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Original Research Article

A Comparative Study of Carbetocin and Oxytocin in Prevention of Postpartum Haemorrhage at a Tertiary Care Centre

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Abstract

Background: Postpartum haemorrhage (PPH) remains a leading cause of maternal mortality, predominantly due to uterine atony. Oxytocin is the standard prophylactic uterotonic; however, its short duration of action and requirement for cold chain storage limit its effectiveness in certain settings. Carbetocin, a long-acting and heat-stable oxytocin analogue, offers the advantage of sustained uterine contraction. This study aimed to compare the effectiveness of carbetocin and oxytocin in the prevention of PPH at a tertiary care centre.

Methods: Prospective comparative study was conducted at T.S. Misra Medical College and Hospital, Lucknow, from July 2024 to December 2025. A total of 100 pregnant women aged 18–40 years were included and equally allocated into two groups: carbetocin (100 µg intravenous bolus) and oxytocin (10 IU intramuscular), administered at delivery of the anterior shoulder. Blood loss was assessed using both objective and visual methods. The primary outcome was the incidence of PPH (>500 mL after vaginal delivery or >1000 mL after caesarean section within 24 hours). Secondary outcomes included total blood loss, changes in haemoglobin and haematocrit levels, need for additional uterotonics, uterine tone, requirement of blood transfusion, and adverse effects. Statistical analysis was performed using appropriate tests, with $p < 0.05$ considered significant.

Results: Baseline demographic and clinical characteristics were comparable between the two groups ($p > 0.05$). The incidence of PPH was lower in the carbetocin group (2%) compared to the oxytocin group (10%), although the difference was not statistically significant ($p = 0.092$). Atonic PPH was the most common type observed. In vaginal deliveries, blood loss >500 mL was significantly lower in the carbetocin group (0% vs. 4%; $p = 0.030$). Mean blood loss and the decline in haemoglobin and haematocrit levels were comparable between groups. A significantly higher proportion of women in the carbetocin group had a firm uterus at 15 minutes postpartum (92% vs. 78%; $p = 0.049$). The need for blood transfusion (6% vs. 18%) and additional uterotonics was higher in the oxytocin group, although these differences were not statistically significant.

Conclusion: Carbetocin is a safe and effective alternative to oxytocin for the prevention of postpartum haemorrhage. It demonstrates superior early uterine tone and favourable clinical trends in reducing PPH incidence and intervention requirements. Carbetocin may be particularly advantageous in resource-limited settings due to its prolonged action and heat stability.

Keywords: Postpartum haemorrhage; Carbetocin; Oxytocin; Uterotonics; Uterine atony; Active management of third stage of labour; Blood loss; Tertiary care centre.

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Introduction

Postpartum haemorrhage (PPH) continues to be one of the most significant contributors to maternal morbidity and mortality worldwide, particularly in developing countries such as India. Despite advances in obstetric care, PPH accounts for nearly 25–30% of maternal deaths globally and remains a major preventable cause of mortality. According to the World Health Organization, PPH is defined as

blood loss exceeding 500 mL following vaginal delivery or more than 1000 mL after cesarean section within 24 hours of childbirth. The burden of PPH is disproportionately higher in low-resource settings due to delays in diagnosis, limited access to blood products, and inadequate emergency obstetric care.

Uterine atony is the most common cause of PPH, accounting for approximately 70–80% of cases. Effective prevention of uterine atony is therefore critical in reducing the incidence of PPH. Active management of the third stage of labour (AMTSL), which includes prophylactic administration of uterotonic agents, controlled cord traction, and uterine massage, has been widely adopted as a standard practice to prevent excessive blood loss. Among these, the timely use of uterotonic drugs plays the most pivotal role.

Oxytocin has traditionally been the first-line uterotonic agent recommended for the prevention of PPH due to its rapid onset of action and proven efficacy. However, its relatively short half-life necessitates repeated dosing or continuous infusion to maintain uterine tone, which may limit its effectiveness in certain clinical scenarios. Furthermore, oxytocin is heat-sensitive and requires cold chain storage, posing logistical challenges in resource-limited settings where maintaining optimal storage conditions may not always be feasible.

