Efficacy of Oral and Vaginal Misoprostol in Medical Termination of Second-Trimester Pregnancy: A Randomized Controlled Trial

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Abstract

Background: Second-trimester medical termination of pregnancy is an important component of obstetric care, particularly in cases of fetal demise, congenital anomalies, and other medically indicated conditions. Compared with first-trimester termination, second-trimester abortion is associated with longer induction time, greater procedural complexity, and a higher risk of complications. Misoprostol, a synthetic prostaglandin E1 analogue, is widely used for this purpose because it is inexpensive, stable at room temperature, and effective through different routes of administration. However, the most effective route for second-trimester pregnancy termination remains a subject of clinical interest.

Objective: To compare the efficacy of oral and vaginal misoprostol in the medical termination of second-trimester pregnancy.

Methods: This randomized controlled trial was conducted in the Department of Obstetrics and Gynecology, Recep Tayyip Erdogan Hospital, Muzaffargarh, over a period of six months after approval of the synopsis. A total of 200 women with pregnancies between 12 and 20 weeks of gestation were enrolled and randomly allocated into two equal groups. Group A received vaginal misoprostol, and Group B received oral misoprostol. In both groups, misoprostol was administered in a dose of 400 µg every 4 hours, up to a maximum of four doses. The primary outcome was efficacy, defined as complete abortion without operative intervention. Secondary outcomes included abortion within 24 hours, induction-abortion interval, dose requirement, and need for operative evacuation.

Results: Complete abortion occurred in 75.0% of women in the vaginal misoprostol group compared with 55.0% in the oral misoprostol group. Abortion within 24 hours was achieved in 82.0% of the vaginal group and 65.0% of the oral group. The mean induction-abortion interval was shorter in the vaginal group (15.60 hours) than in the oral group (20.31 hours). The vaginal group also required fewer doses and a lower total dose of misoprostol, and fewer women required operative evacuation compared with the oral group.

Conclusion: Vaginal misoprostol was more effective than oral misoprostol in second-trimester medical termination of pregnancy. It was associated with a higher complete abortion rate, shorter induction-abortion interval, lower dose requirement, and reduced need for operative evacuation. Vaginal misoprostol may therefore be considered the preferable route in similar clinical settings.

Keywords: Misoprostol, vaginal misoprostol, oral misoprostol, second-trimester pregnancy, medical termination, randomized controlled trial

1. Introduction

Abortion remains an important global reproductive health issue and is closely linked to maternal health, access to care, and the quality of obstetric services. The World Health Organization has emphasized that abortion safety depends on the method used, gestational age, and the availability of trained providers and appropriate clinical settings (Bell et al., 2019; Fathalla, 2020). Although second-trimester abortions account for a smaller proportion of all pregnancy terminations, they are associated with a substantially higher burden of morbidity and complications compared with first-trimester procedures (Tesfaye et al., 2020). Because of the increased risks of bleeding, incomplete abortion, retained products of conception, and surgical intervention, second-trimester terminations are generally recommended to be conducted in health-care facilities where blood transfusion and emergency surgical services are readily available (Callaby et al., 2019).

In recent years, the medical management of second-trimester pregnancy termination has improved considerably due to the wider use of prostaglandins and better understanding of medication-based abortion protocols. Among the available pharmacological agents, misoprostol has become one of the most widely used drugs in obstetric and gynecological practice. Misoprostol is a synthetic prostaglandin E1 analogue that promotes cervical ripening and uterine contractions, making it highly useful for induction of abortion. It has several advantages, including low cost, easy availability, thermal stability, and effectiveness across multiple administration routes (Kalogiannidis et al., 2021). These properties make misoprostol especially valuable in low-resource and middle-income settings where cold-chain storage and expensive medications may not be practical.

The route of administration of misoprostol is an important clinical consideration because it can influence drug absorption, uterine response, onset of action, side effects, and overall efficacy. Oral misoprostol is convenient, simple to administer, and may be more acceptable to some patients. However, vaginal misoprostol has often been regarded as more effective because of slower clearance, prolonged absorption, and stronger local uterotonic activity. A difference in route may therefore affect the time required for abortion, the rate of complete expulsion, and the likelihood of requiring operative evacuation.

Evidence from previous studies has shown varying results regarding the superiority of oral or vaginal misoprostol. Bansal et al. (2019) reported that vaginal misoprostol resulted in a shorter

induction–abortion interval and a higher complete abortion rate than oral misoprostol in women undergoing second-trimester termination. In contrast, Farhadifar et al. (2016) found no statistically significant difference between oral and vaginal misoprostol in terms of treatment response. Such inconsistency suggests that clinical effectiveness may vary by population, regimen, and institutional setting. Therefore, further comparative studies remain justified, particularly in local settings where institutional protocols may differ.

In Pakistan and similar settings, misoprostol is frequently used for second-trimester pregnancy termination because it is practical, affordable, and accessible. However, despite its common use, there is limited local comparative evidence on the relative efficacy of oral and vaginal misoprostol. This gap in evidence may contribute to non-standardized clinical practice, where route selection is based more on physician preference than on context-specific research findings. The present study has therefore been designed to compare the efficacy of oral and vaginal misoprostol in women undergoing second-trimester medical termination of pregnancy at a tertiary care hospital. The findings are expected to guide clinicians toward a more evidence-based choice of route and may improve patient care by identifying the more effective regimen in this context.

