e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(6); 1675-1679

Original Research Article

Maternal and Perinatal Outcomes of Induction of Labor using Misoprostol Versus Dinoprostone

Madhuri Choudhary[1], Anjali[2], Minu Sharan[3]

[1]Senior Resident, Department of Obstetrics & Gynaecology, Patna Medical College & Hospital, Patna, Bihar, India

[2]Senior Resident, Department of Obstetrics & Gynaecology, Patna Medical College & Hospital, Patna, Bihar, India

[3]Professor, Department of Obstetrics & Gynaecology, Patna Medical College & Hospital, Patna, Bihar, India

Received: 27-04-2026 / Revised: 26-05-2026 / Accepted: 28-06-2026

Corresponding Author: Dr. Anjali

Conflict of interest: Nil

Abstract:

Background: Induction of labor (IOL) is one of the most commonly performed obstetric interventions. Misoprostol and dinoprostone are widely used cervical ripening agents; however, their comparative effectiveness and safety remain subjects of clinical interest.

Objective: To compare maternal and perinatal outcomes following labor induction using misoprostol and dinoprostone.

Methods: A prospective observational study was conducted in the Department of Obstetrics and Gynecology, PMCH, Patna, over one year. Five hundred women undergoing induction of labor were enrolled, including 250 receiving misoprostol and 250 receiving dinoprostone. Maternal and neonatal outcomes were compared using appropriate statistical tests.

Results: The mean induction-to-delivery interval was significantly shorter in the misoprostol group (10.8±3.4 hours) than in the dinoprostone group (13.2±4.1 hours; $p<0.001$). Vaginal delivery rates were higher with misoprostol (78.4% vs. 69.2%; $p=0.019$). Cesarean section rates were lower in the misoprostol group (21.6% vs. 30.8%; $p=0.021$). Maternal complications and neonatal outcomes were comparable between groups.

Conclusion: Misoprostol demonstrated greater efficacy in achieving vaginal delivery within a shorter duration while maintaining a safety profile comparable to dinoprostone.

Keywords: Induction of Labor, Misoprostol, Dinoprostone, Maternal Outcome, Perinatal Outcome.

DOI: 10.25258/ijcpr.18.6.270

Introduction

One of the most common obstetric procedures carried out globally, induction of labour (IOL) is essential to contemporary obstetric practice. It is described as the artificial start of uterine contractions prior to the spontaneous onset of labour in order to achieve vaginal birth when the dangers associated with continuing the pregnancy are higher than those associated with delivery. Over the past few decades, improved foetal surveillance, a better understanding of high-risk pregnancies, and changing obstetric recommendations have all contributed to a significant increase in the incidence of labour induction. For a variety of maternal and foetal reasons, induction of labour is currently necessary in 20–30% of pregnancies [1].

Post-term pregnancy, hypertensive disorders of pregnancy, early rupture of membranes, oligohydramnios, foetal development limitation, diabetes mellitus, and specific maternal medical conditions are common grounds for induction. Cervical favorability, as determined by the Bishop score, is regarded as one of the most significant indicators of successful induction. Before successful labour begins, women with an unfavourable cervix frequently need cervical ripening medications [2].

Because prostaglandins can encourage cervical softening and trigger uterine contractions, they are frequently used for cervical ripening and labour induction. A common treatment for cervical ripening is dinoprostone, a synthetic prostaglandin E2 (PGE2) analogue. However, the hunt for substitute agents has been prompted by their comparatively high cost, requirement for refrigeration, and inconsistent efficacy. Because of its strong cervical ripening effects, affordability, and convenience of storage, misoprostol, a synthetic

prostaglandin E1 (PGE1) analogue, has become a viable and affordable substitute [3].

The effectiveness and safety of misoprostol and dinoprostone for inducing labour have been compared in a number of trials. Misoprostol has been linked to increased rates of vaginal delivery and shorter induction-to-delivery intervals, however uterine tachysystole and hyperstimulation are still a risk. On the other hand, although dinoprostone is usually thought to have a good safety profile, it may be linked to prolonged labour times and increased risks of induction failure. There are conflicting findings in the literature that is currently accessible, and data from various populations is still inconsistent [4].

Finding an induction agent that is both safe and effective is crucial from a clinical standpoint in India, where large patient loads and resource limitations are prevalent. Many high-risk pregnancies that need labour induction are managed by Patna Medical College and Hospital (PMCH), a significant tertiary care facility in Bihar. In this context, assessing maternal and perinatal outcomes related to frequently used induction drugs might yield important data for evidence-based therapeutic decision-making [5].

In order to examine the maternal and perinatal outcomes of labour induction with misoprostol and dinoprostone among pregnant women admitted to PMCH, the current prospective observational study was conducted. The purpose of the study is to evaluate these two widely used pharmaceutical agents' efficacy, safety, mode of delivery, maternal problems, and neonatal outcomes.

