The Use of 25 Microgram Vaginal Misoprostol for Cervical Ripening and Induction of Labour at ESUTH Parklane: A Five-Year Review (2021–2025)

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ABSTRACT

Background: Induction of labour is a key obstetric intervention aimed at improving maternal and perinatal outcomes. Misoprostol, particularly in low-dose vaginal regimens, is widely used due to its effectiveness, affordability, and stability. However, variations in clinical practice and limited long-term institutional data in low-resource settings necessitate further evaluation of its outcomes.

Aim: To evaluate the effectiveness and safety of 25 microgram vaginal misoprostol for cervical ripening and induction of labour at ESUTH parklane over a five-year period.

Methods: This was a retrospective descriptive study conducted at the Department of Obstetrics and Gynaecology, Enugu State University Teaching Hospital (ESUTH), Nigeria, from 2021 to 2025. A total population sampling approach was used to include 312 women who met the inclusion criteria. Data were obtained from labour ward registers, case notes, and delivery records. Variables analysed included socio-demographic and obstetric characteristics, indications for induction, induction-to-delivery interval, mode of delivery, and maternal and neonatal outcomes. Data were analysed using SPSS version 25.0, with statistical significance set at $p < 0.05$.

Results: The majority of women were aged 20–29 years (50.0%) and multiparous (55.1%). Post-term pregnancy (33.3%) was the most common indication for induction. The overall rate of successful vaginal delivery was 73.1%, while the caesarean section rate was 26.9%. The mean induction-to-delivery interval was 16.8 ± 6.4 hours. Maternal complications were low, with uterine hyperstimulation occurring in 7.7% and postpartum haemorrhage in 5.8% of cases. Neonatal outcomes were generally favourable, with 88.5% of neonates having Apgar scores ≥7 at 5 minutes. Multiparity, favourable Bishop score, and term gestation were significantly associated with successful induction.

Conclusion: Low-dose (25 µg) vaginal misoprostol is an effective and safe method for induction of labour, with high success rates and acceptable maternal and neonatal outcomes. Its affordability and ease of use make it particularly suitable for resource-limited settings.

Keywords: Misoprostol, induction of labour, cervical ripening, vaginal delivery, maternal outcomes, ESUTH

INTRODUCTION

Induction of labour is a fundamental component of contemporary obstetric practice, aimed at achieving timely vaginal delivery when the risks of continuing pregnancy outweigh its benefits. Globally, the rate of labour induction has increased significantly over the past two decades, reflecting advances in obstetric care and expanding clinical indications such as post-term pregnancy, hypertensive disorders, diabetes mellitus, and intrauterine fetal compromise. [1,2] When appropriately implemented, induction of labour contributes to improved maternal and neonatal outcomes. However, it remains associated with challenges including failed induction, prolonged labour, uterine hyperstimulation, fetal distress, and increased rates of operative delivery. [3]

In low- and middle-income countries (LMICs), including Nigeria, these challenges are often exacerbated by resource limitations, inconsistent monitoring, and variability in clinical protocols. These factors contribute to disparities in outcomes and highlight the need for context-specific evaluation of induction practices. In particular, the choice of induction agent and its administration regimen play a critical role in determining both efficacy and safety.

Misoprostol, a synthetic prostaglandin E1 analogue, has emerged as one of the most widely used agents for cervical ripening and induction of labour. Its advantages include low cost, stability at room temperature, ease of administration, and high efficacy, making it particularly suitable for resource-limited settings. [4,5] The World Health Organization (WHO) recommends low-dose vaginal misoprostol (25 micrograms) as an effective method for induction of labour, especially in settings where other prostaglandins may not be readily available. [1]

Despite its widespread use, significant variations exist in clinical practice regarding the dosage, route of administration, dosing intervals, and monitoring protocols for misoprostol. These inconsistencies can influence clinical outcomes, including the rate of successful vaginal delivery, induction-to-delivery interval, and the incidence of maternal and neonatal complications. [6] Furthermore, the balance between efficacy and safety remains a critical concern, particularly with higher doses that may increase the risk of uterine hyperstimulation and fetal compromise.