Carbetocin, a long-acting synthetic analogue of oxytocin, has been introduced as a potential alternative with pharmacokinetic advantages. It has a prolonged half-life and produces sustained uterine contractions following a single dose, eliminating the need for continuous infusion. This makes it particularly attractive in busy labor wards and low-resource settings. Additionally, the development of heat-stable formulations of carbetocin enhances its usability in regions where cold chain maintenance is difficult.

Several studies have compared the efficacy of carbetocin and oxytocin in preventing PPH, especially in cesarean deliveries, demonstrating reduced need for additional uterotonics and improved uterine tone with carbetocin. However, the evidence remains variable across different populations, modes of delivery, and clinical settings. There is limited data from Indian tertiary care centers evaluating the comparative effectiveness of these agents across both vaginal and caesarean deliveries using objective blood loss measurement techniques.

In this context, the present prospective comparative study was conducted at a tertiary care center in Lucknow to evaluate and compare the efficacy and safety of carbetocin and oxytocin in the prevention of postpartum haemorrhage. By assessing outcomes such as incidence of PPH, total blood loss, need for additional uterotonics, changes in hemoglobin levels, and maternal clinical parameters, this study aims to provide evidence-based insights to guide optimal uterotonic use and improve maternal outcomes in routine obstetric practice.

Aim: To study comparison between carbetocin and oxytocin in the prevention of postpartum hemorrhage (PPH) in women delivering at a tertiary care centre.

Objectives

1. To describe the effectiveness of Carbetocin in the prevention of postpartum hemorrhage (PPH).
2. To describe effectiveness of Oxytocin in the prevention of postpartum hemorrhage (PPH).
3. To compare the effectiveness of Carbetocin with that of oxytocin for the prevention of postpartum hemorrhage (PPH).

Methodology

Study Design and Setting: This prospective comparative study was conducted in the Department of Obstetrics and Gynaecology at T.S. Misra Medical College and Hospital, a tertiary care centre in Lucknow, Uttar Pradesh, India. The study was carried out over a period of 18 months, from July 1, 2024, to December 31, 2025.

Study Population: The study included pregnant women aged 18–40 years who delivered at the study institution during the study period. All eligible participants were screened at admission to the labour ward based on predefined inclusion and exclusion criteria.

Inclusion Criteria

- Pregnant women aged 18–40 years
- Women undergoing vaginal delivery or cesarean section under spinal anaesthesia
- Women who provided written informed consent

Exclusion Criteria

- Age <18 years or >40 years
- Placenta previa or abruptio placenta
- Presence of uterine fibroids
- Cesarean section under general anaesthesia
- Known hypersensitivity to carbetocin
- Refusal to participate

Sample Size: The sample size was calculated to detect a difference in the incidence of PPH between the two groups. Assuming a PPH incidence of 15% in the oxytocin group and 5% in the carbetocin group, with 80% power and 95% confidence level, the required sample size was

calculated using the formula for comparison of two proportions:

The calculated sample size was approximately 137. To ensure feasibility and account for institutional constraints, a total of 100 participants were included, with 50 in each group.

Sampling Technique and Group Allocation: Eligible participants were enrolled consecutively and allocated into two groups using an alternating allocation method based on admission sequence to ensure balanced distribution:

- Carbetocin group
- Oxytocin group

Each group comprised 50 participants.

Intervention: Participants received uterotonic agents at the time of delivery of the anterior shoulder:

- **Carbetocin Group:** 100 µg intravenous bolus
- **Oxytocin Group:** 10 IU intramuscular injection

In cases of PPH, additional uterotonics were administered as per institutional protocol, including oxytocin infusion, methylergometrine, misoprostol, and prostaglandins. Surgical interventions were employed when necessary.

Data Collection: Data were collected using a structured and pre-tested proforma. Information recorded included:

Baseline Characteristics

- Age, parity, gestational age
- Mode of delivery
- Relevant obstetric and medical history

Primary Outcome: Incidence of postpartum haemorrhage within 24 hours of delivery

Secondary Outcomes

- Total blood loss
- Need for additional uterotonics
- Requirement for blood transfusion
- Changes in hemoglobin and hematocrit levels
- Uterine tone at 15, 30, 60, and 120 minutes
- Maternal vital parameters
- Urine output

Measurement of Blood Loss

Blood loss was quantified using a combination of objective and subjective methods:

- Measurement using calibrated suction apparatus
- Weighing of soaked pads and drapes after subtracting dry weight
- Use of separate suction containers for amniotic fluid
- Visual estimation by the attending obstetrician

Outcome Measures: The primary outcome was the incidence of PPH, defined as blood loss ≥500 mL within 24 hours of delivery. Secondary outcomes included total blood loss, additional uterotonic requirement, transfusion need, hematological changes, uterine tone, and maternal clinical parameters.

