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Dinoprostone is More Effective than Misoprostol in Induction of Vaginal Delivery

Kazi Farhana Begum[1*], Mehera Parveen[2], Nigar Sultana[3], Hasna Hena Pervin[4], Humaira Alam[5]

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*Corresponding Author

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ABSTRACT

Background: *Induction of labour is frequently performed to reduce maternal and neonatal complications when continuation of pregnancy poses risk. Prostaglandins are widely used for cervical ripening and labour induction. Dinoprostone and misoprostol are commonly used pharmacological agents, but comparative evidence regarding their effectiveness and safety remains inconsistent.* ***Objective:*** *This study aimed to compare the effectiveness and safety of dinoprostone and misoprostol for induction of labour in term pregnancy.* ***Methods & Materials:*** *This randomized controlled trial was conducted at the Department of Obstetrics and Gynecology, Bangladesh Medical University, Dhaka, Bangladesh, from December 2024 to December 2025. A total of 250 term pregnant women requiring labour induction were randomly assigned into dinoprostone group (n=125) and misoprostol group (n=125). Primary outcomes included induction to active labour interval, induction to delivery interval, Bishop score improvement and vaginal delivery within 24 hours. Maternal and neonatal outcomes were also evaluated. Statistical analysis was performed using SPSS version 25.0.* ***Results:*** *Dinoprostone showed significantly shorter induction to active labour interval (11.8±4.1 vs 13.2±4.6 hours; p=0.01) and shorter induction to delivery interval (17.4±5.8 vs 19.6±6.2 hours; p=0.003). Bishop score improvement was significantly higher with dinoprostone (7.9±1.8 vs 6.8±1.9; p<0.001). Vaginal delivery within 24 hours was higher in the dinoprostone group (74.4% vs 64.0%; p=0.048). Uterine tachysystole was significantly lower in the dinoprostone group (8.8% vs 20.8%; p=0.006). Other maternal and neonatal outcomes were comparable.* ***Conclusion:*** *Dinoprostone is more effective than misoprostol for induction of labour, with better cervical ripening, shorter labour duration and lower uterine tachysystole.*

Keywords: *Labour induction, Dinoprostone, Misoprostol*

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1. *Associate Professor, Department of Obstetrics and Gynaecology, Bangladesh Medical University, Dhaka, Bangladesh (ORCID: 0009-0001-4516-5592)*
2. *Associate Professor, Department of Obstetrics and Gynaecology, Bangladesh Medical University, Dhaka, Bangladesh (ORCID: 0009-0002-5696-4370)*
3. *Associate Professor, Department of Obstetrics and Gynaecology, Bangladesh Medical University, Dhaka, Bangladesh (ORCID: 0009-0003-5076-1529)*
4. *Associate Professor, Department of Obstetrics and Gynaecology, Bangladesh Medical University, Dhaka, Bangladesh (ORCID: 0009-0005-2151-3125)*
5. *Assistant Professor, Department of Reproductive Endocrinology and Infertility, Bangladesh Medical University, Dhaka, Bangladesh (ORCID: 0009-0007-7532-7154)*

INTRODUCTION

Induction of labour is a common obstetric intervention performed when the benefits of delivery outweigh the risks of continuing pregnancy. It is estimated that approximately 20–30% of pregnancies worldwide require labour induction for maternal or fetal indications such as postdated pregnancy, premature rupture of membranes, hypertensive disorders and oligohydramnios [1,2]. The success of labour induction largely depends on cervical readiness, often assessed using the Bishop score, which predicts the likelihood of vaginal delivery following induction [3].

Prostaglandins play a central role in cervical ripening and initiation of uterine contractions. Among available pharmacological agents, dinoprostone (prostaglandin E2) and misoprostol (prostaglandin E1 analogue) are widely used for the induction of labour due to their effectiveness in promoting cervical softening, effacement and uterine contractility [4]. Dinoprostone has been extensively studied and recommended in several clinical guidelines because of its controlled pharmacological effect and favorable safety profile [2,5]. Misoprostol, originally developed for the prevention of gastric ulcers, has gained popularity in obstetrics due to its low cost, stability at room temperature and ease of administration [6].

Previous studies have demonstrated varying results regarding the comparative effectiveness of misoprostol and dinoprostone for the induction of labour. Some studies have reported shorter induction to delivery intervals and higher vaginal delivery rates with misoprostol, whereas others suggest a better safety profile and lower uterine hyperstimulation with dinoprostone [7,8]. A systematic review by Sanchez-Ramos et al. found that misoprostol was associated with effective cervical ripening but carried a higher risk of uterine tachysystole compared with dinoprostone [9]. Similarly, Crane et al. reported comparable efficacy between both agents but highlighted differences in safety outcomes [10].

