

Feto-Maternal Outcomes in Induced and Spontaneous Labor among Term Primigravida in a Tertiary Care Hospital

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ABSTRACT:

Background: Induction of labor is a common obstetric intervention performed to improve maternal and neonatal outcomes in term pregnancy. However, concerns remain regarding its association with adverse feto-maternal outcomes compared with spontaneous labor, particularly among primigravida women.

Objective: To compare the feto-maternal outcomes between induced and spontaneous labor among term primigravida admitted in a tertiary care hospital.

Methods: This randomized controlled trial was conducted in the Department of Obstetrics and Gynaecology, Chattogram Medical College Hospital, from March 2018 to February 2019. A total of 130 term primigravida women were purposively enrolled and equally divided into spontaneous labor (n=65) and induced labor (n=65) groups. Socio-demographic characteristics, mode of delivery, duration of labor, maternal complications, and neonatal outcomes were recorded using a structured data collection sheet. Data were analyzed using SPSS version 27. Student's t-test and Chi-square test were used for comparison of continuous and categorical variables, respectively. A p-value <0.05 was considered statistically significant.

Results: The mean age of participants was similar between the spontaneous and induced labor groups (20.26±1.11 vs 20.14±1.03 years; p=0.513). Mean gestational age and BMI were significantly higher in the induced labor group (41.61±0.48 weeks and 24.07±1.32 kg/m²) than in the spontaneous labor group (41.21±0.01 weeks and 22.63±1.55 kg/m²) (p<0.001). Normal vaginal delivery was more frequent in the spontaneous labor group (86.2%) compared to the induced labor group (78.5%), while caesarean section rates were 9.2% and 12.3%, respectively. The mean duration of the first stage of labor was significantly shorter in the induced labor group (7.59±0.85 hours) than in the spontaneous labor group (10.53±1.04 hours) (p<0.001). Maternal complications, including atonic postpartum hemorrhage, cervical tear, and perineal tear, showed no significant difference between groups. Neonatal outcomes such as birth asphyxia, meconium aspiration, NICU admission, and Apgar scores at 1 and 5 minutes were also comparable between the two groups (p>0.05).

Conclusion: Induced labor among term primigravida showed comparable maternal and neonatal outcomes to spontaneous labor without significant increase in adverse feto-maternal complications or caesarean delivery rates.

Key Words: : Induced labor; spontaneous labor; maternal outcome; neonatal outcome; primigravida; term pregnancy.

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Introduction

Induction of labor (IOL) is one of the most commonly performed obstetric interventions worldwide and is undertaken when continuation of pregnancy poses greater risk to the mother or fetus than delivery itself. The procedure involves artificial initiation of uterine contractions before the spontaneous onset of labor with the aim of achieving safe vaginal delivery (World Health Organization (WHO), 2022). The global rate of labor induction has increased substantially over the last two decades, particularly in tertiary healthcare facilities, due to improved obstetric surveillance and increasing concern regarding adverse maternal and perinatal outcomes associated with prolonged pregnancy (Jaiswal et al., 2024).

Term primigravida women constitute a unique obstetric population because labor abnormalities, prolonged labor, and operative delivery are more common among nulliparous mothers (Vahratian et al., 2005). Although spontaneous labor is traditionally considered more physiological and safer, induction of labor has become an accepted and evidence-based intervention for postdated pregnancy, hypertensive disorders, oligohydramnios, and other maternal-fetal indications (Gulmezoglu et al., 2012). Recent studies have shown that appropriately selected induction of labor does not significantly increase adverse feto-maternal outcomes or cesarean delivery rates compared with spontaneous labor (Hong et al., 2023).

Several studies demonstrated that induction of labor may reduce the risks of perinatal mortality, neonatal intensive care unit (NICU) admission, low Apgar score, and cesarean section when performed at appropriate gestational age and under adequate monitoring (Stock et al., 2012; Caughey et al., 2009). However, concerns still exist regarding maternal complications such as postpartum hemorrhage, failed induction, prolonged labor, and fetal distress, especially among primigravida women with unfavorable cervical conditions (Lee et al., 2022). In addition, induction of labor has been associated with increased maternal intervention and longer hospital stay in some settings (Jeer et al., 2023; Väänänen et al., 2025; Ormsby et al., 2025).

