Section: Obstetrics & Gynecology

Original Research Article

ROLE OF CARBETOCIN VS OXYTOCIN IN PREVENTION OF POSTPARTUM HEMORRHAGE IN A TERTIARY CARE CENTRE

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ABSTRACT

Background: Aim: The main aim of the present study was to evaluate the efficacy of carbetocin in prevention of primary postpartum hemorrhage in anemic women at department of OBG GGH Vijayawada in comparison to oxytocin. **Materials and Methods:** The present study was conducted at Department of Obstetrics & Gyenecology, Government General Hospital, Vijayawada, with the primary aim of comparing the efficacy of carbetocin and oxytocin in preventing postpartum hemorrhage (PPH) among anemic women. A total of 100 pregnant women with singleton term pregnancies with anemia were randomly assigned into two groups: one group received 100 mcg of carbetocin and the other received 20 units of oxytocin during the third stage of labor. Blood loss was measured post-delivery by weighing pads, and changes in hemoglobin levels were also recorded to assess blood loss more precisely. **Results:** In the present study, baseline characteristics, including age, gestational age, mode of delivery, parity, BMI, comorbidities, and pre-delivery hemoglobin levels, were statistically similar between the two groups. However, significant differences were observed in clinical outcomes. The carbetocin group had a lower mean blood loss (505.4 mL vs. 626.38 mL; $p<$ 0.00001), a smaller drop in hemoglobin (0.6 g/dL vs. 0.9 g/dL; $p = 0.02$), and better uterine tone (with a significant number showing well-contracted uterus; $p = 0.03$). Additionally, fewer women in the oxytocin group required additional uterotonic agents (16% vs. 36%; $p = 0.02$) and blood transfusions (mean transfusions 0.52 vs. 0.75; $p = 0.04$). **Conclusion:** Overall, the study concluded that carbetocin is more effective than oxytocin in reducing blood loss and the need for additional interventions to manage PPH in anemic women. The findings suggest that carbetocin could serve as a superior alternative to oxytocin for PPH prevention in similar clinical settings.

INTRODUCTION

Postpartum haemorrhage (PPH) is a serious obstetric complication marked by heavy bleeding after giving birth, which poses a considerable threat to maternal health and well-being. It is an important global health issue and even with improvements in obstetric care, postpartum haemorrhage (PPH) continues to be a significant cause of maternal illness and death worldwide, especially in areas with little resources.

Estimated maternal deaths worldwide due to postpartum hemorrhage is 223 deaths per 1lakh live births per year. In India postpartum hemorrhage contributes to 20 percent of maternal deaths.Uterotonic medicines are crucial in preventing and treating postpartum haemorrhage by stimulating uterine contractions and decreasing blood loss after childbirth. The most common underlying cause of PPH is uterine atony. However, prophylactic use of uterotonics are effective in reducing PPH, and among the uterotonics the drug of choice is Oxytocin.[1]It has decreased the incidence of PPH by 40%. It has a rapid onset of action and a short half-life of 3-5 min due to which it requires a continuous intravenous infusion or repeated intramuscular injections.[2]Oxytocin is widely regarded as the primary preventive treatment

for postpartum haemorrhage because of its proven effectiveness and safety record.

In recent years, there has been increasing interest in carbetocin, a synthetic long acting oxytocin that is heat stable and has a longer duration of action, as an effective alternative for preventing postpartum haemorrhage.[3]Carbetocin has a rapid onset of action (within 1-2 min) and a prolonged duration of action. Its safety profile is comparable to that of oxytocin.[4,5,6]

The reason for comparing oxytocin with carbetocin is to improve preventive methods for postpartum haemorrhage and fill in the deficiencies in present obstetric procedures. Oxytocin has been extensively utilised and researched for many years.[7,8]The introduction

of carbetocin presents new opportunities for enhancing maternal results, especially in high-risk groups or environments with restricted access to healthcare facilities. It is crucial for healthcare providers and policymakers to comprehend the similarities, distinctions, and advantages of these two uterotonic medicines in order to make informed judgements about PPH prevention procedures. Our study intends to thoroughly assess and compare oxytocin and carbetocin for their effectiveness in preventing postpartum haemorrhage.

