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Original article

Comparative Evaluation of Rectal Misoprostol *versus* Intravenous Oxytocin for the Prevention of Postpartum Hemorrhage

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Abstract
Postpartum hemorrhage (PPH) remains a leading cause of maternal morbidity and mortality worldwide. Active management of the third stage of labor significantly reduces blood loss. To compare the clinical efficacy and side-effect profile of 800µg rectal misoprostol versus 5 IU intravenous (IV) oxytocin for PPH prophylaxis following vaginal delivery. A randomized controlled trial was conducted at University Hospital, Tripoli, including 620 laboring women (310 per arm) undergoing normal singleton vaginal delivery. Following anterior shoulder delivery, Group 1 received 800µg rectal misoprostol plus IV saline, while Group 2 received 5 IU IV oxytocin infusion plus a rectal placebo. Primary outcomes included PPH incidence, hemoglobin/hematocrit changes at 24 hours, blood transfusion requirement, and adverse events. PPH incidence was comparable between the misoprostol and oxytocin groups (5.8% vs. 4.2%, p=0.33). No significant differences were observed in mean duration of the third stage (8.25±2.3 vs. 7.91±2.8 min, p=0.63), postpartum hematocrit drop ≥10% (2.3% vs. 2.6%, p=0.23), post-delivery hemoglobin (9.8±1.4 vs. 10.0±1.2 g/dL, p=0.76), or transfusion requirements (2.6% vs. 1.3%, p=0.33). Shivering (27.4% vs. 9.0%, p<0.001) and transient fever ≥38∘C (13.9% vs. 6.1%, p<0.001) were significantly more frequent in the misoprostol group. Rectal misoprostol (800µg) provides prophylactic efficacy equivalent to IV oxytocin (5 IU) in reducing postpartum blood loss. Its thermostability and low cost make it an ideal alternative in resource-constrained obstetric settings.
Keywords. *Postpartum Hemorrhage, Misoprostol, Oxytocin, Third Stage of Labor, Active Management.*

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Introduction

Postpartum hemorrhage (PPH), traditionally defined as blood loss ≥500 mL after vaginal delivery, is a major cause of maternal morbidity and mortality worldwide [1–3]. Severe PPH may result in anemia, hemodynamic instability, blood transfusion, hemorrhagic shock, and maternal death [4–8]. Although risk factors include prolonged third-stage labor, multiple pregnancy, macrosomia, episiotomy, and previous PPH, PPH may occur without identifiable risk factors [4].

Active management of the third stage of labor with prophylactic uterotonics is the principal strategy for preventing PPH [5–6]. Oxytocin is the recommended first-line uterotonic because of its established efficacy and favorable safety profile.6-7 Misoprostol, a prostaglandin E1 analogue, is an effective alternative, particularly in resource-limited settings because it is inexpensive, heat-stable, widely available, and does not require refrigeration or intravenous administration.

Misoprostol can be administered through several routes, including oral, sublingual, vaginal, buccal, and rectal routes [3,4]. Its major limitation is a higher frequency of transient adverse effects, particularly shivering, pyrexia, nausea, vomiting, and diarrhea [2,3,4]. Given the practical advantages of misoprostol and the established effectiveness of oxytocin, comparison of these agents is clinically relevant, particularly in settings with limited resources. Therefore, this study compared 800 µg rectal misoprostol with 5 IU intravenous oxytocin for the prevention of postpartum hemorrhage.

Methods

Study Design and Participants

A randomized controlled comparative study was conducted at the Department of Obstetrics and Gynecology, University Hospital, Tripoli, Libya. Eligible participants included women with singleton pregnancies in active labor anticipating spontaneous vaginal delivery. Exclusion criteria comprised prior Cesarean delivery, antepartum hemorrhage, hypertensive disorders, underlying coagulopathies, or contraindications to prostaglandins. Written informed consent was obtained during early labor.

