperstimulation, postpartum hemorrhage, infections, and emotional distress [4-6]. Neonates born after failed IOL may also face increased risks including low Apgar scores, neonatal intensive care unit (NICU) admissions, and prolonged hospital stays [7]. Consequently, predicting which women are at increased risk of failed induction is critical for minimizing adverse outcomes. Several factors have been implicated in influencing the success or failure of labour induction. Among these, the bishopscorea pre-induction assessment of cervical readiness based on dilation, effacement, consistency, position, and station of the presenting partremains one of the most widely used predictors [8]. Other maternal factors such as age, body mass index (BMI), parity, and comorbidities like hypertension or diabetes are also significant [9,10] . Fetal conditions, such as estimated birth weight and amniotic fluid volume, may likewise contribute to the likelihood of successful induction. Moreover, the method of induction, whether pharmacological (e.g., prostaglandins, oxytocin) or mechanical (e.g., Foley catheter), and the timing and monitoring protocols adopted by healthcare providers, can significantly influence outcomes [11-13]. In the context of Bangladesh, where maternal and perinatal health remain pressing public health challenges, understanding the dynamics of IOL is particularly important. Tertiary care hospitals often serve a diverse and high-risk obstetric population, making them ideal for studying trends in induction outcomes. However, there is limited published literature from the region examining the risk factors specifically associated with failed IOL. Most existing studies are either retrospective or do not comprehensively account for the socioclinical variables prevalent in low-resource settings. Therefore, this cross-sectional study aims to fill this knowledge gap by identifying and analyzing the maternal, fetal, and procedural factors that contribute to failed IOL in a tertiary care hospital in Bangladesh. Such evidence can be instrumental in guiding clinical practice, improving maternal counseling, and ultimately reducing unnecessary cesarean sections in similar resource-constrained environments.The primary objective of this study was to evaluate the prevalence of failed induction of labour and identify the risk factors associated with it in pregnant women undergoing IOL in a tertiary care hospital in Bangladesh.

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Methods & MATERIALS

This study was designed as a hospital-based cross-sectional observational study conducted over a 8 months period from August 2021 to March 2022 at the Department of Obstetrics and Gynaecology, Shaheed Ziaur Rahman Medical College Hospital, Bogura, Bangladesh. A total of 60 pregnant women who were admitted for induction of labour (IOL) were consecutively enrolled based on predefined eligibility criteria. Ethical approval for this research was obtained from the Institutional Review Board, and written informed consent was obtained from all participants prior to their inclusion in the study. The primary aim was to assess the incidence and contributing risk factors for failed IOL. Demographic, obstetric, and clinical data were collected through a structured proforma administered by trained medical personnel.

Inclusion Criteria

The study included pregnant women who met the following conditions:

- Singleton pregnancy with a live fetus
- Gestational age ≥ 37 completed weeks
- Cephalic presentation
- Indications for induction including post-dated pregnancy, PROM, hypertensive disorders, GDM, or other maternal-fetal indications
- No contraindications for vaginal delivery
- Normal fetal heart rate patterns at the time of induction

Exclusion Criteria

Women with any of the following were excluded from the study:

- Multiple gestations
- Non-cephalic presentations
- Previous cesarean section or uterine surgery (to avoid confounding with TOLAC—trial of labour after cesarean)
- Known placenta previa, vasa previa, or suspected placental abruption
- Fetal demise or major congenital anomalies
- Clinical evidence of chorioamnionitis
- Refusal to provide informed consent

Data Collection Procedure

Upon admission for induction, each participant underwent a detailed history-taking and physical examination. Data collected included maternal age, parity, gestational age, medical history, and reason for induction. A vaginal examination was performed to assess cervical favourability using the Bishop score. Based on the score and clinical indication, one or more induction methods were used: vaginal prostaglandins (PGE2), intravenous oxytocin infusion, transcervical Foley catheter, or a combination of these methods.Labour progress was monitored using standard obstetric protocols, including partograph documentation, intermittent auscultation or continuous fetal monitoring, and serial vaginal examinations. Induction was deemed successful if the woman progressed to active labour (cervical dilation ≥ 4 cm with regular contractions) and delivered vaginally. Failed induction was defined as no cervical change after 12 hours of adequate uterine contractions or failure to establish active labour within 24 hours of induction, necessitating cesarean delivery. Maternal and fetal outcomes were also recorded for secondary analysis.

Statistical Data Analysis

The collected data were reviewed and entered into SPSS version 25 for statistical analysis. Categorical variables such as age group, parity, method of induction, and outcome (success or failure) were expressed as frequencies and percentages. Continuous variables were summarized using means and standard deviations. Chi-square tests were applied to examine the associations between potential risk factors and the outcome of induction. A p-value of <0.05 was considered statistically significant. Data presentation included detailed tables and visual charts to support analytical clarity.

Results

A total of 60 pregnant women who underwent induction of labour (IOL) were included in the study. The mean maternal age was 26.8 ± 5.3 years, with the highest concentration of patients in the 25–29 year age group (33.3%), followed by the 20–24 year group (30%). Advanced maternal age (≥35 years) accounted for 10% of the cases, and this group showed a higher proportion of failed inductions. Age distribution details are presented in *Table I*.