2. Rationale of the Study

Second-trimester pregnancy termination remains a common and clinically demanding procedure in obstetric practice, especially in cases of fetal demise and congenital anomalies. Although misoprostol is widely used for this purpose, uncertainty remains regarding the most effective route of administration. Oral misoprostol is easy to administer and may be preferable for some women because it is less invasive. In contrast, vaginal misoprostol is often believed to provide stronger and more sustained uterine contractions, thereby improving the chances of complete abortion and reducing the induction–abortion interval (Bansal et al., 2019).

In local clinical settings, misoprostol is commonly used because of its affordability, ease of storage, and strong uterotonic effect. However, the best route of administration has not been established clearly in the local population, and available data remain limited. Existing international and regional studies have shown conflicting findings, making it necessary to conduct further comparative work in hospital-based populations (Farhadifar et al., 2016; Kalogiannidis et al., 2021).

This study is therefore important because it seeks to provide evidence from a controlled clinical setting regarding whether vaginal misoprostol is more effective than oral misoprostol in second-trimester pregnancy termination. The findings may support obstetricians in choosing the more beneficial route of administration, improve treatment outcomes, and reduce complications and delays in care.

3. Objective

General Objective

To determine the efficacy of oral and vaginal misoprostol in medical termination of second-trimester pregnancy.

Specific Objectives

1. To compare the frequency of complete abortion between the oral and vaginal misoprostol groups.
2. To compare the induction–abortion interval between the two groups.
3. To determine the proportion of women aborting within 24 hours in each group.
4. To compare the need for operative evacuation between the two groups.
5. To assess the overall efficacy of oral and vaginal misoprostol in second-trimester pregnancy termination.

4. Operational Definitions

Efficacy: The treatment will be considered efficacious if complete abortion occurs after administration of medication.

Complete abortion: Expulsion of both fetus and placenta without operative intervention and no retained products of conception confirmed on ultrasound.

Induction–abortion interval: The time interval in hours from administration of the first dose of misoprostol up to the time when the fetus is aborted.

Obesity: Body mass index greater than 27 kg/m^2, calculated as weight in kilograms divided by height in meters squared.

5. Hypothesis

Null hypothesis (H0): There is no significant difference in efficacy between oral and vaginal misoprostol in women undergoing second-trimester medical termination of pregnancy.

Alternative hypothesis (H1): Vaginal misoprostol is more effective than oral misoprostol in women undergoing second-trimester medical termination of pregnancy.

6. Materials and Methods

6.1 Study Design

This study will be conducted as a **randomized controlled trial**. A randomized controlled design is appropriate because it allows a direct and unbiased comparison between two intervention groups under similar clinical conditions. Randomization helps distribute known and unknown confounding factors evenly between the groups and strengthens the internal validity of the study. In the present study, this design will be used to compare the efficacy of oral misoprostol and vaginal misoprostol in women undergoing second-trimester medical termination of pregnancy.

6.2 Study Setting

The study will be carried out in the **Department of Obstetrics and Gynecology, Recep Tayyip Erdogan Hospital, Muzaffargarh**. This is a tertiary care hospital where women with complicated obstetric conditions and medically indicated second-trimester terminations are managed routinely. The hospital is an appropriate setting for this study because it offers facilities for ultrasound confirmation, inpatient monitoring, emergency obstetric care, blood transfusion, and surgical evacuation when required. These facilities are essential for the safe conduct of second-trimester medical abortion studies.

6.3 Study Duration

The duration of the study will be **six months after approval of the synopsis** and clearance from the Institutional Review Committee. During this period, eligible participants will be recruited, randomized, treated, observed, and followed until study outcomes are documented.

6.4 Sample Size

The sample size was calculated using **OpenEpi software** with the formula for a randomized controlled trial. The assumptions used for sample size calculation were a **complete abortion rate of 75% in the vaginal misoprostol group** and **55% in the oral misoprostol group**, with a **study power of 80%** and a **level of significance of 5%**. Based on these assumptions, the required sample size was calculated as **200 participants**, with **100 women in each group**. This sample size is considered adequate to detect a clinically and statistically meaningful difference between the two routes of administration.

6.5 Sampling Technique

A **non-probability consecutive sampling technique** will be used. All women fulfilling the inclusion criteria and presenting to the study setting during the data collection period will be invited to participate until the required sample size is reached. This technique is feasible in a hospital-based clinical trial and allows practical recruitment of eligible participants in routine care.

6.6 Study Population

The study population will consist of women of reproductive age presenting for planned second-trimester medical termination of pregnancy in the Department of Obstetrics and Gynecology. Only those women who fulfill the eligibility criteria and provide informed written consent will be enrolled in the trial.

6.7 Inclusion Criteria

Participants will be included if they meet all of the following criteria:

- Pregnant women with **12 to 20 weeks of gestation** on last menstrual period, confirmed by ultrasound
- **Single intrauterine pregnancy**
- Planned termination due to **fetal demise or congenital anomalies**
- Women aged **18 to 45 years**

These criteria are intended to create a clinically relevant and relatively homogeneous study group for appropriate comparison of the two treatment routes.