Recent randomized controlled trials have compared oral and vaginal formulations of misoprostol with dinoprostone for labour induction. Rouzi et al. demonstrated similar effectiveness between hourly titrated oral misoprostol and vaginal dinoprostone in achieving vaginal delivery [11]. Wang

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et al. reported that both agents were effective, although misoprostol showed a higher incidence of uterine hyperstimulation [12]. A meta-analysis by Alfirevic et al. concluded that prostaglandins remain effective pharmacological agents for labour induction, but the optimal agent with the best balance of safety and efficacy remains uncertain [13].

Despite the availability of international evidence, data comparing dinoprostone and misoprostol within the Bangladeshi population remain limited. Variations in patient characteristics, clinical protocols and healthcare settings may influence induction outcomes. Therefore, locally generated evidence is important for guiding clinical practice and improving maternal and neonatal outcomes. Understanding the comparative effectiveness of these agents may assist clinicians in selecting the most appropriate induction method based on safety and efficacy profiles.

This study aimed to compare the effectiveness and safety of dinoprostone and misoprostol for the induction of labour among term pregnant women. The study evaluated induction duration, cervical ripening outcomes, mode of delivery and maternal and neonatal complications. The findings of this study may contribute to evidence-based clinical decision-making and optimize obstetric care in tertiary healthcare settings.

OBJECTIVES

The objective of this study was to compare the effectiveness and safety of dinoprostone and misoprostol for induction of labour in term pregnancy.

METHODS & MATERIALS

This randomized controlled trial was conducted at the Department of Obstetrics and Gynecology, Bangladesh Medical University (BMU), Dhaka, Bangladesh, from December 2024 to December 2025. The study population consisted of 250 pregnant women requiring induction of labour at term. Participants were randomly allocated into two equal groups: 125 women received dinoprostone and 125 women received misoprostol for cervical ripening and induction of labour.

Patients Selection

Inclusion criteria

- Singleton pregnancy at term (37–41 weeks)
- Cephalic presentation
- Bishop score ≤5 at admission
- Indication for labour induction
- Age 18–40 years
- Intact uterus
- Reactive fetal heart rate pattern
- Willingness to participate

Exclusion criteria

- Previous cesarean section or uterine scar
- Multiple pregnancy
- Placenta previa
- Cephalopelvic disproportion
- Fetal distress at admission
- Severe maternal systemic disease
- Intrauterine fetal demise
- Malpresentation
- Chorioamnionitis

Data Collection Procedure

After admission, detailed clinical history, obstetric examination and baseline investigations were recorded using a structured data collection sheet. Eligible participants were randomly assigned into dinoprostone and misoprostol groups using a computer-generated randomization method. Baseline demographic characteristics including maternal age, parity, gestational age, Bishop score and indication for induction were documented. Cervical assessment was performed using the Bishop scoring system by trained obstetricians to maintain consistency.

Participants in the dinoprostone group received prostaglandin E2 preparation as per institutional protocol, while the misoprostol group received prostaglandin E1 preparation in standard recommended dosage. Progress of labour was monitored using partograph. Fetal heart rate monitoring was performed at regular intervals to ensure fetal wellbeing. Maternal vital signs and uterine contraction patterns were assessed periodically to detect complications such as tachysystole or hyperstimulation. If adequate uterine contractions were not achieved, oxytocin augmentation was administered according to clinical protocol.

Time intervals from induction to active labour and delivery were recorded. Mode of delivery, requirement of assisted vaginal delivery, cesarean section and indications for operative delivery were documented. Maternal outcomes including postpartum hemorrhage and uterine tachysystole were recorded. Neonatal outcomes including birth weight, Apgar score at 5 minutes, NICU admission and neonatal complications were assessed immediately after delivery. All collected data were coded to maintain confidentiality and were stored securely to ensure data protection and participant privacy.

Statistical Analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 25.0. Continuous variables were expressed as mean ± standard deviation and compared using independent sample t-test. Categorical variables were expressed as frequency and percentage and compared using chi-square test or Fisher's exact test. A p-value less than 0.05 was considered statistically significant.

RESULTS

Table I shows the baseline maternal characteristics of study participants. The mean age was similar between the dinoprostone group (26.8 ± 4.3 years) and misoprostol group (27.1 ± 4.6 years), with no statistically significant difference (p=0.61). Most participants were aged 25–30 years in both groups. Primigravida constituted 58.4% in the dinoprostone group and 60.8% in the misoprostol group (p=0.68). Mean gestational age was comparable (39.2 ± 1.1 vs 39.4 ± 1.0 weeks; p=0.29). Baseline Bishop scores were similar between groups (3.1 ± 0.9 vs 3.0 ± 1.0; p=0.48). Indications for induction including postdated pregnancy, PROM, gestational hypertension and oligohydramnios were evenly distributed without significant difference (p=0.82).

