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Comparison of Misoprostol and Dinoprostone for Induction of Labour in Full Term Pregnancy

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ABSTRACT

Background: Labor induction is a common obstetrical practice, and a number of agents are effective in facilitating the process. Misoprostol and dinoprostone are two common medications, and their comparative effectiveness regarding labor length and success rate is a subject of continued investigation. **Objective:** To compare the efficacy of misoprostol and dinoprostone for labor induction at term. **Study Design:** Randomized controlled trial. **Duration and Place of Study:** The study was conducted from September 2024 to March 2025 at the Department of Obstetrics and Gynaecology, MTI-D.I. Khan. **Methodology:** 152 pregnant women were randomized into either the dinoprostone (Group B) or misoprostol (Group A) group, with an even split of participants in both groups of 76 each. Inclusion in the study was women presenting between the ages of 18 and 40 years, having a singleton gestation at term (39 weeks of gestation), intact amniotic membrane, and Bishop score ≤6. Induction of labor using either dinoprostone or misoprostol was conducted, and labor duration and success rate of vaginal delivery were noted. **Results:** Misoprostol demonstrated superior performance with a 75.0% success rate, compared to dinoprostone's 47.4% ($p<0.001$). Additionally, labor duration was significantly shorter in the misoprostol group, with an average of 10.66 ± 2.81 hours, compared to 13.84 ± 2.37 hours for dinoprostone. Stratified analysis revealed that misoprostol was particularly more effective in younger patients (≤30 years), as well as in those with fewer previous births and lower socioeconomic status. **Conclusion:** Misoprostol is a more effective and time-efficient agent for labor induction compared to dinoprostone.

INTRODUCTION

Induction of labour describes a medical intervention designed to initiate uterine contractions ahead of spontaneous onset, typically when ongoing pregnancy threatens mother or fetus.[1] It is frequently indicated in post-term pregnancy, fetal growth restriction, maternal conditions such as diabetes, or premature rupture of membranes.[2] The objective of induction is to gain a vaginal delivery with safety by initiating cervical ripening while enabling effective uterine contractions.[3] Success with induction depends upon a variety of variables, among them cervix preparation, type of induction, and general maternal-fetal status.[4] Rigorous assessment and monitoring are paramount in order to minimize complications such as uterine hyperstimulation, fetal distress, or failed induction leading to caesarean section.[5]
There are several methods of inducting full-term pregnancy, usually classified into pharmacological and mechanical methods.[6] Pharmacological agents include prostaglandins to ripen the cervix and oxytocin to cause uterine contractions.[7] Mechanical methods, using a Foley catheter or membrane sweep, physically dilate the cervix.[7] Choice between methods would be made in relation to cervical status, obstetric history, and patient risk factor. Of pharmacological approaches, prostaglandins have become more popular for cervical softening and labour induction.[8] The optimal approach balances efficacy against safety, reducing induction-to-delivery intervals without causing harm.
Misoprostol, a prostaglandin E1 analogue, plays a pivotal role in labour induction by causing uterine contractions while also initiating cervical ripening.[9] It is favored because it can be easily administered, it is affordable, and can be stored at room temperature.[10] It can be administered orally, vaginally, or sublingually, with vaginal route being preferred for labour induction. Misoprostol has been found to effectively reduce the time interval from induction to delivery, with more opportunities for vaginal delivery in a 24-hour window.[11] Its use calls for close dosing and monitoring because a risk for uterine hyperstimulation and fetal distress exists, with

expert clinical care being required to obtain optimal benefits while maintaining maternal-fetal safety.[12]

Dinoprostone, a naturally occurring E2 prostaglandin, remains a widely used drug for induction of labour, principally in full-term gestations with an unfavorable cervix.[13] Dinoprostone's predominant action is cervical dilatation and softening with associated augmentation of contractions to induce labour.[14] Dinoprostone may be administered in vaginal gel, pessary, or insert formulation releasing drug in a controlled gradual manner.[15] Dinoprostone compared with misoprostol possesses a more nuanced safety profile with a lower risk of excessive uterine activity, making it a drug of choice in critical clinical situations.[16] Nevertheless, it may have a longer induction-to-delivery interval, while its added cost and need for storage decreases access in certain circumstances.[17]

A study found that the misoprostol vaginal insert led to a higher rate of vaginal births within both 12 and 24 hours compared to the dinoprostone vaginal insert, with 19.8% vs 8.4% delivering within 12 hours and 54.6% vs 34% within 24 hours ($p<0.001$).[18]

Selective induction of labor at term has increasingly become the focus of interest to optimize methods, among them the use of the pharmacologic agents misoprostol and dinoprostone. Although several international studies have investigated their safety and efficacy, there has been a dearth of local evidence comparing their outcomes in our population. Because there may exist variations in clinical response between populations depending on innate genetic, demographic, and healthcare system factors, this study is critical to provide regional-specific evidence to inform clinical practice and enhance maternal and neonatal care.