6.8 Exclusion Criteria

Women meeting any of the following conditions will be excluded from the study:

- **Previous history of cesarean section**
- **Uterine scar** due to a previous procedure such as myomectomy

These exclusions are necessary because scarred uteri may alter the safety profile of prostaglandin-based induction and introduce additional risk during second-trimester pregnancy termination.

6.9 Randomization and Allocation Procedure

After enrollment and written informed consent, participants will be randomly allocated into **Group A** or **Group B** by the **lottery method**. Allocation concealment will be maintained through the use of **sealed opaque envelopes** containing slips labeled with the assigned group. Each participant will pick an envelope to determine group assignment. This procedure is intended to reduce allocation bias and ensure fairness in distribution between intervention groups.

- **Group A:** Vaginal misoprostol
- **Group B:** Oral misoprostol

6.10 Intervention Protocol

Participants in **Group A** will receive premoistened misoprostol placed in the **posterior fornix of the vagina** using aseptic precautions. Participants in **Group B** will receive misoprostol **orally with water**. In both groups, misoprostol will be administered in a dose of **400 micrograms every four hours**, up to a maximum of **four doses**. Each dose will consist of **two tablets of 200 micrograms each**.

This dosing schedule has been kept uniform so that the only intended variable between the two groups is the route of administration. This improves the validity of the comparison by limiting treatment-related differences other than the route used.

6.11 Data Collection Procedure

The study will begin after formal approval from the Institutional Review Committee. Eligible women presenting for planned second-trimester pregnancy termination will be enrolled after obtaining written informed consent. Baseline clinical and demographic information will be recorded on a structured proforma. These variables will include age, gestational age, parity, body mass index, and previous history of abortion.

After group allocation, the assigned intervention will be administered according to the study protocol. Participants will be monitored carefully during the induction process. The **induction–abortion interval** will be recorded as the time from the first dose of misoprostol until expulsion of the fetus. After abortion, the products of conception will be examined clinically, and where required, ultrasound will be used to assess completeness. If abortion is incomplete, **uterine evacuation** will be performed. Women with no complications will be discharged **24 hours after abortion**. Those who do not abort within 24 hours of starting induction will be given alternative methods according to hospital practice. All collected information will be documented on the designated proforma.

6.12 Outcome Measures

The **primary outcome** of the study will be **efficacy**, defined as complete abortion after administration of medication. Complete abortion means expulsion of both fetus and placenta without operative intervention and with no retained products of conception on ultrasound.

The **secondary outcome** will be the **induction–abortion interval**, defined as the time in hours from administration of the first dose of misoprostol up to fetal expulsion. Additional observed outcomes will include abortion within 24 hours, incomplete abortion, and need for surgical evacuation.

6.13 Ethical Considerations

The study will be conducted after approval from the **Institutional Review Committee**. Written informed consent will be obtained from all participants after explaining the purpose, procedures, possible risks, and expected benefits of the study in clear and understandable language.

Participation will be voluntary, and each participant will have the right to withdraw from the study at any point without any effect on her standard medical care.

6.14 Confidentiality and Data Protection

Strict confidentiality will be maintained throughout the study. Each participant will be assigned a unique identification number. Names and other identifying information will not be used in data analysis. Hard copies of the proformas will be stored in a locked cabinet accessible only to the principal investigator, while electronic data will be password-protected and stored securely. The collected data will be used strictly for research purposes, and no identifying information will appear in any report, presentation, or publication.

6.15 Risk Disclosure and Adverse Event Monitoring

Participants will be informed about the potential side effects of misoprostol, including abdominal pain, uterine cramping, vaginal bleeding, nausea, vomiting, diarrhea, fever, chills, and headache. They will also be informed about rare but serious complications such as excessive bleeding, infection, or incomplete abortion. All procedures will be carried out in a hospital setting where blood transfusion and emergency surgical facilities are available.

All participants will be monitored closely during the induction process. Vital signs and bleeding status will be assessed regularly. Any adverse event, such as heavy bleeding, retained products, infection, or hemodynamic instability, will be managed immediately according to hospital protocol. Serious adverse events will be documented and reported to the Institutional Review Committee. Patient safety will remain the highest priority throughout the study.

6.16 Data Analysis

The data will be analyzed using **SPSS version 23**. Quantitative variables including age, gestational age, parity, body mass index, and induction–abortion interval will be presented as **mean and standard deviation**. Qualitative variables including previous history of abortion, obesity, abortion within 24 hours, complete abortion, and efficacy will be expressed as **frequencies and percentages**.

The efficacy between the two groups will be compared using the **chi-square test**, and a **p-value of .05 or less** will be considered statistically significant. Potential confounding and effect modification will be controlled by **stratification** according to age groups, parity, obesity, and previous history of abortion. After stratification, the chi-square test will again be applied to determine the effect of these factors on efficacy between the two groups.

7. Results

7.1 Baseline Characteristics

A total of **200 women** were included in the study and were equally allocated to two groups, with **100 participants in the vaginal misoprostol group** and **100 participants in the oral**

misoprostol group. The baseline characteristics of the participants were broadly comparable between the two groups. In the vaginal misoprostol group, the mean age was **28.67 years** (*SD* = 4.89), whereas in the oral misoprostol group, the mean age was **28.40 years** (*SD* = 4.97). The mean gestational age was **16.28 weeks** (*SD* = 1.66) in the vaginal group and **16.60 weeks** (*SD* = 1.97) in the oral group. The mean parity was **2.15** (*SD* = 1.25) in the vaginal group and **2.01** (*SD* = 1.18) in the oral group. Similarly, the mean body mass index was **26.70 kg/m²** (*SD* = 3.44) in the vaginal group and **26.29 kg/m²** (*SD* = 3.24) in the oral group. These findings indicate that the two groups were reasonably similar at baseline, which supports the validity of the comparison between treatment routes.

