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**ORIGINAL RESEARCH**

# A comparison of the efficacy of carbetocin and oxytocin for the prevention of post-partum haemorrhage

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## ABSTRACT

**Background:** Postpartum haemorrhage is the leading cause of maternal mortality and it has been estimated that 35% of maternal deaths are related to post- partum haemorrhage.Active management of the third stage of labour is the key and the incidence of post- partum haemorrhage is reduced with the use of prophylactic uterotonics. Prevention of PPH and its early management is most important mainly in developing countries and low resource healthcare settings to improve the quality of life of women. **Aim & Objectives:** To find out theeffectiveness and safety of carbetocin for the prevention of post- partum haemorrhageand to compare its efficacy with oxytocin for the prevention of post- partum haemorrhage.**Material and Methods:** A hospital based study was conducted among 200 females who delivered(both via NVD or C-section) inMuzaffarnagar Medical College & Hospital, Muzaffarnagar, Uttar Pradesh.Study was conducted for 18 months.Data was analysed statistically and chi square test was applied.**Results:**Mean age of women who received Carbetocin and oxytocinwas 29.05 years and 28 years respectively.Out of total women, who received carbetocin, 38% had PPH and out of total women, who received oxytocin, 53% had PPH and it was significantly associated. Nausea was more in women who received oxytocin as compared to women who received carbetocin, showing positive association. **Conclusion:** Our findings conclude that carbetocin is better than oxytocin in preventing PPH. Nausea as a side effect associated with carbetocin is also less as compared to oxytocin. The other side effects like vomiting and headache were more in women oxytocin but there is no significant association.

**Keywords:** PPH, Carbetocin, Oxytocin.



## INTRODUCTION

Postpartum haemorrhage is the leading cause of maternal mortality and it has been estimated that 35% of maternal deaths are related to post- partum haemorrhage.[1] Primary post- partum haemorrhage is defined as excessive bleeding that occurs in the first 24 hours after delivery. The post- partum haemorrhage has been defined as a blood loss in excess of 500 ml after vaginal delivery and in excess of 1000 ml after abdominal delivery.[2]Post- partum haemorrhage occurs in 5% of all deliveries and is responsible for a major part of maternal mortality.[3] The majority of these deaths occur within 4 hours of delivery, which indicates that they are a consequence of the third stage of labour .[4,5]

Active management of the third stage of labour is the key and the incidence of post- partum haemorrhageis reduced with the use of prophylactic uterotonics.[6,7,8] Two uterotonics, oxytocin and carbetocin are in the Essential Medicines List by the World Health Organization.[9]Uterotonic drugs administered at the birth of the baby are routinely recommended for the prevention of PPH for all women, but there is uncertainty over which uterotonic drug is best.[10]

Carbetocin is a long-acting synthetic oxytocin analogue and also works by stimulating the uterus. Carbetocin is a synthetic analogue of oxytocin with a longer half-life and shows a more sustained and stronger action compared to oxytocin. [11]Oxytocin cannot be used orally. Oxytocin is unstable at room temperature and it requires cold storage and transport. It cannot be given intravenously as a large bolus, because it can cause severe hypotension.[12]WHO has recently added carbetocin as a prophylactic uterotonic

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of choice. Its greatest advantage is that it is heat stable and can be stored at room temperature. This is particularly relevant to a country like India where cold chain maintenance is a challenge as oxytocin requires to be stored at a proper temperature.

Prevention of PPH and itsearly managementis most important mainly in developing countries and low resource healthcare settings to improve the quality of life of women.This study will also help obstetriciansto consider possible side effects of both drugs to prevent as well as treat PPH and decrease the maternal mortality due to PPH.

## AIM & OBJECTIVES

1. To study the effectiveness and safety of carbetocin for the prevention of post- partum haemorrhage.
2. To compare the efficacy of carbetocin with oxytocin for the prevention of post- partum haemorrhage.

## MATERIAL AND METHODS

**Study design:** A hospital based interventional study.

**Study area:** Department ofObstetrics &Gynaecology, Muzaffarnagar Medical College & Hospital, Muzaffarnagar.

**Study population:** All admitted Antenatal women with labor pain in labor room for delivery inthe Department ofObstetrics &Gynaecology, Muzaffarnagar Medical College & Hospital, Muzaffarnagar.

**Sample size:** 200 (Hospital based study depending on the average number of deliveries in five year duration period from 2017-2022).

**Sampling technique:** Simple Random Sampling

Patients were selected by allocating them two groups:

- Patient receiving carbetocin drug were allocated group A.
- Patient receiving oxytocin drug were allocated group B.