In low- and middle-income countries like Bangladesh, evidence regarding comparative feto-maternal outcomes between induced and spontaneous labor among term primigravida women remains limited. Most available

studies are conducted in developed countries where obstetric practices and healthcare resources differ significantly from local settings (Orji & Olabode, 2008). Therefore, assessment of maternal and neonatal outcomes in tertiary care hospitals of Bangladesh is essential for evidence-based decision-making and optimal obstetric management.

Considering the increasing frequency of induction of labor and the ongoing debate regarding its safety and effectiveness, this study was designed to compare the feto-maternal outcomes between induced and spontaneous labor among term primigravida women admitted to a tertiary care hospital.

Methodology

This Randomized controlled trial was conducted in the Department of Obstetrics and Gynaecology of Chattogram Medical College Hospital from March 2018 to February 2019. The study population consisted of term primigravida women admitted to the labor ward during the study period. A total of 130 participants were selected by purposive sampling and equally divided into two groups after randomization: spontaneous labor group (n=65) and induced labor group (n=65).

Women with singleton pregnancy, cephalic presentation, live fetus, and gestational age between 41^{0/7} and 41^{6/7} weeks were included in the study. For induction cases, women with Bishop score ≥ 6 were selected. Patients with high-risk pregnancy, gestational diabetes mellitus, pregnancy-induced hypertension, oligohydramnios, fetal growth restriction, malpresentation, severe anemia, fetal distress, and previous uterine complications were excluded.

Induction of labor was performed using intravenous oxytocin infusion according to hospital protocol. Socio-demographic characteristics, obstetric variables, mode of delivery, duration of labor, maternal complications, and neonatal outcomes were recorded using a pre-structured data collection sheet through interview, clinical examination, and hospital records. Ethical approval was taken from the Ethical Review Committee of Chattogram Medical College.

Data Analysis

Collected data were checked, coded, and analyzed using SPSS version 27. Continuous variables were expressed

as mean $\pm$ standard deviation, while categorical variables were presented as frequency and percentage. Student's t-test and Chi-square test were used for comparison of continuous and categorical variables, respectively. Maternal and neonatal outcomes between spontaneous and induced labor groups were compared. A p-value of <0.05 was considered statistically significant.

Operational Definitions

1. Induction of Labor: Artificial initiation of uterine contractions before spontaneous onset of labor to achieve vaginal delivery.
2. Spontaneous Labor: Natural onset of regular uterine contractions leading to progressive cervical dilatation and delivery without medical intervention.
3. Primigravida: A woman who is pregnant for the first time.
4. Term Pregnancy: Pregnancy between 37 completed weeks and 41^{6/7} weeks of gestation.
5. Postpartum Hemorrhage (PPH): Blood loss of more than 500 mL following vaginal delivery.
6. APGAR Score: The Apgar score is a clinical scoring system used to evaluate the condition of a newborn at 1 and 5 minutes after birth based on appearance, pulse, grimace, activity, and respiration.

Results:

A total of 130 term primigravida women were included in the study, with 65 participants in each group. The mean age was comparable between spontaneous and induced labor groups (20.26 ± 1.11 vs 20.14 ± 1.03 years; $p=0.513$). Mean gestational age and BMI were significantly higher in the induced labor group compared to the spontaneous labor group ($p<0.001$). Most participants in both groups had primary level education. No statistically significant difference was observed regarding educational status between the two groups ($p=0.371$).

Table 1: Baseline Characteristics of the Study Participants

Variables	Spontaneous Labor (n=65)	Induced Labor (n=65)	P Value*
Age (years), Mean $\pm$ SD	20.26 ± 1.11	20.14 ± 1.03	0.513
Gestational age (weeks), Mean $\pm$ SD	41.21 ± 0.01	41.61 ± 0.48	<0.001
BMI (kg/m ²), Mean $\pm$ SD	22.63 ± 1.55	24.07 ± 1.32	<0.001
Illiterate	8 (12.3%)	10 (15.4%)	
Primary education	41 (63.2%)	34 (52.3%)	0.371
JSC & above	16 (24.5%)	21 (32.3%)	

Normal vaginal delivery was the predominant mode of delivery in both groups. A higher proportion of women in the spontaneous labor group underwent normal vaginal delivery compared to the induced labor group (86.2% vs 78.5%). Caesarean section was slightly more frequent among induced labor women (12.3%) than spontaneous labor women (9.2%). However, no statistically significant difference was found regarding mode of delivery between the groups ($p>0.05$).