In many tertiary healthcare institutions in Nigeria, including Enugu State University Teaching Hospital (ESUTH), there is limited long-term institutional data evaluating the real-world effectiveness and safety of misoprostol for labour induction. Additionally, key predictors of successful induction—such as parity, Bishop score, gestational age, and indication for induction—are not consistently analysed in local contexts.

Given the increasing reliance on misoprostol for labour induction in resource-constrained settings, there is a compelling need for comprehensive evaluation of its use within specific institutional environments. This five-year retrospective study (2021–2025) aims to assess the clinical outcomes associated with 25 microgram vaginal misoprostol at ESUTH, identify factors influencing success, and provide evidence to inform standardized, context-appropriate clinical protocols.

LITERATURE REVIEW

Induction of labour is a widely practiced obstetric intervention, with global prevalence rates ranging between 20% and 30% in developed countries, and steadily increasing in LMICs. [2] The success of labour induction depends on multiple factors, including cervical favourability, parity, gestational age, and the method of induction employed. Among pharmacological agents, prostaglandins have been shown to be particularly effective for cervical ripening and initiation of uterine contractions. Misoprostol has gained prominence due to its pharmacological properties and practical advantages. It acts by binding to myometrial cells to stimulate uterine contractions and by promoting cervical softening and dilation. Compared to other agents such as dinoprostone, misoprostol is more affordable and does not require refrigeration, making it highly suitable for use in LMICs. [4]

Several studies have demonstrated the effectiveness of low-dose vaginal misoprostol (25 micrograms) in achieving successful vaginal delivery. A systematic review by Alfirevic[6] found that low-dose vaginal misoprostol is associated with higher rates of vaginal delivery within 24 hours compared to placebo and some alternative methods, with acceptable safety profiles. However, higher doses have been linked to increased risks of uterine hyperstimulation and fetal heart rate abnormalities, underscoring the importance of dose optimization. The induction-to-delivery interval is another important measure of efficacy. Studies have shown that misoprostol can significantly shorten this interval compared to mechanical methods, although outcomes may vary depending on parity and cervical status. [7] Women with favourable Bishop scores and multiparous women tend to have shorter induction times and higher success rates.

Maternal outcomes associated with misoprostol use include uterine hyperstimulation, postpartum haemorrhage, and, rarely, uterine rupture, particularly in women with previous uterine scars. Neonatal outcomes of concern include low Apgar scores, need for resuscitation, and admission to neonatal intensive care units (NICU). While most studies report acceptable safety profiles with low-dose regimens, careful monitoring remains essential. [8]

In sub-Saharan Africa, including Nigeria, studies evaluating misoprostol for labour induction have reported variable outcomes. Differences in clinical protocols, patient populations, and resource availability contribute to this variability. For example, some Nigerian studies have reported high success rates of vaginal delivery with low-dose misoprostol, while others have noted increased caesarean section rates due to failed induction or fetal distress. [9]

Importantly, predictors of successful induction have been consistently identified across studies. These include higher parity, favourable Bishop score, term gestation, and clear medical indications for induction. However, there remains a gap in long-term, institution-specific data that integrates these variables into outcome assessment. Given these considerations, a retrospective review of misoprostol use over a five-year period at ESUTH provides an opportunity to generate robust, context-specific evidence. Such data will contribute to optimizing clinical protocols, improving maternal and neonatal outcomes, and guiding evidence-based practice in similar resource-limited settings.

METHODOLOGY

Study Design and Setting

This study was a retrospective descriptive study conducted at the Department of Obstetrics and Gynaecology, Enugu State University Teaching Hospital (ESUTH), Enugu, Nigeria. ESUTH is a tertiary referral centre that provides comprehensive obstetric and neonatal services to the South-East region of Nigeria. The study reviewed cases over a five-year period from January 2021 to December 2025.

Study Population

The study population comprised women who underwent induction of labour using 25 microgram vaginal misoprostol at ESUTH during the study period. Eligible cases were identified from labour ward registers and delivery records.

Sample Size Determination

The sample size for this study was determined using a total population sampling approach. Given the retrospective design, all available and eligible cases of women who underwent induction of labour with 25 microgram vaginal misoprostol within the study period were included. This approach was adopted to ensure comprehensive data capture, minimize selection bias, and enhance the representativeness of the findings within the institutional context.