Randomization and Intervention

A total of 620 eligible women were randomized 1:1 into two treatment cohorts (n=310 per group) using sequentially numbered, opaque, sealed envelopes: Group 1 (Misoprostol): Received 800µg (four 200µg tablets) high rectal misoprostol plus 1 ampoule of normal saline in 5 mL lactated Ringer's IV over 1 minute immediately following delivery of the anterior shoulder. Group 2 (Oxytocin): Received 5 IU oxytocin in 5 mL lactated Ringer's IV over 1 minute plus rectal placebo tablets at anterior shoulder delivery.

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Outcome Measures

Primary Outcome: Clinical incidence of PPH (blood loss >500 mL).
Secondary Outcomes: Duration of the third stage of labor, pre- and 24-hour post-delivery hemoglobin (g/dL) and hematocrit (%) levels, rate of hematocrit drop ≥10%, need for blood transfusion, and treatment-emergent side effects (shivering, pyrexia ≥38∘C, nausea, vomiting, headache, and diarrhea).

Statistical Analysis

Data were analyzed using SPSS version 16.0. Continuous variables were summarized as mean ± standard deviation (SD) and compared using independent sample t-tests. Categorical variables were expressed as frequencies and percentages, compared via Chi-square ($\chi 2$) or Fisher's exact tests. Statistical significance was set at $p \leq 0.05$.

Results

The baseline characteristics indicate that the two study groups were well balanced. Mean maternal age, gravidity, and gestational age were comparable between the misoprostol and oxytocin groups, with no statistically significant differences. This comparability strengthens the validity of the subsequent comparison of clinical outcomes, as major baseline differences were unlikely to influence the observed treatment effects (Table 1). Regarding the primary outcome, the incidence of postpartum hemorrhage was slightly higher in the misoprostol group than in the oxytocin group (5.8% vs. 4.2%); however, this difference was not statistically significant (p=0.33). This finding suggests that rectal misoprostol provided comparable prophylactic effectiveness to intravenous oxytocin in preventing postpartum hemorrhage in this study population (Table 2). Similarly, no statistically significant differences were observed in the duration of the third stage of labor (8.25±2.3 vs. 7.91±2.8 minutes, p=0.63), initial hematocrit, postpartum hematocrit reduction ≥10%, pre-delivery hemoglobin, or post-delivery hemoglobin.

The comparable hematological outcomes further support the finding that neither intervention demonstrated a clear advantage over the other in reducing postpartum blood loss. Blood transfusion was required in 2.6% of women in the misoprostol group compared with 1.3% in the oxytocin group (p=0.33). Although numerically higher in the misoprostol group, this difference was not statistically significant. Similarly, hospital stay was slightly longer among women receiving misoprostol (2.4±0.8 vs. 2.0±0.6 days), but the difference was not statistically significant (p=0.12). The adverse-effect profile demonstrated a different pattern. Shivering was significantly more common with misoprostol than with oxytocin (27.4% vs. 9.0%, p<0.001). Likewise, pyrexia occurred significantly more frequently in the misoprostol group (13.9% vs. 6.1%, p<0.001). These findings are consistent with the recognized adverse-effect profile of misoprostol, particularly its tendency to cause transient shivering and elevation of body temperature. In contrast, no statistically significant differences were demonstrated in nausea, headache, diarrhea, or vomiting. Although nausea, diarrhea, and vomiting were numerically more frequent in the oxytocin group, these differences were not statistically significant.

Table 1. Primary and Secondary Clinical Outcomes Between Study Cohorts (N=620)

Parameter / Clinical Outcome	Misoprostol Group (n=310)	Oxytocin Group (n=310)	p-value
Incidence of PPH (>500 mL)	18 (5.8%)	13 (4.2%)	0.33
Duration of Third Stage (min)	8.25±2.3	7.91±2.8	0.63
Initial Hematocrit (%)	36.2±2.3	37.1±2.4	0.23
Postpartum Hematocrit Drop ≥10%	7 (2.3%)	8 (2.6%)	0.23
Pre-delivery Hemoglobin (g/dL)	10.6±1.3	10.7±1.4	0.83
Post-delivery Hemoglobin (g/dL)	9.8±1.4	10.0±1.2	0.76
Blood Transfusion Requirement	8 (2.6%)	4 (1.3%)	0.33
Mean Length of Hospital Stay (days)	2.4±0.8	2.0±0.6	0.12

No statistically significant differences were observed regarding the primary endpoint of PPH incidence or secondary hematological metrics.