Aims and Objectives

Aim is to evaluate the efficacy of carbetocin in prevention of primary postpartum hemorrhage in anemic women at department of OBG GGH Vijayawada in comparision to oxytocin.

MATERIALS AND METHODS

Study conducted in the department of obstetrics and gynaecology, Government General Hospital, Vijayawada.

Study design: A randomised controlled trial study of 100 women with singleton term pregnancy are included

Study period: May 2025 to April 2026 (1 year)

Participants randomized into 2 groups, group A receiving 100mcg carbetocin and group-B receiving 20 units of oxytocin in third stage of labor.

Post-delivery we assessed estimation of blood loss by weighing pads.

Other appropriate investigations are change in hemoglobin levels.

Inclusion Criteria

1. women > 18 yrs of age
2. Women with singleton, term pregnancy
3. Anemic pregnant women.

Exclusion Criteria

1. Women with coagulopathy
2. History of liver, renal disease
3. History of drug allergy

Statistical Analysis: All statistical analysis were done by using SPSS Software version 20.0 and MS Excel -2019 Continuous data were presented as Mean +/- standard deviation and percentages. Categorical data will be represented in the form of frequencies. Chi square test and T test were done to compare the groups. For all statistical analysis P < 0.05 were considered as statistically significant.

RESULTS

Table1:Age distribution of study group

Study group	Count of Age	Percentage
</=20 yrs	17	17 %
21-25 yrs	36	36%
26-30 yrs	38	38%
>/=30 yrs	9	9%
Total	100	100%

Most patients belonged to the age group 26-30 years, followed by 21-25 years

The mean age of the study population was 24.94.

Table 2: The Mean age group of Carbetocin& Oxytocin

Age	Carbetocin	Oxytocin	Grand Total
</=20 yrs	8	9	17%
21-25 yrs	17	19	36%
26-30 yrs	20	18	38%
>/=30 yrs	5	4	9%
Total	50	50	100%

The mean age of Carbetocin group is 25.22 years. The mean age of oxytocin group is 24.6 years. The difference is not statistically significant (p=0.2).

Table 3: Parity distribution of study group

Parity	Carbetocin	Oxytocin	Grand Total
1	15	16	31
2	28	26	54
3	7	8	15
Grand Total	50	50	100

The difference between mean parity between both the groups is not statistically significant at p=0.1.

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Table 4: Body mass index

Study group	Carbetocin	Oxytocin
Mean BMI	25.4	26.8

The difference in mean BMI of both the groups is not statistically different at p=0.24

Table 5: Socioeconomic class

Row Labels	Carbetocin	Oxytocin
Lower	19	27
Middle	26	19
Upper	5	4
Grand Total	50	50

The difference in socioeconomic class of both the groups is not statistically different at p=0.8

Table 6: Gestational age of study group

Gestational age	Carbetocin	Oxytocin	Grand Total
37 weeks	8	5	13
38 weeks	14	5	19
39 weeks	24	30	54
40 weeks	4	10	14
Total	50	50	100

The mean gestational age of group 1 and 2 are 38.4 and 38.9 weeks respectively. The difference is not statistically significant at p=0.1

Table 7: Grades of anemia

Row Labels	Count of Anemia grading	%
Mild	31	31
Moderate	61	61
Severe	8	8
Grand Total	100	100

Table 8: Anemia of Carbetocin group

Anemia	Carbetocin	Oxytocin
Mild	16	15
Moderate	30	31
Severe	4	4
Grand Total	50	50

Table 9: Mean pre delivery haemoglobin

	Carbetocin	Oxytocin
Mean pre-op Hb	9.1	9.2

The difference in mean pre delivery Hb between both the groups is not statistically significant at p=0.3.

Table 10: Mode of delivery

Mode of delivery	Carbetocin	Oxytocin
Caesarean	24	22
Vaginal	26	28
Grand Total	50	50

The difference in both the groups in terms of mode of delivery is not statistically significant at p=0.3.