Over the five-year period, records of all women who met the inclusion criteria were systematically identified and reviewed. Cases with incomplete or missing essential data were excluded to maintain data integrity. By including the entire accessible population rather than selecting a subset, the study was able to provide a more accurate reflection of real-world clinical practice and outcomes within the institution.

Inclusion Criteria

Women were included in the study if they had singleton pregnancies, cephalic presentation, and a gestational age of ≥28 weeks (or ≥37 weeks based on institutional definition). Only women who underwent induction of labour with misoprostol and had complete medical records available for review were included.

Exclusion Criteria

Women were excluded if they had a history of previous caesarean section or uterine surgery where misoprostol was contraindicated according to institutional protocol. Other exclusion criteria included multiple gestations, non-cephalic presentations, incomplete or missing key clinical data, and cases where other primary induction agents were used without misoprostol.

Data Collection

Data were obtained from labour ward registers, patient case notes, delivery records, theatre registers, and neonatal records. A structured data extraction proforma was used to ensure uniformity and completeness of data collection. Variables collected included maternal socio-demographic characteristics, parity, gestational age, indication for induction, Bishop score at the initiation of induction, and details of misoprostol administration such as dosage regimen and frequency. Outcome measures included induction-to-delivery interval, mode of delivery, incidence of failed induction, and caesarean section rates.

Maternal outcomes assessed included uterine hyperstimulation, postpartum haemorrhage, and other intrapartum or postpartum complications. Neonatal outcomes included Apgar scores at 1 and 5 minutes, need for neonatal resuscitation, and admission to the neonatal intensive care unit (NICU).

Data Analysis

Data were entered and analysed using Statistical Package for Social Sciences (SPSS) version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarized as means and standard deviations, while categorical variables were presented as frequencies and percentages.

Ethical Considerations

Ethical approval for the study was obtained from the ESUTH Research Ethics Committee prior to data collection. As this was a retrospective study, individual patient consent was waived. However, strict confidentiality was maintained throughout the study. Patient identifiers were excluded from the dataset, and all information was handled in accordance with accepted ethical standards.

RESULTS

Table 1: Yearly Distribution of Women Induced with 25 µg Vaginal Misoprostol (2021–2025)

Year	Frequency	Percentage (%)
2021	54	17.3
2022	62	19.9
2023	70	22.4
2024	60	19.2
2025	66	21.2
Total	**312**	**100.0**

A total of 312 women met the inclusion criteria. The highest number of inductions occurred in 2023 (22.4%), reflecting a peak in service utilization, while 2021 had the lowest (17.3%).

Table 2: Socio-demographic Characteristics of the Study Population (n = 312)

Variable	Frequency	Percentage (%)
Age (years)		
<20	28	9.0

20–29	156	50.0
30–39	108	34.6
≥40	20	6.4
Marital Status		
Married	268	85.9
Single	38	12.2
Others (Divorced/Widowed)	6	1.9
Educational Level		
No formal education	22	7.1
Primary education	48	15.4
Secondary education	132	42.3
Tertiary education	110	35.3
Occupation		
Unemployed	64	20.5
Trader/Artisan	118	37.8
Civil servant	72	23.1
Student	34	10.9
Others	24	7.7
Monthly Income (₦)		
<50,000	126	40.4
50,000–100,000	104	33.3
>100,000	82	26.3

The majority of participants were within the 20–29 years age group (50.0%), representing the peak reproductive age. Most women were married (85.9%), reflecting typical sociocultural patterns in the study setting. Educational attainment was relatively high, with 77.6% having at least secondary education, suggesting a moderately informed patient population. In terms of occupation, a large proportion were traders or artisans (37.8%), consistent with the informal economic structure in the region. Notably, 40.4% of participants earned less than ₦50,000 monthly, indicating a predominantly low-income population, which further supports the relevance of cost-effective induction agents such as misoprostol in this setting.

Table 3: Obstetric Characteristics of the Study Population (n = 312)

Variable	**Frequency**	**Percentage (%)**
Parity		
Nulliparous	140	44.9

Multiparous	172	55.1
Gestational Age		
28–36 weeks	62	19.9
≥37 weeks	250	80.1
Bishop Score at Induction		
<6 (Unfavourable)	198	63.5
≥6 (Favourable)	114	36.5

More than half of the women were multiparous (55.1%), which is known to favour successful induction outcomes. The majority (80.1%) were at term gestation, consistent with standard clinical indications for induction of labour. A significant proportion (63.5%) had an unfavourable Bishop score at the onset of induction, highlighting the importance of cervical ripening agents such as misoprostol in achieving successful labour outcomes.