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Table I: Baseline Maternal Characteristics of the Study Participants (*n*=100)

Variable		Dinoprostone (n=125) n (%)	Misoprostol (n=125) n (%)	p-value
Age group (years)	<25	38 (30.4)	35 (28.0)	0.74
	25–30	56 (44.8)	59 (47.2)	
	>30	31 (24.8)	31 (24.8)	
	Mean ± SD	26.8 ± 4.3	27.1 ± 4.6	0.61
Parity	Primigravida	73 (58.4)	76 (60.8)	0.68
	Multigravida	52 (41.6)	49 (39.2)	
Gestational age (weeks)		39.2 ± 1.1	39.4 ± 1.0	0.29
Bishop score at admission		3.1 ± 0.9	3.0 ± 1.0	0.48
Indication for induction	Postdated pregnancy	47 (37.6)	44 (35.2)	0.82
	PROM	29 (23.2)	32 (25.6)	
	Gestational hypertension	26 (20.8)	24 (19.2)	
	Oligohydramnios	23 (18.4)	25 (20.0)	

Table II presents labour induction outcomes. The mean induction to active labour interval was significantly shorter in the dinoprostone group (11.8 ± 4.1 hours) compared with the misoprostol group (13.2 ± 4.6 hours; p=0.01). Mean induction to delivery interval was also shorter with dinoprostone (17.4 ± 5.8 hours vs 19.6 ± 6.2 hours; p=0.003). Bishop score after 12 hours was significantly higher in the dinoprostone group (7.9 ± 1.8 vs 6.8 ± 1.9; p<0.001). Vaginal delivery within 24 hours occurred more frequently in the dinoprostone group (74.4% vs 64.0%; p=0.048). Requirement for oxytocin augmentation was significantly lower with dinoprostone (30.4% vs 47.2%; p=0.006). Failed induction was observed in 8.8% of the dinoprostone group and 14.4% of the misoprostol group (p=0.16).

Table II: Labour Induction Outcomes (Primary Efficacy Outcomes)

Outcome	Dinoprostone (n=125)	Misoprostol (n=125)	p-value
Mean induction to active labour interval (hours)	11.8 ± 4.1	13.2 ± 4.6	0.01
Mean induction to delivery interval (hours)	17.4 ± 5.8	19.6 ± 6.2	0.003
Mean Bishop score after 12 hours	7.9 ± 1.8	6.8 ± 1.9	<0.001
Vaginal delivery within 24 hrs	93 (74.4%)	80 (64.0%)	0.048
Need for oxytocin augmentation	38 (30.4%)	59 (47.2%)	0.006
Failed induction	11 (8.8%)	18 (14.4%)	0.16

Table III describes mode of delivery outcomes. Normal vaginal delivery was significantly higher in the dinoprostone group (76.0%) compared with the misoprostol group (65.6%; p=0.04). Assisted vaginal delivery rates were comparable (9.6% vs 11.2%; p=0.68). Cesarean section rate was lower in the dinoprostone group (14.4%) than in the misoprostol group (23.2%; p=0.048). Fetal distress was the most common indication for cesarean section in both groups.

Table III: Mode of Delivery

Mode of delivery	Dinoprostone (n=125) n (%)	Misoprostol (n=125) n (%)	p-value
Normal vaginal delivery	95 (76.0)	82 (65.6)	0.04
Assisted vaginal delivery	12 (9.6)	14 (11.2)	0.68
Cesarean section	18 (14.4)	29 (23.2)	0.048
Indication for CS			
Fetal distress	9 (7.2)	17 (13.6)	0.08
Failed induction	5 (4.0)	8 (6.4)	0.39
Non-progress of labour	4 (3.2)	4 (3.2)	1

Table IV presents maternal and neonatal outcomes. Uterine tachysystole was significantly lower in the dinoprostone group (8.8%) compared with the misoprostol group (20.8%; p=0.006). Rates of postpartum hemorrhage, meconium-stained liquor, NICU admission, Apgar score less than 7 at 5 minutes, neonatal complications and mean birth weight were comparable between groups, with no statistically significant differences (p>0.05).