Table I
Age Distribution of Participants (*n*=60).

Age Group (years)	Number of Participants	Percentage (%)
20–24	18	30.0%
25–29	20	33.3%
30–34	16	26.7%
≥35	6	10.0%
Total	60	100%

In terms of parity, 36 participants (60%) were nulliparous, and 24 (40%) were multiparous. A significantly higher rate of failed induction (72.2%) was observed among nulliparous women compared to multiparous women (27.8%) (see *Table II*).

Table II
Parity Distribution of Participants.

Parity Status	Number of Participants	Percentage (%)
Nulliparous	36	60.0%
Multiparous	24	40.0%
Total	60	100%

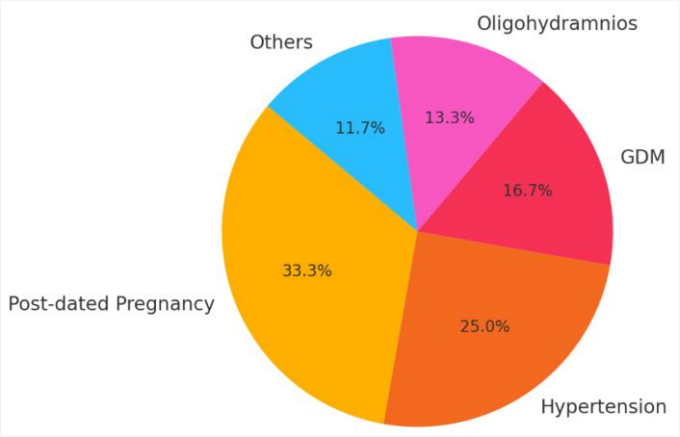

Figure 1 Pie chart representing the clinical indications for induction of labour among the study participants.

The most common indication for induction was post-dated pregnancy (33.3%), followed by hypertensive disorders of pregnancy (25%), gestational diabetes mellitus (16.7%), oligohydramnios (13.3%), and other causes (11.7%), such as maternal request and intrahepatic cholestasis of pregnancy. A graphical representation of induction indications is shown in the Pie Chart (*Figure 1*).

Methods of induction used are shown in *Table III*.

Table III
Methods of Induction Used.

Method of Induction	Number of Participants	Percentage (%)
Prostaglandins (PGE2) Only	22	36.7%
Oxytocin Only	14	23.3%
Mechanical Methods (e.g., Foley catheter)	10	16.7%
Combined Methods (Prostaglandin + Others)	14	23.3%
Total	60	100%

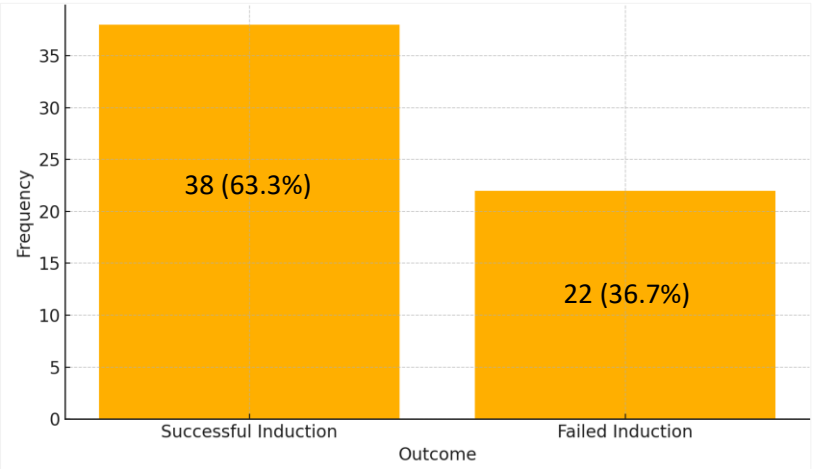

Figure 2 Bar chart showing the distribution of outcomes following labour induction.

Out of 60 inductions, 38 (63.3%) were successful vaginal deliveries, while 22 (36.7%) were classified as failed inductions requiring cesarean section. The failed cases were strongly associated with lower Bishop scores (<6), nulliparity, and maternal age ≥35. These relationships were statistically significant ($p<0.05$). *Figure 2* illustrates the distribution of induction outcomes. No maternal or neonatal mortalities occurred during the study period. However, four neonates from the failed induction group required NICU admission for transient tachypnea and low Apgar scores.

Discussion

The findings of this study shed light on the multifactorial nature of failed induction of labour (IOL) and emphasize the relevance of individualized assessment in obstetric decision-making. Our results indicate a failed induction rate of 36.7%, which is consistent with previously reported international ranges (20–40%) and aligns with studies from similar resource-limited settings [13,14]. This relatively high failure rate underscores the importance of identifying and mitigating risk factors associated with poor outcomes. One of the most notable findings in our study was the significant association between nulliparity and failed induction, with 60% of failed inductions occurring in first-time mothers. This observation supports existing evidence that nulliparous women are more likely to experience prolonged labour due to reduced uterine efficiency and longer cervical preparation times [15-17].