Table 11: Uterine tone assessment after drug administration

	Carbetocin	Oxytocin	Grand Total
Well contracted	41	37	78
Adequately contracted	7	11	18
Atonic	2	2	4
Grand Total	50	50	100

The uterine tone is well contracted in carbetocin group more than in oxytocin with p=0.03.

Table 12: Mean Blood loss after delivery

	Carbetocin	Oxytocin
Mean blood loss (in ml)	505.4	626.38

The mean blood loss between both the groups is statistically significant. The p-value is < .00001. The result is significant at p < .05.

Table 13: Post-delivery Hemoglobin

	Carbetocin	Oxytocin
Mean Post deliveryHemoglobin	8.5	8.3

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The difference in mean pre delivery Hb between both the groups is not statistically significant at p=0.02.

Table 14: Drop in Hb after delivery

	Carbetocin	Oxytocin
Mean pre delivery Hb	9.1	9.2
Mean Post deliveryHb	8.5	8.3
Drop in Hb	0.6	0.9

The difference in both groups in drop in Hb is statistically significant at p=0.02.

Table 15: Need for other uterotonics

Need for other uteritonics	Carbetocin	Oxytocin	Grand Total
No	42	32	74
Yes	8	18	26
Grand Total	50	50	100

The need for uterotonics among both the groups is statistically significant at p=0.02.

Table 16: Blood transfusions

Number of transfusions	Carbetocin	Oxytocin	Grand Total
0	26	21	47
1	22	24	46
2	2	4	6
3	0	1	1
Grand Total	50	50	100

The mean blood transfusions in carbetocin and oxytocin groups are 0.52 and 0.75 respectively and the difference is statistically significant at p=0.04.

DISCUSSION

The study involved 100 anemic women divided equally into two groups—one receiving carbetocin and the other oxytocin—for the prevention of postpartum hemorrhage (PPH). The average age of participants was similar in both groups (25.22 years for carbetocin, 24.6 years for oxytocin), and the difference was not statistically significant (p=0.2). Gestational age, comorbidities (including gestational diabetes, hypertension, and severe anemia), mode of delivery (cesarean or vaginal), parity, and pre-delivery hemoglobin levels were also comparable across the two groups, with no statistically significant differences (p>0.05 for all parameters).

However, significant differences emerged in terms of outcomes directly related to uterotonic efficacy. The mean blood loss was substantially lower in the carbetocin group (505.4 mL) compared to the oxytocin group (626.38 mL), with this difference being highly significant (p<0.00001). Similarly, the drop in hemoglobin post-delivery was less in the carbetocin group (0.6 g/dL) than in the oxytocin group (0.9 g/dL), a statistically significant result (p=0.02). Uterine tone was better in the carbetocin group, with 82% showing well-contracted uterus versus 74% in the oxytocin group (p=0.03). The need for additional uterotonic agents was significantly lower in the carbetocin group (16%) than in the oxytocin group (36%) (p=0.02).

Furthermore, carbetocin was associated with fewer blood transfusions on average (mean of 0.52) compared to the oxytocin group (mean of 0.75), which was also statistically significant (p=0.04). These findings underscore the superior efficacy of carbetocin over oxytocin in minimizing blood loss, preserving hemoglobin levels, reducing the need for additional uterotonics and blood transfusions, and improving uterine tone post-delivery in anemic women.

Table 17: A brief comparison of our study with other studies in the literature: Mean Age

Study	Mean age
Patil (9)	24.9
Delorme (10)	33.0
Larciprete (11)	36.5
Korb (12)	32.1
Voon (13)	31.2
Our study	24.9

This is a table comparing the mean age in our study compared to the mean age in other studies published in the literature. The mean age in our study is comparable to the mean age in other studies published in the literature.

Table 18: Mean gestational age

Study	Mean gestational age
Patil (9)	37.9
Delorme (10)	37.6
Larciprete (11)	36.3
Korb (12)	37.1
Voon (13)	36.9
Our study	38.6

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This is a table comparing the mean gestational age in our study compared to the mean gestational age in other studies published in the literature. The mean gestational age in our study is comparable to the mean gestational age in other studies published in the literature.