Validity and Reliability: Content validity of the data collection tool was established by expert review. A pilot study was conducted to refine the tool. Internal consistency was confirmed with Cronbach's alpha of 0.80, and test-retest reliability showed a correlation coefficient of 0.85.

Statistical Analysis

Data were analysed using SPSS version 25.0.

- Continuous variables were expressed as mean ± standard deviation
- Categorical variables were expressed as frequencies and percentages

Comparisons were made using:

- Chi-square test or Fisher's exact test for categorical variables
- Independent t-test or Mann–Whitney U test for continuous variables

A p-value <0.05 was considered statistically significant.

Ethical Considerations: The study was approved by the Institutional Ethics Committee. Written informed consent was obtained from all participants. Confidentiality was maintained throughout the study.

Results

Table 1: Distribution of the study patients based on groups

Groups	Frequency (n=100)	Percentage
Group C – Carbetocin	50	50.0%
Group O – Oxytocin	50	50.0%

A total of 100 women were included in the study, with equal allocation of 50 participants (50.0%) in each group. This ensured uniform comparison between the Carbetocin and Oxytocin groups.

Table 2: Age distribution

Age (Years)	Group C	Group O	p-value
20–25	16 (32.0%)	13 (26.0%)	
26–30	24 (48.0%)	24 (48.0%)	>0.05
>30	10 (20.0%)	13 (26.0%)	
Mean ± SD	27.74 ± 4.15	28.44 ± 4.05	0.395

The predominant age group in both cohorts was 26–30 years, comprising 24 women (48.0%) in each group. The distribution across other age groups was also similar, and the mean age showed no statistically significant difference (p = 0.395), indicating comparable baseline characteristics.

Table 3: Educational status

Education	Group C	Group O	p-value
Illiterate	6 (12.0%)	5 (10.0%)	
8th pass	3 (6.0%)	1 (2.0%)	
Matric	23 (46.0%)	22 (44.0%)	0.775
12th pass	1 (2.0%)	1 (2.0%)	
Graduate	17 (34.0%)	21 (42.0%)	

Most participants had completed matriculation, accounting for 23 (46.0%) in Group C and 22 (44.0%) in Group O. Graduates formed the next largest group. Educational status was comparable between groups (p = 0.775).

Table 4: Socioeconomic status

Status	Group C	Group O	p-value
Lower	11 (22.0%)	8 (16.0%)	
Lower middle	11 (22.0%)	13 (26.0%)	
Middle	12 (24.0%)	15 (30.0%)	0.775
Upper lower	16 (32.0%)	14 (28.0%)	

The majority belonged to the upper-lower socioeconomic class (32.0% vs. 28.0%). Distribution across other classes was also similar, with no statistically significant difference.

Table 5: Area of residence

Area	Group C	Group O	p-value
Rural	30 (60.0%)	28 (56.0%)	0.686
Urban	20 (40.0%)	22 (44.0%)	

A higher proportion of women were from rural areas in both groups (60.0% vs. 56.0%), with comparable urban representation.

Table 6: Anthropometric parameters

Parameter	Group C	Group O	p-value
Height	154.78 ± 3.66	154.80 ± 3.43	0.977
Weight	70.08 ± 4.96	71.12 ± 5.16	0.307
BMI	29.4 ± 2.25	29.7 ± 2.54	0.533

Anthropometric parameters were nearly identical across both groups, with no statistically significant differences.

Table 7: Parity distribution

Parity	Group C	Group O	p-value
0	25 (50.0%)	23 (46.0%)	
1	22 (44.0%)	25 (50.0%)	
2	2 (4.0%)	2 (4.0%)	0.735
>2	1 (2.0%)	0 (0.0%)	

Primigravida women formed the largest group (50.0% vs. 46.0%). Parity distribution was similar with no significant difference.

