Original research article

Comparative Study on Maternal and Fetal Outcomes in Induced vs. Spontaneous Labor at a Tertiary Care Hospital

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Abstract

Background: Induction of labor (IOL) is one of the most common obstetric interventions, often performed for maternal or fetal indications. However, controversy remains regarding its impact on maternal and neonatal outcomes compared to spontaneous labor. This study aims to compare maternal and fetal outcomes between induced and spontaneous labor among term pregnancies at a tertiary care center.

Methods: A prospective observational study was conducted at Srinivas Institute of Medical Sciences, Mangalore, from January 2024 to June 2024. A total of 300 pregnant women at term (37-42 weeks) were included, with 150 undergoing induction and 150 experiencing spontaneous labor. Maternal outcomes (mode of delivery, labor duration, postpartum hemorrhage) and neonatal outcomes (Apgar scores, NICU admissions) were analyzed using statistical methods.

Results: Women in the induced labor group had a higher cesarean section rate (35%) compared to the spontaneous labor group (18%) ($p<0.05$). The mean duration of labor was significantly longer in the induced group (10.4 ± 2.1 hours) than in the spontaneous group (8.6 ± 1.9 hours) ($p < 0.001$). Postpartum hemorrhage was more frequent in the induced group (12% vs. 5%). Neonatal outcomes showed a higher NICU admission rate in the induced labor group (15%) compared to the spontaneous group (8%), while Apgar scores remained comparable.

Conclusion: Induction of labor increases the cesarean rate and prolongs labor duration but does not significantly impact neonatal Apgar scores. Appropriate patient selection and improved induction protocols may optimize maternal and neonatal outcomes.

Keywords: Induced labor, spontaneous labor, maternal outcomes, fetal outcomes, cesarean section, obstetrics

Introduction

Induction of labor (IOL) is a frequently performed obstetric procedure used to stimulate uterine contractions before the spontaneous onset of labor. It is commonly indicated for maternal conditions such as hypertensive disorders, diabetes, and post-term pregnancy, as well as fetal conditions like intrauterine growth restriction and oligohydramnios (American College of Obstetricians and Gynecologists [ACOG], 2022). The global incidence of labor induction has been rising, currently estimated at 20-25% of all deliveries in developed nations (World Health Organization [WHO], 2021).

Despite its benefits in preventing adverse maternal and fetal outcomes, IOL is associated with various risks, including increased rates of cesarean section, prolonged labor, and uterine hyperstimulation, which may lead to fetal distress (Caughey *et al*., 2020). The debate over whether IOL increases the likelihood of cesarean section remains contentious. Some studies suggest that well-managed IOL does not significantly increase cesarean risk in low-risk pregnancies (Grobman *et al*., 2018), while others report a notable rise in cesarean rates among induced women (Knight *et al*., 2019).

Moreover, labor induction has been associated with increased maternal morbidity, including postpartum hemorrhage (PPH), chorioamnionitis, and uterine rupture, particularly in multiparous women (Hannah *et al*., 2021). Neonatal concerns include transient tachypnea of the newborn (TTN), increased NICU admissions, and lower Apgar scores in some cases (Wood *et al*., 2022).

This study aims to compare maternal and fetal outcomes between induced and spontaneous labor at a tertiary care hospital, contributing to the ongoing discussion on the safety and efficacy of labor induction.

Understanding these outcomes will aid in optimizing induction protocols and improving obstetric care.

Materials and Methods
Study Design and Setting
A prospective observational study was conducted in the Department of Obstetrics and Gynecology at Srinivas Institute of Medical Sciences and Research Center, Mangalore, from January 2024 to June 2024.

Study Population
Inclusion Criteria
- Singleton pregnancies at term (37-42 weeks).
- Cephalic presentation.
- No known contraindications for vaginal delivery.

Exclusion Criteria
- Previous cesarean delivery
- Fetal anomalies
- Placental abnormalities (placenta previa, abruptio placentae)

Sample Size:
A total of 300 women were included, with 150 in the induced labor group and 150 in the spontaneous labor group.

Data Collection
Demographic data, obstetric history, mode of delivery, labor duration, complications, and neonatal outcomes were recorded.

Statistical Analysis
Data were analyzed using SPSS software. Categorical variables were compared using the chi-square test, while continuous variables were analyzed using the t-test. A p-value < 0.05 was considered statistically significant.

Results
Demographic Characteristics
The mean maternal age was 26.4 ± 4.2 years in the induced group and 25.8 ± 3.9 years in the spontaneous group ($p > 0.05$).