METHODOLOGY

This randomized controlled trial was conducted from September 2024 to March 2025 in the Department of Obstetrics and Gynaecology at MTI-D.I. Khan. A total of 152 pregnant women were enrolled, with 76 participants in each arm of the study. The sample size was estimated using the WHO formula, based on a presumed rate of vaginal delivery of 54.6% in the misoprostol group versus 34% in the dinoprostone group,[18] assuming 80% power and a 5% significance level.

Participants were recruited through non-probability consecutive sampling. Eligibility criteria included women between 18 and 40 years of age, carrying a single fetus in a cephalic presentation at 39 completed weeks of gestation, determined by the last menstrual period. All had intact amniotic membranes and a Bishop score of 6 or below, indicating an unripe cervix. Women with contraindications to labour induction or vaginal birth—such as placenta previa, previous classical cesarean section, or active genital herpes—were excluded, along with those presenting with pre-labour rupture of membranes.

Approval was obtained from the institutional ethics committee and CPSP Karachi before initiating the study. Informed consent was secured from all participants, who were then randomly assigned to either Group A (Misoprostol) or Group B (Dinoprostone) using a block randomization method. The assigned agent was inserted vaginally. The induction agent remained in place for a maximum of 24 hours or until the onset of the active phase of labour, defined as regular uterine contractions accompanied by cervical dilation of at least 4 cm.

From the initiation of oxytocin infusion, all participants underwent continuous cardiotocographic monitoring with computerized analysis. If spontaneous labour did not commence, oxytocin was administered using a low-dose escalation protocol. Artificial rupture of membranes was performed when cervical dilation reached 4 to 6 cm. Induction was considered unsuccessful if oxytocin infusion exceeded 12 hours without the onset of active labour. A delivery was categorized as successful if vaginal birth occurred within 12 hours following administration of the induction agent.

All procedures were conducted by the principal investigator under the direct supervision of a senior obstetrician with more than seven years of post-fellowship experience. Baseline and clinical data, including age, gestational age, parity, gravidity, duration of labour, residential status, and socioeconomic background, were recorded using a structured form.

Data were analyzed using SPSS version 23. Continuous variables were summarized using mean and standard deviation. Categorical data were presented as frequencies and percentages. Comparison of successful vaginal deliveries between the two groups was performed using the chi-square test. Stratified analyses were carried out for potential confounders. Post-stratification analysis also employed the chi-square test, with a p-value ≤ 0.05 considered statistically significant.

RESULTS

The study compared 152 patients equally divided between misoprostol (n=76) and dinoprostone (n=76) groups for labor induction. Demographic characteristics were well-matched between groups, with mean ages of 28.99±4.15 years for misoprostol versus 29.13±4.43 years for dinoprostone, identical gestational ages of 39.39±0.20 weeks, and similar gravidity (2.66±1.41 vs 2.95±1.53) and parity (1.66±1.41 vs 1.95±1.53) distributions. Both groups had identical residential distribution with 53.9% rural and 46.1% urban patients, while socioeconomic status showed comparable patterns with poor (30.3% vs 27.6%), middle (53.9% vs 57.9%), and rich (15.8% vs 14.5%) classifications (as shown in Table-I). However, labor duration was significantly shorter with misoprostol at 10.66±2.81 hours compared to dinoprostone at 13.84±2.37 hours (as shown in Table 1).