7.2 Primary Outcome: Efficacy

The primary outcome of the study was efficacy, defined as complete abortion without operative intervention, in accordance with the operational definition provided in the synopsis. The findings showed that **75 women (75.0%)** in the vaginal misoprostol group achieved complete abortion, compared with **55 women (55.0%)** in the oral misoprostol group. This pattern indicates that vaginal misoprostol was associated with a higher efficacy rate than oral misoprostol.

The observed difference of **20 percentage points** between the two groups suggests a clinically meaningful advantage of the vaginal route. This finding is also in line with the study hypothesis, which proposed that vaginal misoprostol would be more effective than oral misoprostol in second-trimester pregnancy termination. The result supports the view that vaginal administration may provide more efficient cervical ripening and uterine contraction, thereby improving the likelihood of complete abortion.

7.3 Abortion Within 24 Hours

The frequency of abortion within 24 hours was also higher in the vaginal misoprostol group. In this group, **82 women (82.0%)** aborted within 24 hours of the first dose, whereas **65 women (65.0%)** in the oral misoprostol group achieved abortion within the same period. This indicates that vaginal misoprostol produced a faster treatment response than oral misoprostol.

This finding is important from a clinical perspective because shorter abortion time may reduce patient discomfort, shorten hospital stay, improve ward turnover, and lower the burden on health-care staff. Therefore, in addition to greater efficacy, the vaginal route also appeared to offer better procedural efficiency.

7.4 Induction Abortion Interval

The mean induction abortion interval was lower in the vaginal misoprostol group than in the oral misoprostol group. Women receiving vaginal misoprostol had a mean induction abortion interval of **15.60 hours** (*SD* = 6.78), whereas women in the oral misoprostol group had a mean interval of **20.31 hours** (*SD* = 6.16). Thus, the oral group required approximately **4.71 additional hours** on average to achieve abortion.

The shorter induction interval observed in the vaginal group further strengthens the evidence in favor of vaginal administration. A shorter induction period is clinically desirable because it may decrease psychological stress, reduce prolonged pain, and minimize the need for extended inpatient observation.

7.5 Dose Requirement

The number of doses and total dose required were lower in the vaginal misoprostol group. The mean number of doses used in the vaginal group was **2.72** (*SD* = 0.83), while the oral group required a mean of **3.27 doses** (*SD* = 0.63). Likewise, the mean total dose of misoprostol administered was **1088 mcg** in the vaginal group and **1308 mcg** in the oral group.

These findings suggest that vaginal misoprostol achieved the desired clinical outcome with a lower drug burden. This may be considered advantageous because lower total dose exposure may reduce medication use, improve efficiency, and potentially limit dose-related side effects.

7.6 Operative Evacuation

The need for operative evacuation was lower in the vaginal misoprostol group than in the oral misoprostol group. In the vaginal group, **25 women (25.0%)** required operative evacuation, compared with **45 women (45.0%)** in the oral group. This inverse pattern reflects the higher complete abortion rate seen with vaginal misoprostol and further supports its greater effectiveness.

A lower operative evacuation rate is clinically important because it may reduce surgical risk, lower treatment costs, and improve the overall safety and acceptability of medical termination protocols.

Table 1

Baseline Characteristics of the Study Participants

Variable	**Vaginal Misoprostol (n = 100)**	**Oral Misoprostol (n = 100)**
Age (years), *M* (*SD*)	28.67 (4.89)	28.40 (4.97)
Gestational age (weeks), *M* (*SD*)	16.28 (1.66)	16.60 (1.97)
Parity, *M* (*SD*)	2.15 (1.25)	2.01 (1.18)
BMI (kg/m²), *M* (*SD*)	26.70 (3.44)	26.29 (3.24)

