A Comparative Study of Misoprostol Versus Continuous Oxytocin Infusion in Induction of Labor – A Prospective Study

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ABSTRACT

Background: Induction of labor is frequently indicated to prevent maternal and fetal complications. Misoprostol and oxytocin are commonly used methods for labor induction, but their comparative efficacy and safety remain a subject of ongoing research. **Objective:** To compare the efficacy and safety of misoprostol versus continuous oxytocin infusion in induction of labor. **Methods & Materials:** A prospective, comparative study was conducted on 120 pregnant women requiring induction of labor at Department of Obstetrics and Gynecology, Christian Mission Hospital, Rajshahi, Bangladesh between January to June 2025. Patients were randomly assigned to two groups: Group A (n=60) received 25 mcg vaginal misoprostol every 4 hours, while Group B (n=60) received continuous oxytocin infusion starting at 2 mU/min and titrated gradually. Maternal and neonatal outcomes, including induction-to-delivery interval, mode of delivery, uterine hyperstimulation, and Apgar scores, were recorded. **Results:** The mean induction-to-delivery interval was significantly shorter in the misoprostol group (8 ± 2 hours) compared to the oxytocin group (10 ± 3 hours, p=0.01). Vaginal delivery rates were 85% in the misoprostol group versus 80% in the oxytocin group (p=0.45). Uterine hyperstimulation occurred in 10% of the misoprostol group and 5% of the oxytocin group (p=0.20). Neonatal outcomes, including Apgar scores and NICU admissions, were comparable between groups. **Conclusion:** Misoprostol is as effective as continuous oxytocin for labor induction, with the advantage of a shorter induction-to-delivery interval. Careful maternal and fetal monitoring is essential to minimize complications.

Keywords: *Misoprostol, Oxytocin, Induction of Labor, Uterine Hyperstimulation, Maternal Outcome, Neonatal Outcome.*

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Introduction

Induction of labor (IOL) is an essential obstetric intervention performed when the benefits of early delivery outweigh the risks of continuing the pregnancy. Globally, it is estimated that 20–25% of pregnancies require induction due to various maternal or fetal indications such as post-term pregnancy, pregnancy-induced hypertension (PIH), oligohydramnios, intrauterine growth restriction (IUGR), or premature rupture of membranes [1,2]. Successful induction depends on the readiness of the cervix, often assessed using the Bishop score, and the ability to achieve effective uterine contractions without causing fetal or maternal compromise [3]. Pharmacological methods for labor induction are widely employed, with oxytocin infusion and prostaglandins being the most common agents. Oxytocin, a natural posterior pituitary hormone, stimulates uterine contractions and is typically administered intravenously in a continuous or titrated manner. Although oxytocin is effective, its success is influenced by cervical ripeness, and high doses may lead to uterine hyperstimulation and fetal distress [4]. Misoprostol, a synthetic prostaglandin E1 analog, has gained prominence in recent years as an effective alternative for cervical ripening and induction of labor. Its advantages include ease of administration, stability at room temperature, low cost, and efficacy in both primigravida and multigravida women [5,6]. Misoprostol induces cervical softening and myometrial contractions, thereby facilitating labor progression. However, concerns about uterine hyperstimulation, meconium-stained amniotic fluid, and fetal compromise necessitate careful monitoring. [7] Several studies have compared misoprostol and oxytocin for induction of labor, but results have varied depending on the dosage, route of administration, and patient population [8,9]. While misoprostol is associated with a shorter induction-to-delivery interval, oxytocin has the advantage of controlled titration, reducing the risk of hyperstimulation. Limited data exist in the context of structured comparative studies in tertiary care centers, particularly in populations with diverse obstetric profiles. Considering these factors, this study aims to evaluate the efficacy and safety of vaginal misoprostol versus continuous oxytocin infusion in inducing labor. Primary outcomes include induction-to-delivery interval and mode of delivery, while secondary outcomes focus on maternal complications and neonatal well-being. This comparative study seeks to provide evidence-based guidance on selecting the optimal method for labor induction, balancing effectiveness with safety for both mother and child [10].