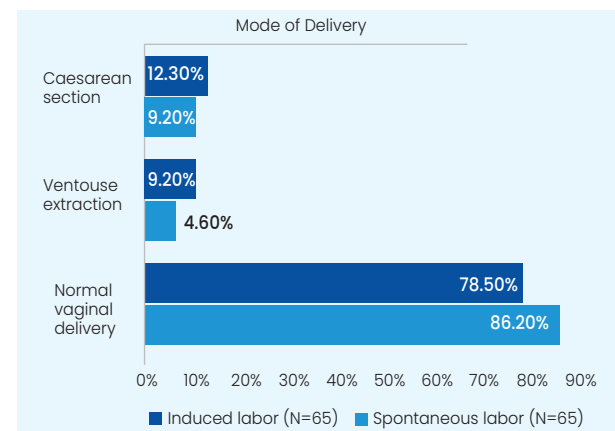


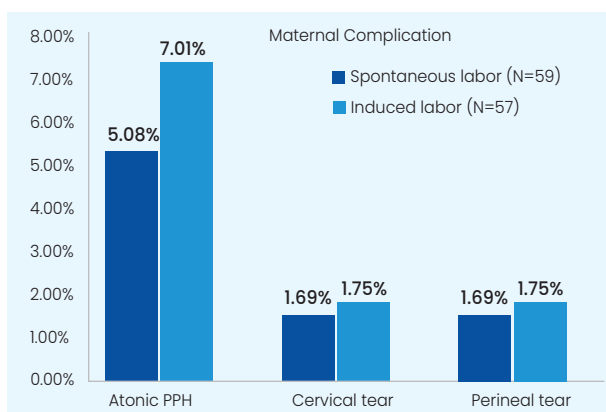
Figure 1: Comparison of Mode of Delivery between the Study Groups

The duration of labor differed significantly between the two groups. The mean duration of the first stage of labor was significantly longer in spontaneous labor compared to induced labor (10.53 ± 1.04 vs 7.59 ± 0.85 hours; $p<0.001$). Similarly, the mean duration of the second stage of labor was longer in the spontaneous labor group (49.10 ± 7.99 minutes) than the induced labor group (45.05 ± 8.28 minutes), which was statistically significant ($p=0.001$).

Table 2: Comparison of Duration of Labor between the Study Groups

Duration of Labor	Spontaneous Labor (n=59) Mean $\pm$ SD	Induced Labor (n=57) Mean $\pm$ SD	P Value*
First stage (hours)	11.21 ± 1.31	6.99 ± 0.84	<0.001
Second stage (minutes)	47.10 ± 7.92	44.05 ± 8.18	

Maternal complications were infrequent in both study groups. Atonic postpartum hemorrhage was the most common complication observed in spontaneous and induced labor groups (5.08% vs 7.01%). Cervical tear and perineal tear were observed in only one participant in each group. No statistically significant difference was found regarding maternal complications between spontaneous and induced labor groups ($p>0.05$).



chi square test

Figure 2: Maternal Outcomes among the Study Groups

Neonatal outcomes were comparable between spontaneous and induced labor groups. Birth asphyxia occurred in 3.07% neonates in both groups, while meconium aspiration was observed in 1.54% cases in each group. NICU admission was slightly higher among spontaneous labor neonates compared to induced labor neonates (4.6% vs 1.54%).