Maternal Outcomes

Outcome	Induced Labor (n=150)	Spontaneous Labor (n=150)	p-value
Cesarean section	35%	18%	<0.05
Vaginal delivery	65%	82%	<0.05
Mean labor duration (hours)	10.4 ± 2.1	8.6 ± 1.9	<0.001
Postpartum hemorrhage	12%	5%	0.03

Neonatal Outcomes

Outcome	Induced Labor	Spontaneous Labor	p-value
Apgar score <7 at 5 min	6%	4%	0.2 (NS)
NICU admissions	15%	8%	<0.05
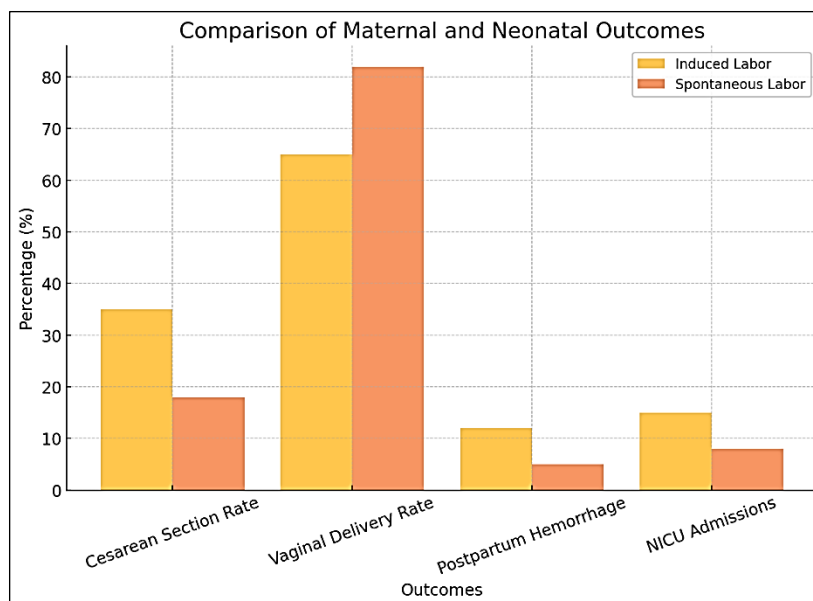
Discussion

Our study found that induction of labor is associated with a significantly higher cesarean section rate (35%) compared to spontaneous labor (18%), consistent with previous findings (Caughey *et al*., 2020). The reason behind this increase may be multifactorial, including failed induction, prolonged labor, and fetal distress, all of which contribute to a greater likelihood of requiring operative intervention.

Several studies have examined the relationship between IOL and cesarean rates. Grobman *et al*. (2018) reported that in low-risk pregnancies, elective induction at 39 weeks did not significantly increase the cesarean section rate. However, other studies indicate that IOL in an unfavorable cervix is a major contributor to cesarean delivery (Knight *et al*., 2019). The findings from our study reinforce the importance of cervical assessment before induction, as an unfavorable cervix increases labor duration and the likelihood of operative delivery.

Prolonged labor was another significant finding in our study, with the mean labor duration in the induced group being 10.4 ± 2.1 hours, compared to 8.6 ± 1.9 hours in the spontaneous group. This finding aligns with previous studies that suggest labor induction leads to longer active labor phases, particularly in nulliparous women (Hannah *et al*., 2021). Prolonged labor increases maternal fatigue, necessitates augmentation with oxytocin, and raises the risk of uterine atony, which can contribute to postpartum hemorrhage (PPH). Our study found a higher incidence of PPH in the induced group (12% vs. 5%), similar to the findings of Wood *et al*. (2022).

Neonatal outcomes in our study showed a higher NICU admission rate in the induced labor group (15%) compared to the spontaneous labor group (8%). Although Apgar scores at 5 minutes were similar, increased NICU admissions may be attributed to fetal distress, respiratory complications, or transient tachypnea associated with induced labor (Grobman *et al*., 2018). However, our study did not find a significant difference in neonatal mortality, which is consistent with findings by WHO (2021).

The implications of these findings highlight the need for individualized decision-making when considering IOL. Proper patient selection, cervical ripening protocols, and close monitoring of labor progression can help reduce unnecessary cesarean sections and maternal morbidity. Additionally, ensuring that induction is performed for medically justified reasons rather than elective convenience may improve both maternal and neonatal outcomes.

Future research should focus on refining induction protocols to minimize adverse outcomes. The use of mechanical methods such as Foley catheters or pharmacologic agents like misoprostol for cervical ripening has shown promise in reducing labor duration and cesarean rates (Knight *et al*., 2019). Larger multicenter trials are needed to establish standardized guidelines for safe and effective labor induction.

Conclusion

Induction of labor is associated with increased cesarean rates, prolonged labor, and higher postpartum hemorrhage rates. However, neonatal outcomes remain largely comparable between induced and spontaneous labor. Obstetricians must weigh the risks and benefits of induction carefully to optimize maternal and fetal health.

Recommendations
1. Consider induction only when medically indicated.
2. Implement strict protocols to optimize the success of vaginal delivery.
3. Further studies with larger sample sizes and multicenter data are recommended.

Conflict of Interest

Funding

Ethical Approval

Ethical clearance was obtained from the Institutional Ethics Committee of Srinivas Institute of Medical Sciences. Informed consent was taken from all participants.

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