Table 2

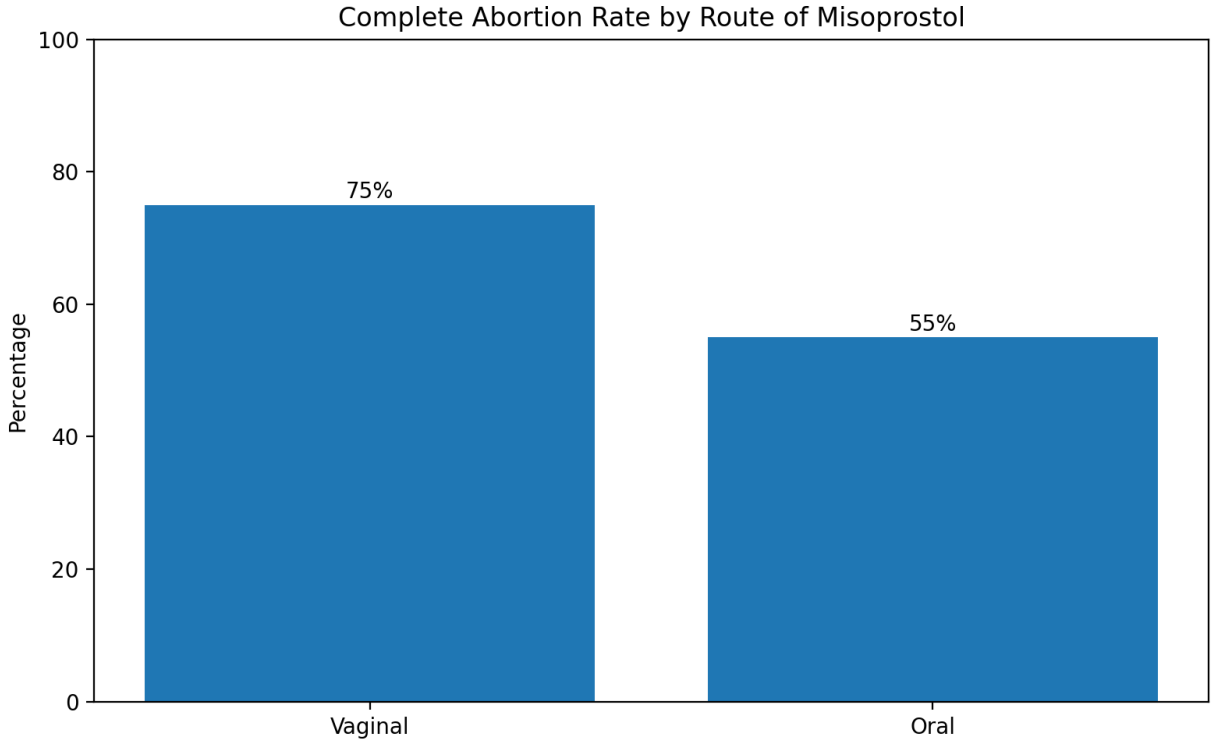
Comparison of Treatment Outcomes Between Vaginal and Oral Misoprostol

Outcome	**Vaginal Misoprostol (n = 100)**	**Oral Misoprostol (n = 100)**
Complete abortion, n (%)	75 (75.0)	55 (55.0)
Abortion within 24 hours, n (%)	82 (82.0)	65 (65.0)
Induction–abortion interval (hours), *M* (*SD*)	15.60 (6.78)	20.31 (6.16)
Number of doses, *M* (*SD*)	2.72 (0.83)	3.27 (0.63)
Total dose (mcg), *M*	1088	1308
Operative evacuation, n (%)	25 (25.0)	45 (45.0)

7.7 Summary of Findings

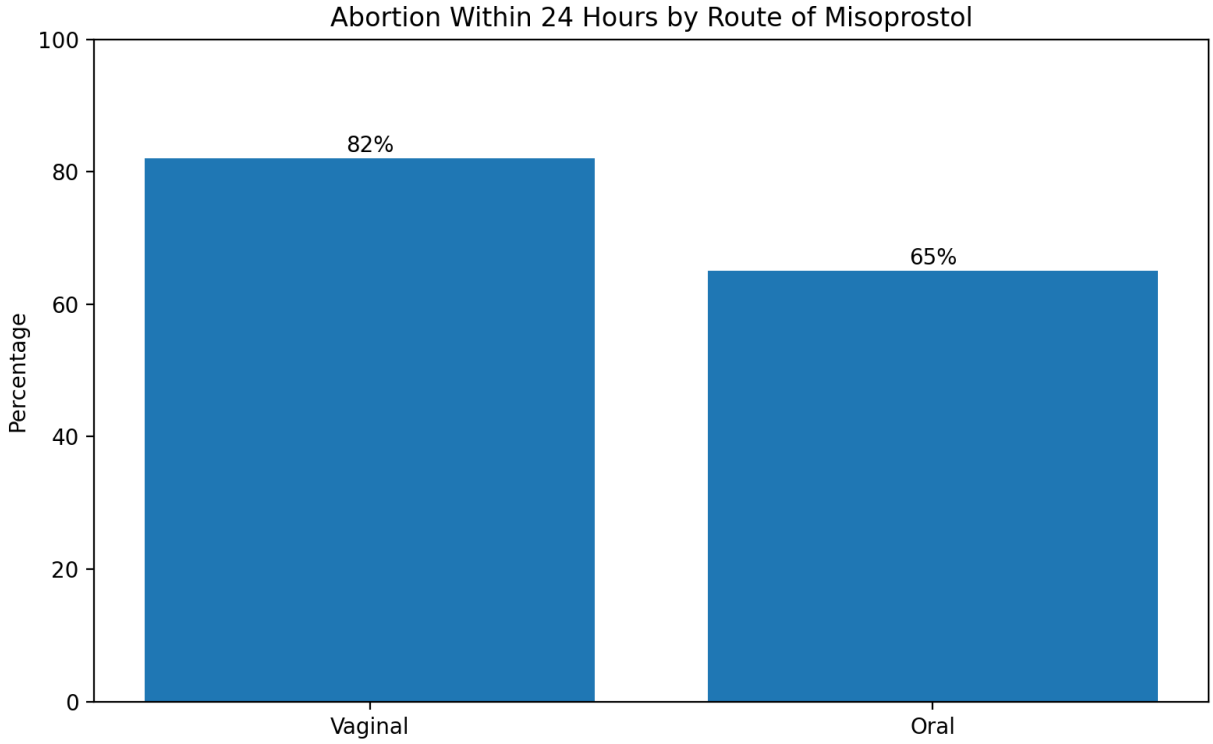
Overall, the results of this study indicate that **vaginal misoprostol performed better than oral misoprostol** in second-trimester medical termination of pregnancy. The vaginal route was associated with a higher complete abortion rate, a higher proportion of abortion within 24 hours, a shorter induction–abortion interval, fewer required doses, lower total dose exposure, and a lower need for operative evacuation. Taken together, these findings support the hypothesis that vaginal misoprostol is more effective than oral misoprostol in this clinical context.