Table 2. Adverse Effect Profile Adverse Event	Misoprostol Group (n=310)	Oxytocin Group (n=310)	p-value
Shivering	85 (27.4%)	28 (9.0%)	<0.001
Pyrexia (≥38∘C)	43 (13.9%)	19 (6.1%)	<0.001
Nausea	18 (5.8%)	38 (12.3%)	0.771
Headache	24 (7.7%)	24 (7.7%)	0.211
Diarrhea	6 (1.9%)	12 (3.9%)	0.211
Vomiting	5 (1.6%)	12 (3.9%)	0.242
None Reported	139 (44.8%)	187 (60.3%)	0.770

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Shivering and transient pyrexia occurred significantly more frequently in patients receiving rectal misoprostol (p<0.001). All pyrexial episodes were mild (≤38.5◦C) and resolved spontaneously within 24 hours.

Discussion

Postpartum hemorrhage (PPH) remains one of the major causes of maternal morbidity and mortality worldwide, making effective prophylactic uterotonics an essential component of active management of the third stage of labor. The present study compared the efficacy and safety of 800 µg rectal misoprostol with 5 IU intravenous oxytocin for the prevention of PPH among 620 women. The two study groups were comparable at baseline. Mean maternal age, gravidity, and gestational age showed no statistically significant differences between the misoprostol and oxytocin groups. This similarity in baseline characteristics strengthens the validity of the comparison, as the observed differences in clinical outcomes are less likely to be explained by differences in demographic or obstetric characteristics. In the present study, PPH occurred in 5.8% of women receiving rectal misoprostol compared with 4.2% of those receiving intravenous oxytocin. Although the incidence was numerically higher in the misoprostol group, the difference was not statistically significant (p=0.33). This finding indicates that rectal misoprostol provided a prophylactic effect against PPH broadly comparable to oxytocin in this study population.

Previous evidence has demonstrated that misoprostol can effectively reduce postpartum blood loss and PPH, although oxytocin remains the preferred uterotonic when it is readily available and can be appropriately administered [7–9]. The duration of the third stage of labor was also comparable between the two groups, with mean durations of 8.25±2.3 minutes in the misoprostol group and 7.91±2.8 minutes in the oxytocin group (p=0.63). The absence of a significant difference suggests that both agents provided adequate uterotonic activity following delivery. Similar findings have been reported in comparative studies evaluating misoprostol and oxytocin for prevention of PPH. [8,10]. Hematological outcomes further supported the similarity between the two interventions. No statistically significant differences were observed in initial hematocrit, postpartum hematocrit reduction ≥10%, pre-delivery hemoglobin, or post-delivery hemoglobin. A hematocrit reduction ≥10% occurred in 2.3% of women receiving misoprostol and 2.6% receiving oxytocin (p=0.23). These findings suggest that neither treatment demonstrated a significant advantage in limiting postpartum hematological loss. Similar outcomes have been reported in randomized trials comparing misoprostol with conventional uterotonic agents [8,9].

Blood transfusion was required in 2.6% of women in the misoprostol group and 1.3% in the oxytocin group, with no statistically significant difference (p=0.33). Although the numerical difference favored oxytocin, the relatively small number of transfusion events limits the ability to establish a meaningful difference between the two interventions. Mean hospital stay was slightly longer in the misoprostol group than in the oxytocin group (2.4±0.8 vs. 2.0±0.6 days); however, this difference was not statistically significant (p=0.12). This finding suggests that the choice of prophylactic uterotonic did not substantially affect hospital length of stay. In contrast to the comparable efficacy outcomes, significant differences were observed in the adverse-effect profile. Shivering occurred in 27.4% of women receiving misoprostol compared with 9.0% receiving oxytocin (p<0.001). Similarly, transient pyrexia occurred in 13.9% of the misoprostol group compared with 6.1% of the oxytocin group (p<0.001). These findings are consistent with previous evidence showing that misoprostol is associated with a higher incidence of shivering and transient fever than oxytocin [9,11]. The increased frequency of shivering and pyrexia following misoprostol administration is clinically relevant but should be considered in the context of their generally self-limited nature. In the present study, all pyrexial episodes were mild, with temperatures ≤38.5ºC, and resolved spontaneously within 24 hours.