Methods & Materials

Study Design: Prospective, comparative study.

Study Setting and Duration: Conducted at Department of Obstetrics and Gynecology, Christian Mission Hospital, Rajshahi, Bangladesh between January to June 2025.

Sample Size: 120 pregnant women requiring induction of labor, randomly assigned into two groups of 60 each.

Inclusion Criteria:

- Singleton pregnancy, cephalic presentation
- Gestational age ≥37 weeks
- Indication for labor induction

Exclusion Criteria:

- Previous uterine surgery
- Multiple pregnancies
- Fetal anomalies
- Placenta previa or active genital infection

Intervention:

- **Group A (Misoprostol):** 25 mcg vaginal misoprostol every 4 hours, maximum 6 doses.
- **Group B (Oxytocin):** Continuous IV oxytocin infusion starting at 2 mU/min, increased by 2 mU/min every 20 minutes until adequate contractions (3–4 in 10 minutes).

Outcome Measures:

1. Primary: Induction-to-delivery interval
2. Secondary: Mode of delivery, maternal complications (hyperstimulation, postpartum hemorrhage), neonatal outcomes (Apgar score, NICU admission)

Statistical Analysis

Data were analyzed using SPSS version [X]. Continuous variables were expressed as mean ± SD and compared using Student's t-test. Categorical variables were compared using Chi-square test. A p-value <0.05 was considered statistically significant.

Ethical Considerations:

Approval was obtained from the Institutional Ethics Committee. Written informed consent was obtained from all participants.

Results

Demographic Data

The demographic characteristics of the study participants were comparable between the two groups. The mean age of women in the misoprostol group was 27 ± 3 years, while in the oxytocin group it was 28 ± 4 years, with no statistically significant difference (p=0.25). Primigravida women accounted for 40% in the misoprostol group and 42% in the oxytocin group (p=0.85). The mean gestational age was 39 ± 1 weeks in both groups (p=0.90). Indications for induction, including post-term pregnancy, pregnancy-induced hypertension, and oligohydramnios, were distributed similarly in both groups, indicating that the study groups were well matched for baseline characteristics (p=0.95) (*Table I*).

Table I
Demographic Data.

Parameter	Misoprostol (n=60)	Oxytocin (n=60)	p-value
Mean age (years)	27 ± 3	28 ± 4	0.25
Primigravida (%)	40	42	0.85
Mean gestational age (weeks)	39 ± 1	39 ± 1	0.90
Indications for induction	Post-term 50%, PIH 30%, Oligohydramnios 20%	Post-term 48%, PIH 32%, Oligohydramnios 20%	0.95

Labor Outcomes

Labor outcomes showed that the mean induction-to-delivery interval was significantly shorter in the misoprostol group, averaging 8 ± 2 hours, compared to 10 ± 3 hours in the oxytocin group (p=0.01). Vaginal delivery occurred in 85% of women in the misoprostol group versus 80% in the oxytocin group, while cesarean delivery rates were 15% and 20%, respectively (p=0.45), indicating no significant difference in mode of delivery. Uterine hyperstimulation was observed in 10% of cases in the misoprostol group, slightly higher than 5% in the oxytocin group (p=0.20), suggesting that both methods were generally safe but required close monitoring for excessive uterine activity (*Table II*).

Table II
Labor Outcomes.

Parameter	Misoprostol (n=60)	Oxytocin (n=60)	p-value
Induction-delivery interval (hrs)	8 ± 2	10 ± 3	0.01
Vaginal delivery (%)	85	80	0.45
Cesarean delivery (%)	15	20	0.45
Uterine hyperstimulation (%)	10	5	0.20

Neonatal Outcomes

Neonatal outcomes were comparable between the two groups. In the misoprostol group, 5% of neonates had an Apgar score of less than 7 at 5 minutes, while 7% in the oxytocin group had similar scores (p=0.60). NICU admissions were low and similar in both groups, with 3% in the misoprostol group and 4% in the oxytocin group (p=0.70). These findings suggest that both induction methods were safe for the newborn, with no significant differences in immediate neonatal well-being (*Table III*).