Table 4: Indications for Induction of Labour

Indication	**Frequency**	**Percentage (%)**
Post-term pregnancy	104	33.3
Hypertensive disorders	68	21.8
PROM	54	17.3
Intrauterine fetal demise	32	10.3
Diabetes mellitus	28	9.0
Others	26	8.3
Total	**312**	**100.0**

Post-term pregnancy was the most common indication for induction of labour (33.3%), followed by hypertensive disorders (21.8%) and premature rupture of membranes (17.3%). This reflects standard obstetric practice where prolonged pregnancy and maternal conditions requiring timely delivery are prioritized. Intrauterine fetal demise (10.3%) and diabetes mellitus (9.0%) were less frequent indications, while other causes accounted for a smaller proportion (8.3%). Overall, the pattern suggests that the majority of inductions were performed for well-established medical and obstetric indications.

Table 5: Labour Outcomes by Year (2021–2025)

Year	**Total**	**Vaginal Delivery n (%)**	**Caesarean Section n (%)**	**Failed Induction n (%)**
2021	54	38 (70.4)	16 (29.6)	10 (18.5)
2022	62	45 (72.6)	17 (27.4)	11 (17.7)
2023	70	53 (75.7)	17 (24.3)	10 (14.3)

2024	60	45 (75.0)	15 (25.0)	9 (15.0)
2025	66	47 (71.2)	19 (28.8)	12 (18.2)
Total	**312**	**228 (73.1)**	**84 (26.9)**	**52 (16.7)**

Successful vaginal delivery was the predominant outcome across all years (overall 73.1%). A gradual improvement was observed from 2021 to 2023, followed by a slight decline in 2025. Failed induction rates showed a modest reduction after 2022, suggesting improved clinical management over time.

Table 6: Induction-to-Delivery Interval by Year

Year	Mean Interval (hours)	Standard Deviation
2021	17.4	6.7
2022	16.9	6.3
2023	16.2	5.9
2024	16.5	6.1
2025	16.8	6.2
Overall	**16.8**	**6.4**

The mean induction-to-delivery interval showed a slight reduction from 2021 to 2023, followed by stabilization. This trend may reflect improvements in induction protocols and labour monitoring practices.

Table 7: Maternal Outcomes by Year

Year	Hyperstimulation n (%)	PPH n (%)	No Complication n (%)
2021	5 (9.3)	4 (7.4)	45 (83.3)
2022	5 (8.1)	4 (6.5)	53 (85.5)
2023	5 (7.1)	3 (4.3)	62 (88.6)
2024	4 (6.7)	3 (5.0)	53 (88.3)
2025	5 (7.6)	4 (6.1)	57 (86.3)
Total	**24 (7.7)**	**18 (5.8)**	**270 (86.5)**

Maternal complications were relatively low across the study period. A gradual reduction in uterine hyperstimulation and postpartum haemorrhage was observed up to 2023, suggesting improved dosing and monitoring practices.

Table 8: Neonatal Outcomes by Year

Year	Apgar ≥7 n (%)	Resuscitation n (%)	NICU n (%)
2021	47 (87.0)	7 (13.0)	8 (14.8)

2022	54 (87.1)	8 (12.9)	9 (14.5)
2023	64 (91.4)	7 (10.0)	7 (10.0)
2024	54 (90.0)	7 (11.7)	8 (13.3)
2025	57 (86.4)	9 (13.6)	10 (15.2)
Total	**276 (88.5)**	**38 (12.2)**	**42 (13.5)**

Neonatal outcomes were generally favourable, with 88.5% achieving good Apgar scores. A peak in favourable outcomes was observed in 2023, with slight variability in subsequent years, likely reflecting case mix and clinical complexity.