Table 1

Demographics of the patients (n=152)

Demographics		Group A n=76 Mean±SD	Group B n=76 Mean±SD
Age (years)		28.99±4.15	29.13±4.43
Gestational Age (weeks)		39.39±0.20	39.39±0.20
Duration of Labour (hours)		10.66±2.81	13.84±2.37
Gravidity		2.66±1.41	2.95±1.53
Parity		1.66±1.41	1.95±1.53
Residential Status	Rural n(%)	41 (53.9%)	41 (53.9%)
	Urban n(%)	35 (46.1%)	35 (46.1%)
Socioeconomic Status	Poor n(%)	23 (30.3%)	21 (27.6%)
	Middle n(%)	41 (53.9%)	44 (57.9%)
	Rich n(%)	12 (15.8%)	11 (14.5%)

Overall efficacy analysis demonstrated superior performance of misoprostol with 75.0% success rate compared to dinoprostone's 47.4% (p<0.001), representing a significant clinical advantage (as shown in Table 2).

Table 2

Comparison of efficacy between the two groups (n=152)

Efficacy	Group A n=76	Group B n=76	P value
	n (%)	n (%)	
Yes	57 (75.0%)	36 (47.4%)	
No	19 (25.0%)	40 (52.6%)	<0.001
Total	76 (100%)	76 (100%)	

The study compared 152 patients equally divided between misoprostol (n=76) and dinoprostone (n=76) groups for labor induction. Demographic characteristics were well-matched between groups, with mean ages of 28.99±4.15 years for misoprostol versus 29.13±4.43 years for dinoprostone, identical gestational ages of 39.39±0.20 weeks, and similar gravidity (2.66±1.41 vs 2.95±1.53) and parity (1.66±1.41 vs 1.95±1.53) distributions. Both groups had identical residential distribution with 41 patients (53.9%) rural and 35 patients (46.1%) urban in each group, while socioeconomic status showed comparable patterns with poor patients (23 [30.3%] vs 21 [27.6%]), middle class patients (41 [53.9%] vs 44 [57.9%]), and rich patients (12 [15.8%] vs 11 [14.5%]) (as shown in Table-I). However, labor duration was significantly shorter with misoprostol at 10.66±2.81 hours compared to dinoprostone at 13.84±2.37 hours (as shown in Table-I). Overall efficacy analysis demonstrated superior performance of misoprostol with 57 patients (75.0%) achieving success compared to dinoprostone's 36 patients (47.4%) success rate (p<0.001), while 19 patients (25.0%) failed with misoprostol versus 40 patients (52.6%) with dinoprostone (as shown in Table-II). Stratified analysis revealed that misoprostol's efficacy was particularly pronounced in younger patients (≤30 years) with 50 patients (100%) achieving success versus 34 patients (72.3%) for dinoprostone with 0 failures (0.0%) versus 13 failures (27.7%) respectively (p<0.001), while both drugs showed poor efficacy in patients >30 years with misoprostol achieving 7 successes (26.9%) and 19 failures (73.1%) compared to dinoprostone's 2 successes (6.9%) and 27 failures (93.1%) (p=0.017). Parity analysis showed misoprostol's superiority in patients with ≤2 previous births with 57 successes (85.1%) and 10 failures (14.9%) versus dinoprostone's 36 successes (57.1%) and 27 failures (42.9%) (p=0.002), though both drugs failed completely in higher parity patients with 0 successes (0.0%) and 9 failures (100.0%) for misoprostol versus 0 successes (0.0%) and 13 failures (100.0%) for dinoprostone (p=1.000). Socioeconomic stratification revealed misoprostol's advantage in poor patients with 19 successes (82.6%) and 4 failures (17.4%) versus dinoprostone's 11 successes (52.4%) and 10 failures (47.6%) (p=0.047), and in middle-class patients with 35 successes (85.4%) and 6 failures (14.6%) versus dinoprostone's 22 successes (50.0%) and 22 failures (50.0%) (p<0.001), while both drugs performed poorly in wealthy patients with misoprostol showing 3 successes (25.0%) and 9 failures (75.0%) versus dinoprostone's 3 successes (27.3%) and 8 failures (72.7%) (p=1.000). Geographic analysis showed misoprostol's effectiveness in both rural patients with 26 successes (63.4%) and 15 failures (36.6%) versus dinoprostone's 14 successes (34.1%) and 27 failures (65.9%) (p=0.010), and in urban populations with 31 successes (88.6%) and 4 failures (11.4%) versus dinoprostone's 22 successes (62.9%) and 13 failures (37.1%) (p=0.021), with particularly strong performance in urban settings (as shown in Table 3 and Graph 1).