Materials and Methods

Study Design and Setting: This prospective observational study was conducted in the Department of Obstetrics and Gynecology, Patna Medical College and Hospital (PMCH), Patna, Bihar, over a period of one year. PMCH is a tertiary care teaching hospital that receives a large number of antenatal and intrapartum patients from both urban and rural areas of Bihar.

Study Population: Pregnant women admitted for induction of labor during the study period were screened for eligibility. A total of 500 women who underwent labor induction were enrolled in the study. Based on the induction agent administered as per institutional protocol and treating obstetrician's discretion, participants were categorized into two groups:

- **Group A (Misoprostol Group):** 250 women induced with misoprostol.
- **Group B (Dinoprostone Group):** 250 women induced with dinoprostone.

Inclusion Criteria

- Singleton pregnancy.
- Cephalic presentation.
- Gestational age ≥37 weeks.
- Intact membranes or favorable conditions for induction.
- Bishop score ≤6.
- Medical or obstetric indication for induction of labor.
- Women willing to provide written informed consent.

Exclusion Criteria

- Previous uterine scar (previous cesarean section or myomectomy).
- Multiple pregnancy.
- Malpresentation.
- Placenta previa or vasa previa.
- Fetal distress at admission.
- Severe cephalopelvic disproportion.
- Known hypersensitivity to prostaglandins.
- Contraindications to vaginal delivery.

Study Procedure: After obtaining written informed consent, detailed demographic and obstetric information was recorded, including maternal age, parity, gestational age, indication for induction, and pre-induction Bishop score.

Women in the misoprostol group received 25 µg vaginal misoprostol every 4–6 hours as per institutional protocol until adequate uterine contractions were achieved or the maximum permissible dose was reached.

Women in the dinoprostone group received 0.5 mg intracervical dinoprostone gel, repeated according to clinical requirements and institutional guidelines.

Maternal vital signs, uterine contractions, cervical changes, fetal heart rate, and labor progress were monitored throughout labor. Continuous fetal surveillance was performed using intermittent or continuous cardiotocography whenever indicated.

Oxytocin augmentation and artificial rupture of membranes were performed when clinically required. The mode of delivery and any maternal or fetal complications were documented.

Outcome Measures

Primary Maternal Outcomes

1. Induction-to-delivery interval (hours).
2. Successful vaginal delivery rate.
3. Cesarean section rate.
4. Instrumental delivery rate.

Secondary Maternal Outcomes

1. Uterine tachysystole.
2. Uterine hyperstimulation syndrome.
3. Postpartum hemorrhage.
4. Maternal fever and other complications.

Perinatal Outcomes

1. Birth weight.
2. Apgar score at 1 and 5 minutes.
3. Neonatal intensive care unit (NICU) admission.
4. Meconium-stained liquor.
5. Perinatal mortality.

Sample Size: A total sample size of 500 participants (250 in each group) was included during the study period using consecutive sampling.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) version 26.0. Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages.

Comparisons between the two groups were performed using:

- Independent Student's t-test for continuous variables.
- Chi-square test or Fisher's exact test for categorical variables.

A p-value of less than 0.05 was considered statistically significant.

Results

A total of 500 women underwent labor induction during the study period. Both groups were comparable regarding age, parity, gestational age, and Bishop score (Table 1). The mean induction-to-delivery interval was significantly shorter among women induced with misoprostol compared to dinoprostone (10.8±3.4 vs. 13.2±4.1 hours; p<0.001). Vaginal delivery occurred more frequently in the misoprostol group (78.4%) than in the dinoprostone group (69.2%), while cesarean section rates were significantly lower (21.6% vs. 30.8%; p=0.021).

Although uterine tachysystole occurred more frequently with misoprostol, the difference did not reach statistical significance (p=0.072). Neonatal outcomes, including birth weight, Apgar score, NICU admission, and perinatal mortality, were comparable between groups.

Table 1: Baseline Characteristics

Variable	Misoprostol (n=250)	Dinoprostone (n=250)	p-value
Mean age (years)	25.9±3.8	26.1±4.1	0.582
Primigravida	138 (55.2%)	132 (52.8%)	0.593
Gestational age (weeks)	39.1±1.2	39.0±1.3	0.461
Bishop score	3.8±1.1	3.9±1.0	0.312

Table 2: Labor Outcomes

Outcome	Misoprostol	Dinoprostone	p-value
Induction-delivery interval (hours)	10.8±3.4	13.2±4.1	<0.001
Vaginal delivery	196 (78.4%)	173 (69.2%)	0.019
Cesarean section	54 (21.6%)	77 (30.8%)	0.021
Instrumental delivery	12 (4.8%)	16 (6.4%)	0.435