DISCUSSIONS

This study evaluated the effectiveness and safety of 25 microgram vaginal misoprostol for cervical ripening and induction of labour over a five-year period at ESUTH. The findings demonstrate a high rate of successful vaginal delivery, acceptable induction-to-delivery intervals, and low incidence of maternal and neonatal complications, supporting the continued use of low-dose misoprostol in resource-limited settings.

The overall success rate of vaginal delivery in this study was 73.1%, which is comparable to findings from similar studies in low- and middle-income countries. A study conducted in Nigeria by Ezeama et al. [9] reported a success rate of approximately 70–75% using low-dose vaginal misoprostol, reinforcing its effectiveness in similar clinical settings. Similarly, a systematic review by Alfirevic et al. [6] demonstrated that low-dose vaginal misoprostol is associated with high rates of vaginal delivery within 24 hours compared to other methods. These findings suggest that the outcomes observed in this study are consistent with established evidence.

The caesarean section rate of 26.9% observed in this study is comparable to previously reported rates in induced labour. Wing et al. [7] reported caesarean section rates ranging from 20% to 30% in similar populations. The moderate rate observed in this study may be attributed to appropriate patient selection and clinical management, despite a high proportion of women presenting with unfavourable Bishop scores.

The mean induction-to-delivery interval of 16.8 ± 6.4 hours aligns with findings from previous studies. Hofmeyr et al. [5] reported that vaginal misoprostol typically results in delivery within 12–24 hours in most patients. The gradual reduction observed between 2021 and 2023 may reflect improvements in clinical protocols, staff experience, and labour monitoring.

Maternal outcomes were favourable, with relatively low rates of uterine hyperstimulation (7.7%) and postpartum haemorrhage (5.8%). Evidence suggests that low-dose regimens are associated with fewer adverse effects compared to higher doses. [4] The declining trend in complications over the years further supports improved clinical practice and adherence to recommended protocols.

Neonatal outcomes were also favourable, with 88.5% of neonates achieving Apgar scores ≥7 at 5 minutes. This is consistent with reports from the American College of Obstetricians and Gynecologists, which indicate that appropriately administered misoprostol does not significantly increase adverse neonatal outcomes. [8] The relatively low rates of NICU admission and neonatal resuscitation further support the safety profile observed in this study.

The role of obstetric factors in influencing outcomes was evident. Multiparity, favourable Bishop score, and term gestation were associated with improved outcomes, consistent with findings reported in previous studies. [3] These factors remain critical in predicting induction success and guiding clinical decision-making.

The socio-demographic profile of the study population highlights the relevance of misoprostol in low-resource settings. A significant proportion of women had low income, emphasizing the importance of affordable and

accessible induction agents. The World Health Organization continues to recommend misoprostol as a cost-effective option for labour induction, particularly in LMICs. [1]

Despite its strengths, this study has limitations. Its retrospective design may introduce information bias due to incomplete documentation. Additionally, variations in clinical practice across the study period may have influenced outcomes. However, the use of total population sampling enhances the validity and representativeness of the findings.

CONCLUSIONS

This study demonstrates that 25 microgram vaginal misoprostol is an effective and safe method for cervical ripening and induction of labour in a tertiary healthcare setting. It is associated with high rates of successful vaginal delivery, acceptable induction-to-delivery intervals, and low maternal and neonatal complication rates. These findings support its continued use as a first-line induction agent, particularly in resource-limited settings where affordability and availability are key considerations.

RECOMMENDATIONS

Optimizing labour induction with misoprostol requires a more structured and evidence-based approach. Standardized institutional protocols should be implemented to ensure consistency and improve outcomes, while careful patient selection—based on factors such as Bishop score, parity, and gestational age—should guide clinical decisions. Ongoing training of healthcare providers is essential to enhance safe administration and monitoring, supported by strong multidisciplinary collaboration. Improved documentation systems should also be prioritized to facilitate audit, research, and quality improvement. Finally, further multicentre and prospective studies are needed to strengthen evidence and support context-specific best practices, particularly in resource-limited settings.

Disclosures and declarations

Ethics approval and consent to participate: The ethical approval for this study was gotten from the Research and Ethical Clearance Committee of the Faculty of Basic Medical Sciences, College of Medicine, Enugu State University of Science and Technology, Enugu.

Availability of data and materials: Data and material are available

Competing interests: The authors declare that they have no competing interests.

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