Table 3

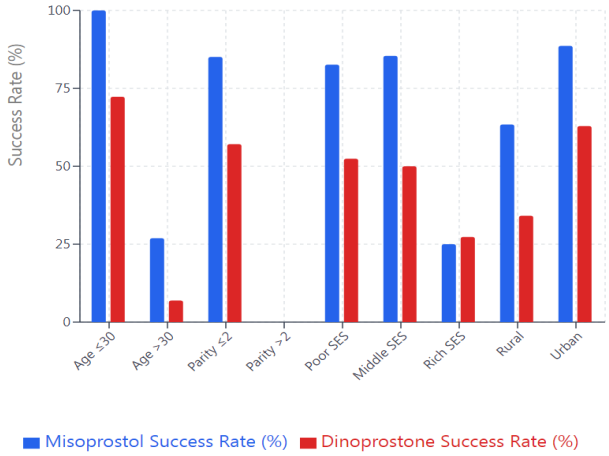
Association of Efficacy with Demographic Variables

Demographics variables		Group	Efficacy		P-value
			Yes (n, %)	No (n, %)	
Age (years)	≤30	A	50 (100.0%)	0 (0.0%)	<0.001*
		B	34 (72.3%)	13 (27.7%)	
	>30	A	7 (26.9%)	19 (73.1%)	0.017*
		B	2 (6.9%)	27 (93.1%)	
Parity	≤2	A	57 (85.1%)	10 (14.9%)	0.002
		B	36 (57.1%)	27 (42.9%)	
	>2	A	0 (0.0%)	9 (100.0%)	1.000*
		B	0 (0.0%)	13 (100.0%)	
Social Class	Poor	A	19 (82.6%)	4 (17.4%)	0.047
		B	11 (52.4%)	10 (47.6%)	
	Middle	A	35 (85.4%)	6 (14.6%)	<0.001
		B	22 (50.0%)	22 (50.0%)	
	Rich	A	3 (25.0%)	9 (75.0%)	1.000*
		B	3 (27.3%)	8 (72.7%)	
Residence	Rural	A	26 (63.4%)	15 (36.6%)	0.010
		B	14 (34.1%)	27 (65.9%)	
	Urban	A	31 (88.6%)	4 (11.4%)	0.021*
		B	22 (62.9%)	13 (37.1%)	

*Fischer Exact Test

Graph 1

Stratification of Efficacy with Demographic Variables



DISCUSSION

This comparative study demonstrated the superior efficacy of misoprostol over dinoprostone for labor induction in term pregnancies, with misoprostol achieving a significantly higher success rate of 75.0% compared to dinoprostone's 47.4% (p<0.001), while also reducing labor duration by approximately 3 hours. The enhanced effectiveness of misoprostol can be attributed to its higher binding affinity for prostaglandin E1 receptors and its dual mechanism of action, promoting both cervical ripening through increased collagenase activity and stronger

uterine contractions via enhanced myometrial sensitivity to oxytocin. The age-related efficacy pattern, where misoprostol achieved 100% success in patients ≤30 years compared to only 26.9% in those >30 years, reflects the physiological decline in prostaglandin receptor density and myometrial responsiveness with advancing maternal age, compounded by increased cervical collagen cross-linking that reduces tissue compliance. The dramatic reduction in efficacy observed in multiparous patients (parity >2) for both medications is explained by uterine muscle fatigue, decreased prostaglandin receptor expression following repeated pregnancies, and structural changes in myometrial architecture that impair coordinated contractions.

The most consistent finding across multiple studies[19-24] and corroborated by our current study is the significantly shorter labor duration with misoprostol compared to dinoprostone. Our study demonstrated labor duration of 10.66±2.81 hours for misoprostol versus 13.84±2.37 hours for dinoprostone, which aligns closely with Akhtar et al.[19] who reported 7±1.75 hours versus 9±1.98 hours respectively. Similarly, Iftikhar et al. [27] found labor duration of 5.5667±1.0063 hours versus 9.4667±1.7167 hours ($p<0.05$), and Mohamed et al.[25] reported induction-to-delivery time of 14.86±12.58 hours versus 33.18±26.44 hours ($p<0.001$). This consistent pattern suggests that misoprostol's pharmacokinetic properties, including faster absorption and more potent uterine stimulation, contribute to accelerated labor progression across diverse populations and settings.