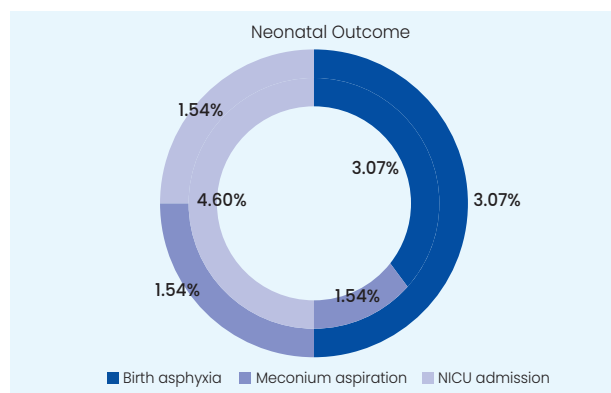


Figure 3: Neonatal Outcomes among the Study Groups

Mean APGAR scores at both 1 minute and 5 minutes showed no statistically significant difference between the groups ($p > 0.05$).

Table 3: Neonatal Outcomes among the Study Groups (APGAR SCORE)

Neonatal Outcomes	Spontaneous Labor (n=65)	Induced Labor (n=65)	P Value*
APGAR score at 1 minute, Mean $\pm$ SD	6.35 $\pm$ 1.45	6.22 $\pm$ 1.46	0.356
APGAR score at 5 minutes, Mean $\pm$ SD	8.40 $\pm$ 1.37	8.33 $\pm$ 1.28	0.567

chi square test (qualitative) & student's t test (quantitative)

Discussion

The present study compared the feto-maternal outcomes between induced and spontaneous labor among term primigravida women admitted to a tertiary care hospital. The findings demonstrated that induced labor had comparable maternal and neonatal outcomes with spontaneous labor, without significant increase in adverse complications or cesarean delivery rates. Similar observations were reported by Grobman et al. (2018), who found that elective induction at term did not increase maternal or neonatal morbidity among low-risk nulliparous women.

In this study, the mean maternal age was similar in both groups, indicating good comparability between the study populations. However, gestational age and BMI were significantly higher among induced labor women. This finding is expected because labor induction is commonly performed in women approaching late-term pregnancy or postdated gestation (Middleton et al., 2020). Increased maternal BMI among induced labor cases has also been reported in previous studies and may contribute to delayed spontaneous onset of labor (Arrowsmith et al., 2011).

Normal vaginal delivery was the predominant mode of delivery in both groups, and although cesarean section was slightly higher among induced labor women, the difference was not statistically significant. This result is consistent with studies conducted by Walker et al. (2016) and Keulen et al. (2019), who concluded that induction of labor at term does not significantly increase cesarean delivery rates when performed under proper clinical supervision. In contrast, some earlier studies suggested a higher risk of operative delivery following induction, particularly among nulliparous women with unfavorable cervix (Davey & King, 2016).

The duration of the first and second stages of labor was significantly shorter in the induced labor group in the present study. Similar findings were observed by Saccone et al. (2017), who reported that induction with oxytocin may facilitate effective uterine contractions and reduce labor duration. Reduced duration of labor may contribute to improved maternal comfort and lower risk of prolonged labor complications.

Maternal complications such as atonic postpartum hemorrhage, cervical tear, and perineal tear were low and

comparable in both groups. Comparable maternal morbidity between induced and spontaneous labor has also been documented by Coates et al. (2020). Neonatal outcomes including birth asphyxia, meconium aspiration, NICU admission, and Apgar scores were not significantly different between the groups. These findings are supported by studies conducted by Wennerholm et al. (2019), who found no increased neonatal morbidity associated with term induction of labor.

The findings of the current study suggest that induction of labor among carefully selected term primigravida women is a safe and effective obstetric intervention. Proper patient selection, close intrapartum monitoring, and timely obstetric management are essential to achieve favorable maternal and neonatal outcomes.

This study was conducted in a single tertiary care hospital with a relatively small sample size, which may limit the generalizability of the findings.

Conclusion

The present study demonstrated that induced labor among term primigravida women had maternal and neonatal outcomes comparable to spontaneous labor. Although induced labor showed slightly higher rates of cesarean section and maternal complications, the differences were not statistically significant, indicating that induction of labor can be considered a safe and effective obstetric intervention when performed under proper clinical supervision and monitoring.

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