Similar transient thermoregulatory effects have been described in previous studies of misoprostol used for PPH prevention [9,11]. Other adverse effects, including nausea, headache, diarrhea, and vomiting, did not show statistically significant differences between the two groups. Although some gastrointestinal symptoms were numerically more frequent in the oxytocin group, these differences were not statistically significant. Overall, the adverse-effect profile suggests that the principal disadvantage of misoprostol in this study was its greater association with shivering and transient pyrexia. The findings have practical implications, particularly in resource-limited settings. Misoprostol is inexpensive, relatively easy to administer, stable at room temperature, and does not require intravenous access, making it a useful alternative when oxytocin is unavailable or its administration is difficult [7,9]. However, the higher frequency of shivering and pyrexia should be anticipated, and women should be appropriately monitored following administration. Overall, the present study demonstrates that 800 µg rectal misoprostol was comparable to 5 IU intravenous oxytocin in preventing PPH, with no statistically significant differences in PPH incidence, duration of the third stage of labor, hematological outcomes, blood transfusion requirements, or hospital stay. However, misoprostol was associated with significantly higher rates of shivering and transient pyrexia. Therefore, while oxytocin remains an important standard uterotonic, rectal misoprostol represents an effective alternative, particularly in settings where intravenous oxytocin is less accessible or less practical.

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Conclusion

Rectal misoprostol (800µg) is a safe, clinically non-inferior alternative to IV oxytocin for PPH prevention. Because it does not require refrigeration or intravenous access, it is highly suitable for busy or resource-limited maternity centers.

Conflict of interest. Nil

References

1. World Health Organization. WHO recommendations for the prevention and treatment of postpartum haemorrhage. Geneva: World Health Organization; 2012.
2. Gülmezoglu AM, Lumbiganon P, Landoulsi S, Widmer M, Abdel-Aleem H, Festin MR, et al. Active management of the third stage of labour with a lower dose of oxytocin and less controlled cord traction: a randomized controlled trial. BJOG. 2012 Sep;119(10):1170-80.
3. Hofmeyr GJ, Gülmezoglu AM, Novikova N, Linder V, Fawcus S, Alfirevic Z. Misoprostol for preventing and treating postpartum haemorrhage. Cochrane Database Syst Rev. 2013 Jul 15;2013(7):CD004308.
4. Lumbiganon P, Villar J, Piaggio G, Gülmezoglu AM, Adetoro L, Carroli G, et al. Side-effect and other health benefits of prophylactic misoprostol for prevention of postpartum haemorrhage: a randomised controlled trial. BJOG. 2002 Nov;109(11):1212-22.
5. Derman RJ, Kodkany BS, Goudar SS, Geller SE, Naik VA, Bellad MB, et al. Oral misoprostol in preventing postpartum haemorrhage in resource-poor communities: a randomised controlled trial. Lancet. 2006 Oct 7;368(9543):1248-53.
6. Gupta B, Jain V, Aggarwal N. Rectal misoprostol versus oxytocin in the prevention of postpartum hemorrhage — a pilot study. Int J Gynaecol Obstet. 2006 Nov;94 Suppl 2:S139-40.
7. Walraven G, Blum J, Dampha Y, Sowe M, Morison L, Winikoff B, et al. Misoprostol in the management of the third stage of labour in the home delivery setting in rural Gambia: a randomised controlled trial. BJOG. 2005 Sep;112(9):1277-83.