Our study's overall efficacy rate of 75.0% for misoprostol versus 47.4% for dinoprostone ($p<0.001$) demonstrates superior effectiveness that is consistent with several previous studies. Fayaz et al. [26] reported 70% of patients delivered within 12 hours with misoprostol compared to 48% with dinoprostone ($p=0.025$), while Khan et al. [23] found 56.07% versus 34.58% delivery rates within 12 hours respectively ($p=0.02$). However, contrasting results were observed in Unni et al.[22] where dinoprostone showed higher vaginal delivery rates (73.58% vs 50.94%, $p=0.02$), though they noted increased cesarean rates and fetal complications with misoprostol. This discrepancy may be attributed to differences in patient selection criteria, monitoring protocols, and dosing regimens.

A notable finding in our study was the pronounced age-related efficacy difference, with 100% success in patients ≤30 years for misoprostol versus 72.3% for dinoprostone, while both drugs showed poor performance in patients >30 years (26.9% vs 6.9% respectively). This age-stratified analysis provides new insights not extensively explored in the reviewed literature. Fayaz et al.[26] reported mean ages of 25.04±4.342 and 25.26±4.105 years, with the majority (71.50%) being between 15-30 years, but did not analyze age-specific efficacy. The declining efficacy with increasing maternal age may be related to physiological changes in cervical tissue composition and responsiveness to prostaglandins, suggesting that age should be considered as a significant factor in drug selection for labor induction.

Our study revealed misoprostol's superiority in patients with ≤2 previous births (85.1% vs 57.1% success rates, $p=0.002$), while both drugs failed completely in higher parity patients. This finding partially contradicts Durani et al.[20] who found no significant differences between primigravida and multigravida outcomes. The complete failure in grand multiparous patients in our study suggests that alternative approaches may be necessary for this population, possibly due to uterine overdistension and reduced contractility in higher parity women.

Several studies [19,24,26,27] consistently reported higher vaginal delivery rates with misoprostol. Jahangir et al.[24] found 88% vaginal delivery with misoprostol versus 68% with dinoprostone, while Akhtar et al. [19] reported 92% versus 62% respectively. However, Unni et al. [22] reported contrary findings with dinoprostone showing higher vaginal delivery rates (73.58% vs 50.94%), which they attributed to increased fetal complications with misoprostol requiring cesarean intervention. The variability in these findings emphasizes the importance of proper patient selection and continuous monitoring protocols.

While our study focused primarily on efficacy outcomes, the literature reveals important safety considerations. Unni et al.[22] reported higher maternal complications including postpartum hemorrhage (24.5% vs 11.3%) and neonatal complications with misoprostol, while Biswas [21] found no significant differences in complication rates. Iftikhar et al.[27] reported two cases of uterine hyperstimulation with misoprostol but concluded that proper monitoring could minimize risks. These findings suggest that while misoprostol may be more effective, careful patient selection and monitoring are crucial for safety. This research supports the increasing body of evidence favoring the greater effectiveness of misoprostol during labor induction in relation to dinoprostone. Our results are consistent with prior studies, yet they also offer new information regarding the effects of parity, socioeconomic status, and age on the effectiveness of the drug. Most notably, our findings indicate that patient-specific factors need to be taken into consideration when choosing an induction agent, supporting more individualized methods in practice. There are a number of limitations of this study that need to be borne in mind. To start, the study took place at a single institution, and as a consequence, the results may not generalize to other populations or healthcare facilities. Second, the sample size of 76 patients in both groups is small, and this will lower the statistical power of the results and may bring in bias. More robust evidence would be provided by larger multicenter studies that would be able to confirm these findings. Furthermore, variation in clinician experience and hospital guidelines were not accounted for, and this may have impacted the results.

CONCLUSION

Our research has determined that misoprostol is more effective than dinoprostone for labor induction, with more rapid labor and greater overall success. The study also found misoprostol to have greater effectiveness in patients who are younger, who have fewer prior births, and those from lower socioeconomic strata. These results suggest that misoprostol should be considered a preferred option for labor induction, especially in certain patient subgroups.

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Author's Contribution
The authors have each contributed significantly to this manuscript as described below:
Dr. Sara Khan contributed to data collection, study design, and manuscript preparation.
Dr. Sadia Anwar played an essential role in the study design, manuscript editing, and review.
Dr. Fatima Gul assisted with data collection, analysis, and contributed to the manuscript writing.
Dr. Humaira Riaz helped with the data analysis, interpretation, and manuscript revision.

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