Table 8: Gestational age

Gestational Age	Group C	Group O	p-value
<36 weeks	1 (2.0%)	5 (10.0%)	
36–38 weeks	22 (44.0%)	25 (50.0%)	0.142
>38 weeks	27 (54.0%)	20 (40.0%)	
Mean ± SD	37.32 ± 1.33	37.66 ± 1.45	0.225

Most pregnancies were term (>38 weeks), and gestational age distribution was comparable between groups.

Table 9: Distribution of patients based on risk factors

Risk Factors	Group C (n=50)	Group O (n=50)
Twin pregnancy	3 (6.0%)	0 (0.0%)
Severe anemia	2 (4.0%)	2 (4.0%)
PROM	3 (6.0%)	5 (10.0%)
PPROM	4 (8.0%)	4 (8.0%)
Preterm labor	3 (6.0%)	4 (8.0%)
GDM	2 (4.0%)	2 (4.0%)
Severe IUGR	2 (4.0%)	2 (4.0%)
Severe preeclampsia	2 (4.0%)	1 (2.0%)
Breech	2 (4.0%)	2 (4.0%)
Polyhydramnios	1 (2.0%)	3 (6.0%)
Previous LSCS	9 (18.0%)	12 (24.0%)
Others	9 (18.0%)	7 (14.0%)
None	8 (16.0%)	6 (12.0%)

The distribution of obstetric risk factors was comparable between both groups. Previous cesarean section was the most common risk factor, observed in 9 (18.0%) women in Group C and 12 (24.0%) in Group O. Other risk factors such as PROM, PPROM, and preterm labor showed similar distribution. Overall, no major imbalance in baseline risk profile was noted.

Table 10: Distribution based on mode of delivery

Mode of Delivery	Subtype	Group C	Group O	p-value
Vaginal	Spontaneous	13 (26.0%)	11 (22.0%)	
	Induced	6 (12.0%)	7 (14.0%)	
LSCS	Elective	11 (22.0%)	6 (12.0%)	
	Emergency	20 (40.0%)	25 (50.0%)	0.513
Instrumental	Forceps	0 (0.0%)	1 (2.0%)	

Mode of delivery was similar across both groups. LSCS constituted a significant proportion, particularly emergency LSCS (40.0% in Group C vs. 50.0% in Group O). Vaginal deliveries were also comparable. No statistically significant difference was observed ($p = 0.513$).

Table 11: Comparison of blood pressure (mmHg)

Parameter	Group C	Group O	p-value
SBP Pre-op	113.1 ± 20.28	112.78 ± 19.12	0.071
SBP Post-op	107.68 ± 5.3	110.04 ± 10.58	0.377
DBP Pre-op	73.2 ± 9.64	72.72 ± 7.99	0.044
DBP Post-op	69.32 ± 9.36	72.68 ± 11.44	0.984

Hemodynamic parameters remained stable in both groups. Although a statistically significant difference was noted in pre-operative DBP ($p = 0.044$), it was not clinically significant. Overall, both groups maintained comparable blood pressure profiles.

Table 12: Comparison of total blood loss based on mode of delivery

Mode	Blood Loss	Group C	Group O	p-value
Vaginal (n=38)	≤500 ml	19 (50.0%)	17 (44.7%)	
	>500 ml	0 (0.0%)	2 (5.3%)	0.030
	Mean ± SD	381.57 ± 47.75	444.21 ± 111.66	0.128
LSCS (n=62)	≤1000 ml	29 (46.8%)	28 (45.2%)	
	>1000 ml	2 (3.2%)	3 (4.8%)	0.640
	Mean ± SD	637.09 ± 180.72	606.45 ± 209.26	0.539

In vaginal deliveries, all women in Group C had blood loss ≤500 ml, whereas 2 (5.3%) women in Group O had blood loss >500 ml, showing a statistically significant difference ($p = 0.030$). In LSCS, blood loss was comparable between groups.

Table 13: Comparison of hemoglobin levels (g/dl)

Parameter	Group C	Group O
Pre-operative	11.28 ± 1.39	11.21 ± 1.51
Post-operative	10.32 ± 1.23	10.14 ± 1.52
p-value	<0.001	<0.001

Both groups showed a statistically significant decline in hemoglobin levels post-delivery ($p < 0.001$). The magnitude of reduction was similar, indicating comparable blood loss impact.