Table IV: Maternal and Neonatal Outcomes

Outcome	Dinoprostone (n=125) n (%)	Misoprostol (n=125) n (%)	p-value
Uterine tachysystole	11 (8.8)	26 (20.8)	0.006
Postpartum hemorrhage	7 (5.6)	9 (7.2)	0.6
Meconium-stained liquor	14 (11.2)	19 (15.2)	0.35
NICU admission	10 (8.0)	13 (10.4)	0.51
Apgar score <7 at 5 min	6 (4.8)	8 (6.4)	0.58
Mean birth weight (kg)	2.94 ± 0.41	2.91 ± 0.39	0.63
Neonatal complications	9 (7.2)	11 (8.8)	0.64

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DISCUSSION

The present randomized controlled trial compared the effectiveness and safety of dinoprostone and misoprostol for the induction of labour among term pregnant women. The findings demonstrated that dinoprostone was associated with shorter induction to active labour interval, shorter induction to delivery interval, improved Bishop score after 12 hours, higher rate of vaginal delivery within 24 hours and lower requirement for oxytocin augmentation compared with misoprostol. Additionally, the incidence of uterine tachysystole was significantly lower in the dinoprostone group, suggesting a favorable safety profile.

The baseline maternal characteristics were comparable between both groups, indicating that differences in outcomes were likely related to the pharmacological effects of the induction agents rather than confounding factors. Similar findings were reported by Papanikolaou et al., who observed no significant baseline differences between misoprostol and dinoprostone groups in a randomized prospective study [14]. Comparable demographic distribution has also been described in other clinical trials evaluating prostaglandins for labour induction [15].

The shorter induction to active labour and delivery intervals observed with dinoprostone in this study are consistent with findings reported by Mlodawski et al., who demonstrated improved induction outcomes with dinoprostone vaginal insert compared with misoprostol [16]. Similarly, Socha et al. reported higher effectiveness of prostaglandin E2 preparations in achieving cervical ripening within a shorter duration [17]. The improved Bishop score after 12 hours in the dinoprostone group suggests more efficient cervical ripening, which is an important predictor of successful vaginal delivery. Previous studies have shown that prostaglandin E2 has a favorable effect on collagen remodeling and cervical softening [4].

The higher proportion of vaginal delivery within 24 hours in the dinoprostone group is comparable with findings from Gaudineau et al., who reported improved vaginal delivery rates with prostaglandin E2 pessary compared with misoprostol [18]. Similarly, Rankin et al. found higher successful vaginal delivery rates with dinoprostone vaginal insert compared with misoprostol vaginal insert [19]. The lower need for oxytocin augmentation in the dinoprostone group observed in this study indicates adequate uterine contractility achieved with prostaglandin E2. This finding is supported by Barrilleaux et al., who demonstrated reduced need for additional augmentation with dinoprostone compared with other induction agents [20].

The lower cesarean section rate observed with dinoprostone is consistent with findings reported by Veena et al., who demonstrated reduced operative delivery rates among women induced with prostaglandin E2 [21]. Reduced cesarean delivery may reflect improved cervical favourability and effective uterine contractions. Previous systematic reviews have indicated that appropriate cervical ripening agents may reduce cesarean section rates by facilitating the progression of labour [13].

Uterine tachysystole was significantly higher in the misoprostol group in this study. This observation aligns with findings from Hofmeyr et al., who reported increased uterine hyperstimulation associated with misoprostol use [7]. Increased uterine tachysystole may lead to fetal heart rate abnormalities and increased operative delivery rates. Liu et al. also demonstrated a higher incidence of uterine hyperstimulation with misoprostol compared with prostaglandin E2 [22]. Safety concerns related to uterine overstimulation remain an important consideration when selecting pharmacological induction agents.

Maternal outcomes such as postpartum hemorrhage and neonatal outcomes including NICU admission, Apgar score and neonatal complications were comparable between the two groups in this study. Similar findings were reported by Maggi et al., who observed no significant differences in neonatal outcomes between misoprostol and dinoprostone groups [23]. Wang et al. also demonstrated comparable neonatal safety profiles between prostaglandin E1 and prostaglandin E2 agents [12].

Overall, the findings of the present study suggest that dinoprostone may provide more favorable induction outcomes with a lower risk of uterine tachysystole compared with misoprostol. Previous meta-analyses have indicated that while both agents are effective for cervical ripening, dinoprostone demonstrates a more controlled uterotonic effect with fewer adverse uterine contractions [24]. The current findings support the clinical utility of dinoprostone as an effective pharmacological agent for labour induction in term pregnancy.

CONCLUSION

Dinoprostone demonstrated superior effectiveness compared with misoprostol for induction of labour in term pregnancy. It was associated with shorter induction intervals, improved cervical ripening, higher vaginal delivery rate, reduced need for oxytocin augmentation and lower incidence of uterine tachysystole. Maternal and neonatal outcomes were comparable between groups. These findings support the use of dinoprostone as an effective and safe pharmacological agent for labour induction in clinical obstetric practice.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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