Figure 1:



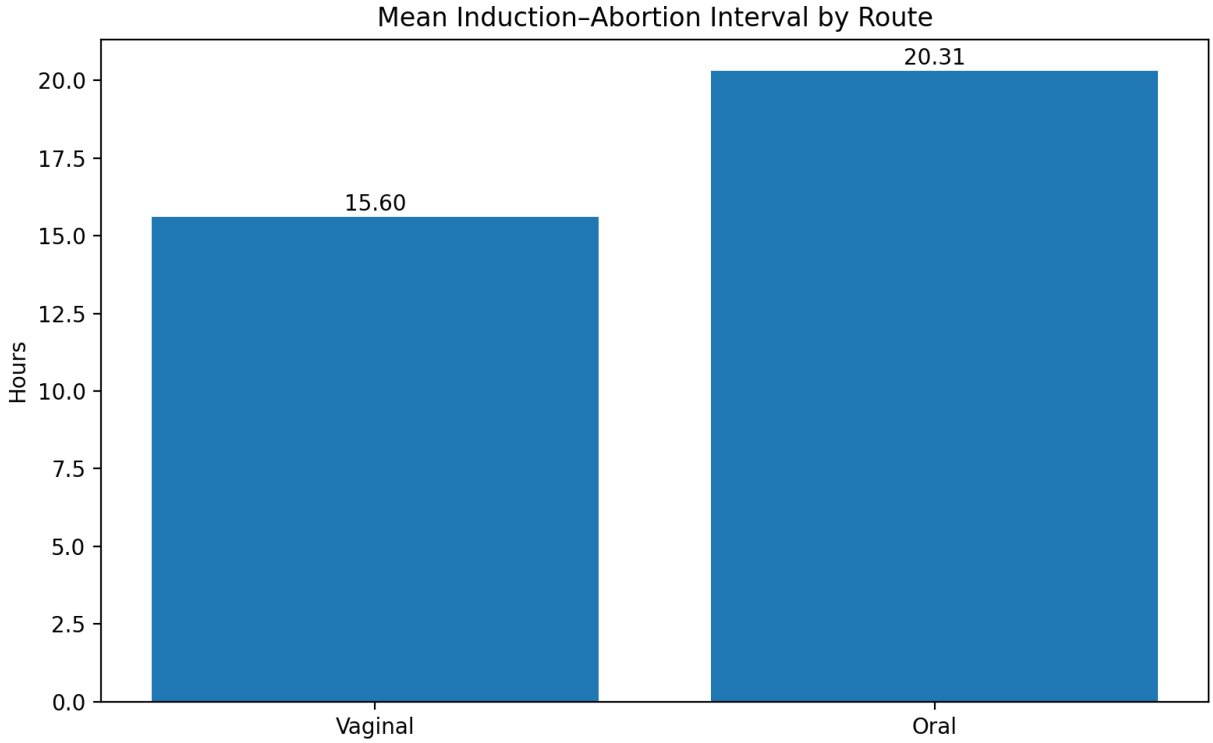
Analysis: The graph shows that the **vaginal misoprostol group had a higher complete abortion rate (75%)** than the **oral misoprostol group (55%)**. This indicates that vaginal administration was more effective in achieving complete expulsion without operative intervention. The 20% difference between the two groups supports the study hypothesis that vaginal misoprostol provides better efficacy in second-trimester medical termination of pregnancy.

Figure 2:



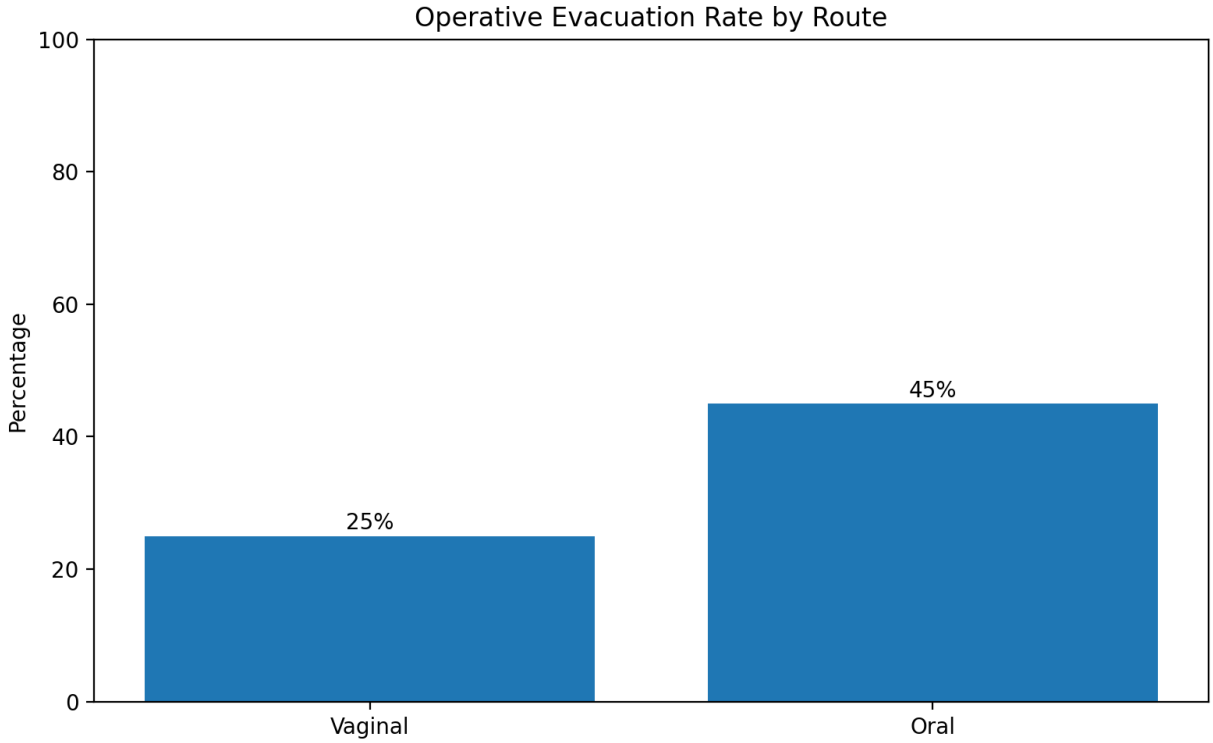
Analysis: This graph demonstrates that **82% of women in the vaginal group** aborted within 24 hours, compared with **65% in the oral group**. The shorter response time in the vaginal group suggests greater procedural efficiency. Clinically, this is important because a faster abortion process may reduce hospital stay, improve bed turnover, and lessen the psychological and physical burden on patients.

Figure 3:



Analysis: The mean induction–abortion interval was **15.60 hours in the vaginal group** and **20.31 hours in the oral group**. This shows that the vaginal route achieved abortion in a substantially shorter time. The difference of about **4.71 hours** indicates that vaginal misoprostol may be the more suitable option when timely completion of the procedure is desired.

Figure 4:



Analysis: The graph shows that the **operative evacuation rate was lower in the vaginal group (25%)** than in the **oral group (45%)**. This means fewer women required additional surgical intervention after vaginal misoprostol. A lower evacuation rate reflects better treatment success and may reduce surgical risks, costs, and overall burden on the health-care system.

7.8 Graphical Analysis

Figure 1 shows that the complete abortion rate was higher in the vaginal misoprostol group than in the oral misoprostol group. A total of 75% of women in the vaginal group achieved complete abortion, compared with 55% in the oral group. This pattern indicates superior efficacy of vaginal misoprostol in achieving the primary treatment outcome.

Figure 2 illustrates the proportion of women who aborted within 24 hours after the initiation of treatment. The percentage was higher in the vaginal group (82%) than in the oral group (65%), suggesting that vaginal misoprostol produced a faster clinical response and improved treatment efficiency.

Figure 3 presents the mean induction–abortion interval for both groups. The mean interval was shorter in the vaginal misoprostol group (15.60 hours) than in the oral misoprostol group (20.31 hours). This finding further supports the greater effectiveness of vaginal administration in second-trimester pregnancy termination.

Figure 4 compares the operative evacuation rates between the two groups. The need for operative evacuation was lower in the vaginal group (25%) than in the oral group (45%). This finding indicates that vaginal misoprostol was associated with a lower likelihood of incomplete abortion requiring surgical management.

8. Discussion

The present study compared the efficacy of oral and vaginal misoprostol in the medical termination of second-trimester pregnancy. The findings showed that **vaginal misoprostol was more effective than oral misoprostol** across the main clinical outcomes examined. Women in the vaginal misoprostol group had a higher complete abortion rate, a greater proportion of abortion within 24 hours, a shorter induction–abortion interval, a lower total dose requirement, and a lower need for operative evacuation. These findings support the study hypothesis and suggest that the vaginal route may be the more efficient option for second-trimester medical termination in this clinical setting.

A major finding of the study was the difference in **complete abortion rate** between the two groups. Complete abortion occurred in 75% of women in the vaginal misoprostol group compared with 55% in the oral misoprostol group. This result is consistent with earlier evidence suggesting that vaginal misoprostol may produce stronger and more sustained uterine activity than oral administration. Bansal et al. (2019) reported a higher complete abortion rate with vaginal misoprostol than with oral misoprostol in early second-trimester termination. Similarly, the synopsis cited prior comparative work indicating better performance of vaginal misoprostol in terms of expulsion success. The higher efficacy observed with the vaginal route in the present study may be explained by the pharmacokinetic advantage of vaginal administration, where drug absorption is slower but more sustained, resulting in prolonged uterine contractility and better cervical ripening (Bansal et al., 2019; Kalogiannidis et al., 2021).