Table 14: Comparison of hematocrit levels (%)

Parameter	Group C	Group O
Pre-operative	35.02 ± 2.71	35.17 ± 3.83
Post-operative	33.00 ± 2.56	33.08 ± 3.71
p-value	<0.001	0.007

A statistically significant reduction in hematocrit levels was observed in both groups, with no meaningful difference between them.

Table 15: Comparison of platelet count (/mm³)

Parameter	Group C	Group O
Pre-operative	173180 ± 46981	171020 ± 50018
Post-operative	144220 ± 41225	146585 ± 55051
p-value	<0.001	0.022

Platelet counts declined significantly in both groups post-delivery, reflecting physiological response, with comparable trends.

Table 16: Occurrence of postpartum hemorrhage

PPH	Group C	Group O	p-value
No	49 (98.0%)	45 (90.0%)	
Yes	1 (2.0%)	5 (10.0%)	0.092

PPH was observed in 1 (2.0%) woman in Group C compared to 5 (10.0%) in Group O. Although not statistically significant, the trend suggests lower PPH incidence with carbetocin.

Table 17: Type of PPH

Type	Group C	Group O	p-value
Traumatic	0 (0.0%)	1 (2.0%)	
Atonic	1 (2.0%)	4 (8.0%)	0.226
No PPH	49 (98.0%)	45 (90.0%)	

Atonic PPH was more frequent in Group O, while no traumatic PPH was observed in Group C. However, differences were not statistically significant.

Table 18: Additional interventions

Intervention	Group C	Group O	p-value
Blood transfusion (Yes)	3 (6.0%)	9 (18.0%)	0.064
Oxytocin infusion	10 (20.0%)	16 (34.0%)	0.171
Misoprostol	6 (12.0%)	9 (18.0%)	0.400
PGF2α	2 (4.0%)	7 (14.0%)	0.080

The Oxytocin group required more additional interventions, including blood transfusions (18.0% vs. 6.0%) and uterotonics, indicating relatively lower efficacy compared to carbetocin.

Table 19: Uterine tone

Time	Tone	Group C	Group O	p-value
15 min	Hard	46 (92.0%)	39 (78.0%)	0.049
	Flabby	4 (8.0%)	11 (22.0%)	
30 min	Hard	49 (98.0%)	50 (100.0%)	0.314
60 min	Hard	50 (100.0%)	50 (100.0%)	1.00
120 min	Hard	50 (100.0%)	50 (100.0%)	1.00

At 15 minutes, significantly more women in Group C had a firm uterus (92.0% vs. 78.0%, p = 0.049). At later intervals, uterine tone was comparable in both groups.

Discussion

Postpartum haemorrhage (PPH) remains a leading cause of maternal morbidity and mortality worldwide, accounting for a substantial proportion of preventable maternal deaths, particularly in low- and middle-income countries. The third stage of labour is critical, as serious and life-threatening complications may arise even in the absence of identifiable risk factors. Prompt and effective management during this period is therefore essential to prevent adverse maternal outcomes.

Both oxytocin and carbetocin exert their uterotonic effects by binding to oxytocin receptors in the uterine myometrium, resulting in rhythmic uterine contractions. Oxytocin, when administered intramuscularly, has a rapid onset of action within 3–5 minutes; however, its effect is relatively short-lived, typically lasting 2–3 hours. Due to its short half-life (1–6 minutes), continuous infusion is often required to maintain uterine tone. Additionally, oxytocin requires cold chain storage and trained

personnel for administration, which may limit its effectiveness in resource-constrained settings. In contrast, carbetocin, a long-acting oxytocin analogue, provides sustained uterine contraction following a single dose, making it a potentially advantageous alternative in clinical practice.

Demographic Characteristics: The present study demonstrated that both groups were well matched in terms of age distribution. The majority of participants in both groups belonged to the 26–30-year age group, with mean ages of 27.74 years in the carbetocin group and 28.44 years in the oxytocin group, showing no statistically significant difference. These findings are consistent with studies by Tai et al., Priya ALP et al., and Jha et al., all of which reported comparable age distribution between groups, reflecting the peak reproductive age in the Indian population.