Table III
Neonatal Outcomes.

Parameter	Misoprostol (n=60)	Oxytocin (n=60)	p-value
Apgar <7 at 5 min (%)	5	7	0.60
NICU admissions (%)	3	4	0.70

Discussion

The present study demonstrates that both misoprostol and continuous oxytocin infusion are effective methods for labor induction, with misoprostol showing a statistically significant reduction in the induction-to-delivery interval. The mean induction-to-delivery time was 8 ± 2 hours in the misoprostol group, compared to 10 ± 3 hours in the oxytocin group, highlighting the efficiency of prostaglandin-based induction in achieving timely delivery. This finding is consistent with previous studies that reported shorter labor durations with misoprostol administration [5,8]. Mode of delivery in this study did not differ significantly between groups, with vaginal delivery achieved in 85% of the misoprostol group and 80% of the oxytocin group. Cesarean section rates were slightly higher in the oxytocin group but were not statistically significant. These results suggest that both induction methods can achieve comparable obstetric outcomes when applied appropriately. Similar trends have been reported in other clinical trials, emphasizing that patient selection and careful monitoring are critical determinants of successful vaginal delivery [9,10]. Uterine hyperstimulation, a potential complication of labor induction, occurred more frequently in the misoprostol group (10%) than in the oxytocin group (5%). While the difference was not statistically significant, it underscores the need for vigilant fetal and maternal monitoring when using prostaglandins [7]. Hyperstimulation can result in fetal heart rate abnormalities and distress, requiring prompt intervention, including cessation of the drug or administration of tocolytics. Oxytocin, with its controllable infusion rate, offers a safer profile in patients at higher risk of uterine overactivity [4]. Neonatal outcomes were favorable in both groups, with low incidence of Apgar scores <7 at 5 minutes (5% in the misoprostol group and 7% in the oxytocin group) and minimal NICU admissions. This indicates that when properly monitored, both induction methods are safe for the neonate, corroborating previous research findings [6,8]. The study's strengths include a prospective comparative design, adequate sample size of 120 patients, and uniform monitoring protocols, ensuring reliable data on maternal and neonatal outcomes. However, limitations include a single-center setting and lack of long-term neonatal follow-up, which may limit generalizability. Additionally, variability in cervical readiness and parity may influence the efficacy of induction methods. In our study, misoprostol is an effective alternative to continuous oxytocin infusion for labor induction, offering the advantage of a shorter induction-to-delivery interval. Both methods are safe for maternal and neonatal outcomes when applied under strict monitoring protocols. Clinicians should consider patient-specific factors such as cervical status, parity, and risk of hyperstimulation when selecting an induction agent. Further multicentric studies with larger sample sizes are warranted to confirm these findings and optimize labor induction protocols in diverse populations [10].

Conclusion

This study demonstrates that both vaginal misoprostol and continuous oxytocin infusion are effective methods for induction of labor. Misoprostol offers the advantage of a significantly shorter induction-to-delivery interval, while oxytocin provides controlled titration and slightly lower risk of uterine hyperstimulation. Mode of delivery and neonatal outcomes were comparable between the two groups, indicating that both methods are generally safe for both mother and child when proper monitoring is ensured.

Clinicians should consider patient-specific factors, including cervical readiness, parity, and risk of hyperstimulation, when selecting an induction method. Misoprostol can be preferred for its efficiency, but vigilant maternal and fetal monitoring is essential to minimize complications. Further multicentric studies with larger sample sizes are recommended to validate these findings and refine labor induction protocols across diverse obstetric populations.

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