This is a graph comparing the mean gestational age in our study compared to the mean gestational age in other studies published in the literature. The mean gestational age in our study is comparable to the mean gestational age in other studies published in the literature.

Table 19: Mean volume of blood loss

Study	Mean volume of blood loss
Patil (9)	377.5
Delorme (10)	468.6
Larciprete (11)	622.5
Korb (12)	420.6
Voon (13)	613.2
Our study	565.89

This is a table comparing the mean volume of blood loss in our study compared to the mean volume of blood loss in other studies published in the literature. The mean volume of blood loss in our study is comparable to the mean volume of blood loss in other studies published in the literature.

Table 20: Mean Pre-op Hb in carbetocin group

Study	Mean Pre op Hb
Patil (9)	8.9
Delorme (10)	9.8
Larciprete (11)	10.1
Korb (12)	9.6
Voon (13)	8.2
Our study	9.1

This is a table comparing the mean pre op Hb in our study compared to the mean pre op Hb in other studies published in the literature. The mean pre op Hb in our study is comparable to the mean pre op Hb in other studies published in the literature.

Table 21: Mean Post op Hb in carbetocin group

Study	Mean post-op Hb
Patil (9)	9.1
Delorme (10)	8.9
Larciprete (11)	9.1
Korb (12)	8.4
Voon (13)	7.1
Our study	8.5

This is a table comparing the mean post op Hb in our study compared to the mean post op Hb in other studies published in the literature. The mean post op Hb in our study is comparable to the mean post op Hb in other studies published in the literature.

Table 22: Need for uterotonics in carbetocin

Study	% of patients needing uterotonics
Patil (9)	11.3
Delorme (10)	16.8
Larciprete (11)	10.6
Korb (12)	5.9
Voon (13)	12.1
Our study	16

This is a table comparing the % need for uterotonics in our study compared to the % need for uterotonics in other studies published in the literature. The % need for uterotonics in our study is comparable to the % need for uterotonics in other studies published in the literature.

Clinical Significance

This study holds significant clinical relevance as it provides evidence supporting the superior efficacy of carbetocin over oxytocin in the prevention of postpartum hemorrhage (PPH) among anemic women—a high-risk group particularly vulnerable to the adverse outcomes of excessive blood loss. By demonstrating reduced blood loss, improved uterine tone, and decreased need for additional uterotonics and blood transfusions, the findings underscore carbetocin's potential to enhance maternal outcomes and reduce morbidity. Its single-dose administration and longer duration of action also make it especially valuable in settings where continuous drug infusion

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and close monitoring are challenging. Implementing carbetocin in obstetric protocols may lead to safer, more streamlined postpartum care, especially in resource-limited environments.

Limitations

Despite its promising results, the study has few limitations. First, the sample size was relatively small (n=100), which may limit the generalizability of the findings. Second, the study was conducted in a single-center tertiary care hospital, and results may differ in primary or rural healthcare settings.

Future Directions

Future research should involve multicenter trials with larger, more diverse populations to validate these findings across different healthcare settings. Studies focusing on cost-effectiveness analyses of carbetocin versus oxytocin, particularly in low-resource environments, would also be beneficial. Further exploration into the long-term maternal outcomes, neonatal effects, and patient satisfaction with both drugs can offer a more holistic view. Moreover, stratified analyses based on severity of anemia, mode of delivery, and other risk factors for PPH may help to refine guidelines for personalized uterotonic use in clinical practice.

CONCLUSION

This study demonstrates that carbetocin is a more effective uterotonic agent than oxytocin in the prevention of postpartum hemorrhage among anemic women. While both drugs were comparable in baseline demographic and obstetric parameters, carbetocin significantly reduced mean blood loss, minimized the drop in post-delivery hemoglobin levels, and improved uterine contractility. Additionally, it led to a decreased need for additional uterotonics and blood transfusions, suggesting better overall hemostatic control. Given its single-dose administration and prolonged action, carbetocinoffers a practical and efficient alternative to oxytocin, especially in resource-limited settings where close monitoring may not always be feasible. The findings of this study support the use of carbetocin as a preferred agent for PPH prevention in anemic obstetric populations, thereby enhancing maternal safety and outcomes.

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