Educational and socioeconomic characteristics were also comparable between groups. Most women had completed matriculation, followed by a substantial proportion of graduates. The majority belonged to the upper-lower and middle socioeconomic classes. These findings are similar to those reported in other Indian studies, suggesting homogeneity of baseline characteristics and minimizing confounding effects. Furthermore, a larger proportion of participants were from rural areas, emphasizing the relevance of the study in populations with limited access to advanced obstetric care.

Anthropometric and Obstetric Characteristics: Anthropometric parameters such as height, weight, and BMI were comparable between the two groups. Elevated BMI has been associated with an increased risk of PPH due to uterine atony and prolonged labour; however, the similarity in BMI between groups in the present study minimizes its confounding effect. Comparable findings have been reported by Desai D et al., who also observed no significant difference in BMI between carbetocin and oxytocin groups.

With respect to parity, nearly half of the women in both groups were primigravidae, followed by parity 1. The distribution of parity was similar between groups, consistent with findings reported by Tai et al. and Jha et al. Gestational age was also comparable, with most deliveries occurring at term in both groups. These findings indicate that both groups were well matched in terms of obstetric characteristics, allowing for valid comparison of outcomes.

Risk Factors and Mode of Delivery: The distribution of obstetric risk factors was similar between the two groups, with previous cesarean section being the most common risk factor. Other conditions such as PROM, PPROM, hypertensive disorders, and gestational diabetes were evenly distributed. Similar findings have been reported by Tse KY et al. and Ahmed ME et al., reinforcing the comparability of study groups.

Mode of delivery was also comparable, with a significant proportion of cesarean sections in both groups. Emergency cesarean section was slightly more common in the oxytocin group, while elective cesarean section was more frequent in the carbetocin group. Vaginal deliveries, both spontaneous and induced, were similarly distributed. These findings are consistent with those reported by Tai et al., where no significant difference in delivery mode was observed between groups.

Hemodynamic Parameters: Both groups demonstrated stable hemodynamic parameters pre- and post-delivery. Although a statistically significant reduction in diastolic blood pressure was observed in the carbetocin group, it was not clinically significant. These findings are comparable to those reported by Priya ALP et al., who also observed similar hemodynamic stability between the two groups.

Blood Loss According to Mode of Delivery: In vaginal deliveries, the incidence of blood loss exceeding 500 ml was higher in the oxytocin group, and this difference was statistically significant. Although the difference in mean blood loss was not statistically significant, the trend toward reduced blood loss with carbetocin is clinically important. In cesarean deliveries, blood loss was comparable between the two groups.

These findings are consistent with those reported by Tai et al. and Jha et al., who observed reduced blood loss with carbetocin. However, some studies such as Desai D et al. have reported a statistically significant reduction in blood loss with carbetocin, highlighting variability in findings across studies.

Hematological Changes: Both groups exhibited a statistically significant decline in hemoglobin, hematocrit, and platelet levels post-delivery. However, no significant difference was observed between the two groups. While some studies, including those by Ahmed ME et al. and Debbie-Lyn Uy et al., have reported better preservation of hemoglobin levels with carbetocin, the present study did not demonstrate a significant intergroup difference. This may be attributed to the relatively small sample size and inclusion of both vaginal and cesarean deliveries.

Incidence and Type of PPH: The incidence of PPH was lower in the carbetocin group compared to the oxytocin group, although the difference did not reach statistical significance. Atonic PPH was the predominant type in both groups, consistent with the known pathophysiology of PPH. The

requirement for additional uterotonics and blood transfusion was higher in the oxytocin group, suggesting comparatively better efficacy of carbetocin. However, these differences were not statistically significant. Advanced surgical interventions were rarely required in either group, indicating effective overall management.

Uterine Tone and Additional Interventions: A significantly higher proportion of women in the carbetocin group had a firm uterus at 15 minutes post-delivery compared to the oxytocin group. At later time intervals, uterine tone was comparable in both groups. This suggests that carbetocin provides more rapid and sustained uterine contraction in the immediate postpartum period.

These findings are supported by studies such as those by Tai et al. and Esseissah SA et al., which reported lower rates of PPH and reduced need for additional uterotonics with carbetocin. However, some studies, including those by Hang X et al. and Tse KY et al., have reported no significant difference between the two agents, indicating variability in outcomes.