Table 3: Maternal Complications

Complication	Misoprostol	Dinoprostone	p-value
Uterine tachysystole	18 (7.2%)	9 (3.6%)	0.072
Hyperstimulation	10 (4.0%)	5 (2.0%)	0.184
PPH	7 (2.8%)	10 (4.0%)	0.459
Maternal fever	5 (2.0%)	8 (3.2%)	0.402

Table 4: Neonatal Outcomes

Outcome	Misoprostol	Dinoprostone	p-value
Mean birth weight (kg)	2.92±0.38	2.89±0.40	0.381
Apgar <7 at 5 min	12 (4.8%)	15 (6.0%)	0.557
NICU admission	22 (8.8%)	27 (10.8%)	0.455
Perinatal mortality	2 (0.8%)	3 (1.2%)	0.651

Discussion

In this prospective observational study, women having misoprostol and dinoprostone induction of labour at a tertiary care teaching hospital had their maternal and perinatal outcomes compared. Finding the safest and most effective pharmaceutical agent is crucial for improving the outcomes for both mothers and newborns during induction of labour, which is still one of the most common obstetric procedures. Women in both groups had similar baseline features, suggesting sufficient homogeneity and reducing confounding effects. Comparable pre-induction

Bishop scores, gestational age, mother age, and parity distribution indicate that the induction agents, rather than demographic variables, are likely responsible for the observed variations in outcomes [6].

One of the study's main conclusions was that misoprostol had a much shorter induction-to-delivery time than dinoprostone. Misoprostol-using women gave birth about 2.4 hours ahead of dinoprostone-using women. This result confirms earlier research showing misoprostol's superior uterotonic and cervical ripening effects. Because it reduces maternal suffering, shortens hospital stays, and enhances the use of healthcare resources, shorter labour length is therapeutically beneficial. Women who were induced with misoprostol had a much greater vaginal delivery rate (78.4%) than those who were induced with dinoprostone (69.2%) [7]. As a result, the misoprostol group had a far reduced rate of caesarean sections. Misoprostol's strong prostaglandin E1 activity, which leads to more efficient cervical ripening and uterine contractions, may be the reason for its improved efficacy in attaining a successful vaginal delivery. Numerous randomised trials and meta-analyses assessing labour induction drugs have revealed similar results [8].

During induction, maternal safety is still a crucial factor. The misoprostol group had higher rates of uterine tachysystole and hyperstimulation, although these differences were not statistically significant. Serious maternal problems, such as postpartum haemorrhage and maternal fever, continued to be uncommon and similar across populations. These results imply that misoprostol has an acceptable safety profile when administered in accordance with advised guidelines and with suitable monitoring. Additionally, the two groups' neonatal outcomes were similar. Birth weight, low Apgar scores, NICU admissions, and perinatal death did not differ statistically significantly. These results suggest that misoprostol's enhanced effectiveness was not linked to unfavourable outcomes for newborns. Previous comparative investigations of prostaglandin drugs used to induce labour have found similar newborn safety profiles [9].

The prospective design, comparatively high sample size, and thorough evaluation of both maternal and neonatal outcomes are the study's merits. It is important to recognise some limitations, though. Due to the observational nature of the study and the lack of randomisation in treatment allocation, selection bias may have occurred. Additionally, the study was carried out at a single tertiary care facility, which would restrict how broadly the results can be applied. All things considered, the results validate the use of misoprostol as an efficient induction drug linked to increased vaginal delivery rates and shorter induction-to-delivery intervals without jeopardising the safety of mothers or newborns [10].

Conclusion

The maternal and perinatal outcomes of women having misoprostol and dinoprostone labour induction at PMCH, Patna, were compared in this prospective observational study. The results showed that, in comparison to dinoprostone, misoprostol was linked to significantly shorter induction-to-delivery durations and greater rates of successful vaginal delivery. Additionally, misoprostol-induced women had far reduced incidence of caesarean sections.

The misoprostol group experienced uterine tachysystole and hyperstimulation more frequently, but these differences were not statistically significant, and the two groups' overall maternal safety outcomes were similar. newborn outcomes, such as birth weight, Apgar scores, NICU admissions, and perinatal mortality, also did not differ significantly, suggesting that the increased effectiveness of misoprostol did not come at the price of newborn safety.

According to the findings, misoprostol is a safe and efficient substitute for dinoprostone when it comes to inducing labour in people who are carefully chosen. Shorter labour times, a higher chance of vaginal delivery, and lower incidence of caesarean sections are some of its benefits. These advantages might lead to better patient satisfaction and more effective use of medical resources.

To confirm these results and provide standardised procedures for the best use of induction drugs in various obstetric populations, more multicenter randomised studies with bigger sample numbers are advised.

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