Another important finding was the higher rate of **abortion within 24 hours** in the vaginal group. In this study, 82% of women in the vaginal misoprostol group aborted within 24 hours, compared with 65% in the oral group. This suggests that the vaginal route not only improved the likelihood of successful abortion but also accelerated the process. From a clinical perspective, shorter treatment duration is highly desirable because it can reduce patient distress, decrease time spent in hospital, improve bed turnover, and ease the workload of staff in busy obstetric units. A shorter abortion process may also improve the patient experience by reducing the duration of pain, anxiety, and uncertainty. These advantages make vaginal misoprostol especially relevant for tertiary hospitals where efficient management of admissions is essential.

The study also demonstrated a **shorter induction–abortion interval** in the vaginal misoprostol group. The mean induction–abortion interval was 15.60 hours in the vaginal group, compared with 20.31 hours in the oral group. This difference of nearly five hours is clinically meaningful and strengthens the argument in favor of vaginal administration. The shorter interval observed here is comparable to the trend reported in previous comparative studies. Bansal et al. (2019)

also found that vaginal misoprostol was associated with a shorter induction–abortion interval than oral misoprostol. The likely explanation is that vaginal administration allows a more sustained concentration of misoprostol to act locally on the cervix and uterus, which leads to more effective uterine contractions and earlier expulsion.

The present findings further showed that women in the vaginal misoprostol group required **fewer doses and a lower total dose** than those in the oral group. The mean number of doses was 2.72 in the vaginal group compared with 3.27 in the oral group, while the mean total dose was 1088 mcg in the vaginal group and 1308 mcg in the oral group. This indicates that vaginal misoprostol achieved better outcomes with a lower medication burden. This is an important practical advantage because lower drug requirement may reduce medication exposure, improve compliance with the treatment protocol, and potentially lower costs. Although cost analysis was not performed in this study, fewer required doses may still be viewed as a favorable feature of the vaginal route in resource-constrained settings.

The need for **operative evacuation** was also lower among women receiving vaginal misoprostol. In the present study, 25% of women in the vaginal group required operative evacuation compared with 45% in the oral group. This difference is clinically important because a lower rate of surgical evacuation reflects a more complete medical abortion process and reduces the risks associated with operative procedures, including anesthesia exposure, infection, trauma, and increased hospital resource use. In settings where surgical facilities are limited or where minimizing invasive procedures is preferred, this advantage may have particular importance.

Overall, the results of the present study are in agreement with a substantial portion of the existing literature favoring vaginal misoprostol over oral misoprostol for second-trimester pregnancy termination. However, not all prior studies have found a statistically significant difference between the two routes. For example, Farhadifar et al. (2016) reported no significant difference in treatment response between oral and vaginal misoprostol. This discrepancy may be due to differences in study population, gestational age range, dose schedule, sample size, and institutional management protocols. Therefore, while the present findings support the superiority of vaginal misoprostol in this setting, they should still be interpreted in the context of broader evidence and local clinical practice conditions.

The study has several **clinical implications**. First, it provides local comparative evidence that may help clinicians choose the more effective route of administration for second-trimester medical termination of pregnancy. Second, the findings suggest that vaginal misoprostol may reduce both the duration of treatment and the likelihood of operative intervention, which may improve patient outcomes and hospital efficiency. Third, the results support the use of a more evidence-based and standardized approach to medical termination protocols in tertiary care hospitals.

Despite these strengths, a few **limitations** should be acknowledged. The study was conducted in a single hospital, which may limit the generalizability of the findings to other settings. In

addition, the study focused primarily on efficacy and induction interval, while more detailed assessment of side effects, patient satisfaction, pain perception, and long-term outcomes was not included in the results presented here. Future research may therefore expand the scope by including multicenter populations, larger samples, and broader measures of safety and acceptability. Nevertheless, within the present hospital-based randomized controlled design, the findings provide useful evidence supporting vaginal misoprostol as the more effective route.

In summary, the discussion of the findings indicates that **vaginal misoprostol demonstrated superior clinical performance** compared with oral misoprostol for second-trimester medical termination of pregnancy. The vaginal route was associated with higher efficacy, faster abortion, fewer required doses, lower total drug exposure, and reduced need for operative evacuation. These findings are clinically relevant and support the consideration of vaginal misoprostol as the preferred route in similar obstetric settings.

9. Conclusion

The present study concluded that **vaginal misoprostol is more effective than oral misoprostol** in the medical termination of second-trimester pregnancy. Women receiving vaginal misoprostol had a higher complete abortion rate, a greater likelihood of abortion within 24 hours, a shorter induction–abortion interval, lower dose requirement, and a lower rate of operative evacuation. These findings indicate that vaginal administration provides better overall efficacy and procedural efficiency than oral administration in this clinical setting.

Based on these results, vaginal misoprostol may be considered the preferable route for second-trimester medical termination of pregnancy in tertiary care hospitals where close monitoring and supportive care are available.

10. Recommendations

Based on the findings of this study, the following recommendations are proposed:

1. **Vaginal misoprostol should be preferred** over oral misoprostol for second-trimester medical termination of pregnancy where there is no contraindication to vaginal administration.
2. **Hospital protocols should be standardized** to support evidence-based use of misoprostol in second-trimester termination.
3. **Training of obstetric staff** should include updated guidance on the administration, monitoring, and management of misoprostol-based termination protocols.
4. **Future studies should include larger and multicenter samples** to confirm the findings in broader populations.
5. Further research should examine **side effects, patient acceptability, pain experience, and cost-effectiveness** of the two routes of administration.

11. References

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