Conclusion

The present study demonstrates that both carbetocin and oxytocin are effective uterotonic agents for the prevention of postpartum haemorrhage. However, carbetocin showed certain clinical advantages over oxytocin. It was associated with better early uterine tone, a lower incidence of postpartum haemorrhage, reduced blood loss in vaginal deliveries, and a decreased requirement for additional uterotonic agents and blood transfusion.

Although many of these differences did not reach statistical significance, the consistent trend in favor of carbetocin suggests its superior clinical efficacy, particularly in the immediate postpartum period. The sustained uterotonic effect of carbetocin following a single dose makes it a practical and effective alternative to oxytocin, especially in busy labour wards and resource-limited settings where continuous infusion and cold chain maintenance may be challenging.

Both drugs demonstrated comparable safety profiles, with stable hemodynamic parameters and no major adverse outcomes observed. The findings of this study support the use of carbetocin as an effective uterotonic agent for the prevention of postpartum haemorrhage. However, larger multicentric studies with greater sample size are recommended to further validate these findings and to establish statistical significance across different clinical settings and modes of delivery.

References

1. Hogan MC, Foreman KJ, Naghavi M, Ahn SY, Wang M, Makela SM, et al. Maternal mortality for 181 countries 1980–2008: systematic analysis of progress towards millennium development goal. Lancet. 2010; 375(9726): 1609–23.
2. Bashir K, Sabha M. Carbetocin versus oxytocin in placental separation and postpartum hemorrhage in caesarean section: comparative observational study. Int J Reprod Contracept Obstet Gynecol. 2023; 12:2004–7.
3. Heneghan C, Ward A, Perera R, et al. Self-monitoring of oral anticoagulation: systematic review and meta-analysis of individual patient data. Lancet. 2012;379:322–34.
4. Westhoff G, Cotter AM, Tolosa JE. Prophylactic oxytocin for the third stage of labour to prevent postpartum haemorrhage. Cochrane Database Syst Rev. 2013;CD001808.
5. World Health Organization. WHO recommendations for the prevention and treatment of postpartum haemorrhage. Geneva: WHO Press; 2012. Available from: http://apps.who.int/iris/bitstream/10665/75411/1/9789241548502_eng.pdf.
6. Tse KY, Yu FNY, Leung KY. Comparison of carbetocinand oxytocin infusions in reducing the requirement for additional uterotonics or procedures in women at increased risk of postpartum haemorrhage after caesarean section. Hong Kong Med J. 2020;26:382–9.
7. Jin XH, Li D, Li X. Carbetocin vs oxytocin for prevention of postpartum hemorrhage after vaginal delivery: a meta-analysis. Medicine (Baltimore). 2019;98(47):e17911.
8. Chen YT, Chen SF, Hsieh TT, Lo LM, Hung TH. Comparison of the efficacy of carbetocin and oxytocin on hemorrhage-related changes in women with caesarean deliveries. Taiwan J Obstet Gynecol. 2018; 57:677–82.
9. Attilakos G, Psaroudakis D, Ash J, Buchanan R, Winter C, Donald F, et al. Carbetocin versus oxytocin for the prevention of postpartum haemorrhage following caesarean section: a double-blind randomized trial. BJOG. 2010;117(8):929–36.
10. Tai K, Barman K, Das R, Mili T, Chowdhury N. Comparison of intravenous carbetocin versus intramuscular oxytocin in management of third stage of labour in vaginal delivery. New Indian J OBGYN. 2024;10(2):300–4.
11. Singh G, Radhakrishnan G, Guleria K. Comparison of sublingual misoprostol, intravenous oxytocin, and intravenous methylergometrine in active management of

the third stage of labor. Int J Gynaecol Obstet. 2009;107(2):130–4.
12. Chaudhuri P, Banerjee GB, Mandal A. Rectally administered misoprostol versus intravenous oxytocin infusion during cesarean delivery to reduce blood loss. Int J Gynaecol Obstet. 2010;109(1):25–9.
13. Desai D, Chaudhary R, Pawar A. Comparative analysis of carbetocin and oxytocin in the prevention of postpartum hemorrhage following caesarean section. IJIRMS. 2025; 10(11): 1–6.
14. Uy DL, Pangilinan NC, Cabingue CR. Carbetocinversus oxytocin for the prevention of postpartum hemorrhage following elective caesarean section: Rizal Medical Center experience. Philipp J Obstet Gynecol. 2013; 37(2): 71–79.