Additionally, the biological immaturity of the cervix and the absence of prior vaginal delivery appear to play a substantial role in delaying or inhibiting the onset of effective contractions.Advanced maternal age (≥35 years) emerged as another independent predictor of failed IOL in this study. Women in this age group were more likely to undergo cesarean section after failed induction, consistent with findings from studies in both high-income and low-income countries [18,19]. Age-related changes in cervical compliance, decreased uterine contractility, and an increased incidence of co-existing medical conditions such as gestational hypertension or diabetes may all contribute to this trend. The Bishop score, a widely accepted predictor of successful induction, was also found to be a crucial determinant in our study. Women with a Bishop score of less than 6 had significantly higher rates of failed induction, reaffirming the need for adequate cervical ripening prior to initiating active labour protocols [20]. Interestingly, while prostaglandins were the most commonly used method of induction in our setting and demonstrated relatively higher success rates, the combination of methods (mechanical and pharmacological) also showed promising results, which aligns with global best practices in IOL [21-23]. The most frequent indication for induction in our cohort was post-dated pregnancy, followed by hypertensive disorders and GDM, similar to patterns observed in regional and international studies [24,25]. However, the outcomes varied depending on the indication. For instance, women with GDM or hypertensive disorders often had less favorable Bishop scores, possibly contributing to lower success rates. Our findings also highlight the importance of institutional factors such as skilled personnel availability, proper protocol adherence, and consistent monitoring of labour progression. It is worth noting that despite the use of recommended induction techniques, outcome disparities persistedsuggesting that patient-specific physiological factors often override procedural interventions. This necessitates not only strict selection criteria but also the preparedness for timely cesarean delivery if maternal or fetal well-being is compromised. These results call for an integrative approach that combines clinical acumen, objective assessments (e.g., Bishop scoring), and facility readiness to optimize labour induction outcomes and reduce avoidable maternal and neonatal complications [26,27]. sMoreover, the broader implications of failed IOL extend beyond immediate clinical outcomes. The psychological stress experienced by the mother, the economic burden of prolonged hospital stays, and increased surgical interventions in cases of failed IOL can contribute to overall negative healthcare experiences. In low- and middle-income countries like Bangladesh, where maternal healthcare resources are often stretched, the decision to induce labour must be made judiciously. While our study provides valuable insights, further multicentric studies with larger sample sizes and diverse patient demographics are needed to validate these findings. Additionally, incorporating variables such as maternal BMI, socioeconomic status, and fetal weight estimation may enhance the predictive value of induction outcomes. Future research should also explore novel and culturally appropriate cervical ripening strategies and assess their acceptability and efficacy in low-resource settings.

Limitations

This study was limited by its small sample size (n=60), which restricts the generalizability of the findings to the wider population. Being a single-center study, it may not account for institutional variations in induction protocols or clinician preferences. The observational nature of the study also precludes causality assessment. Additionally, variables like maternal BMI, fetal weight estimation, and socioeconomic factors were not included, which might have impacted the results. Despite these limitations, the study provides valuable insights into the pattern of induction failures and highlights areas for further investigation.

Conclusion

This cross-sectional study investigated the risk factors associated with failed induction of labour (IOL) in a tertiary care hospital in Bangladesh and found that nearly one-third (36.7%) of inductions were unsuccessful. The data clearly demonstrate that specific maternal and procedural variables significantly influence the outcome of induction. Notably, nulliparity, advanced maternal age (≥35 years), and low Bishop scores at the time of induction were strongly associated with a higher likelihood of failure. These findings align with existing international literature and reaffirm the critical importance of individualized patient assessment before initiating the induction process. The study also highlighted that while prostaglandins and combined methods were commonly used, success was more likely in cases where cervical favorability was adequate prior to induction.

Given the clinical and psychological consequences of failed inductionsincluding increased cesarean section rates, maternal anxiety, prolonged hospital stays, and neonatal complicationshealthcare providers must employ a tailored and evidence-based approach to labour management. This includes thorough cervical assessment using the Bishop score, appropriate selection of induction methods, and counseling patients regarding realistic expectations and potential outcomes. The study underscores the necessity for structured institutional protocols and staff training to enhance patient outcomes. Furthermore, policies promoting early risk stratification and the judicious use of induction are essential, particularly in resource-constrained settings like Bangladesh, where overburdened healthcare systems can amplify the impact of failed obstetric interventions.

Future research should aim to include larger sample sizes and multicenter data to validate these results further. Investigating additional maternal and fetal variables, such as BMI, socioeconomic status, and fetal weight estimation, would also provide a more nuanced understanding of risk profiles. Moreover, integrating newer technologies for cervical assessment and exploring non-invasive induction strategies could contribute to safer and more effective maternal care pathways. Ultimately, minimizing failed inductions will contribute not only to better clinical outcomes but also to more efficient resource utilization and improved maternal satisfaction in childbirth experiences.

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