**Study duration:** 18 months (12 months for data collection and 6 months for data compilation)

**Study method**

- All the antenatal patients coming with labor pain in labor room were considered to be divided in two Groups- Group A and Group B randomly. 200 women were selected randomly in the study time period of 1 year (both who gave birth via NVD and C-section).
- Group A include 100 patients to whom 100 microgram I/M dose of carbetocin in the buttock after delivery of baby was given. Group B include 100 patients to whom 10IU I/M dose of oxytocin in the buttock after delivery of baby was given.
- Once there was no further concern about on-going bleeding following delivery of the placenta, blood and blood-soaked materials were collected and weighed. Dry weights were subtracted to measure blood loss.
- Post- partum blood loss was measured by measuring same size of mops. Pre soakage and post soakage weight and volume were measured by squeezing the soaked mops.
- Volume of post- partum blood loss was also measured by using delivery drape.

**Inclusion criteria**

- All admitted pregnant women with labor pain in labor room for delivery in Muzaffarnagar Medical College, Muzaffarnagar.
- Patients who gave informed written consent.

**Exclusion criteria**

All pregnant women with-

- Cardiovascular problems
- Thrombotic diseases
- Patients who did not give consent

**Ethical approval:** Ethical approval was taken from the Institutional Ethics Committee of Muzaffarnagar Medical College, Muzaffarnagar. All the patients were informed about the purpose of the study and consent for the same was taken.

**Consent:** Written informed consent was taken from all the study participants.

**Statistical analysis:** The prevalence rates were expressed as percentages under 95% confidence intervals. The P-value 0.05 was considered statistically significant. Discrete data was entered in MS-Excel sheet and data was analysed using the software SPSS 21.0.

The tests used were:

- Proportion and percentages
- Chi-square test

## RESULTS

Maximum number of participants who received carbetocin and oxytocin were present in the age group 25-30 years (40% and 38% respectively) followed by 20-25 years i.e. 28% and 32%. The least number of participants were present in the age group 35-40 years who received carbetocin and oxytocin i.e. 8% and 12%. **(Table 1, Fig. 1)**Mean age of women who received Carbetocin and oxytocinwas 29.05 years and 28 years respectively.

Out of 100 patients who received carbetocin, 69 (69%) were multigravidae and 31 (31%) were primigravidae. Similarly, out of 100 patients who received oxytocin, majority i.e. 65 (69%) were

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multigravidae and 35 (35%) were primigravidae. **(Table 2, Fig. 2a, Fig. 2b)**

Table 6.3 shows the distribution of women according to PPH after giving carbetocin and oxytocin. It shows that out of total women, who received carbetocin, 38% had PPH and out of total women who received oxytocin, 53% had PPH.There was positive association (statistical significant with p< 0.05); as it was more in women who received oxytocin as compared to women who received carbetocin.

Table 6.4 shows the comparison of side effects in women after giving carbetocin and oxytocin. Nausea was more in women who received oxytocin as compared to women who received carbetocin, showing positive association. It was statistically significant (p< 0.05). There was no association of vomiting and headache with carbetocin and oxytocin as they were not statistically significant.

**Table 1: Age-wise distribution of the participants: (N=200)**

| Age Group (in years) | Women who received Carbetocin (n= 100) (%) | Women who received Oxytocin (n=100) (%) | Total (N=200) (%) |
|---|---|---|---|
| 20-25 | 27 (27) | 32 (32) | **59 (59)** |
| 25-30 | 33 (33) | 38 (38) | **71 (71)** |
| 30-35 | 22 (22) | 18 (18) | **40 (40)** |
| 35-40 | 18 (18) | 12 (12) | **30 (30)** |
| Total | 100 (100) | 100 (100) | **200 (100)** |

**Table 2: Distribution of women according to parity: (N=200)**

| Parity | Women who received Carbetocin (n= 100) (%) | Women who received Oxytocin (n=100) (%) | Total (N=200) (%) |
|---|---|---|---|
| Primigravida | 31 (31) | 35 (35) | **66 (33)** |
| Multigravida | 69 (69) | 65 (65) | **134 (67)** |
| Total | 100 (100) | 100 (100) | **200 (100)** |

**Table 3: Comparison of side effects of both drugs in women: (N=200)**

| Symptom | Women who received Carbetocin (n= 100) (%) | Women who received Oxytocin (n= 100) (%) | Total (N=200) (%) | Chi-square test |
|---|---|---|---|---|
| **Vomiting** | | | | **1.23, df=1, p> 0.05** |
| Present | **09 (09)** | **14 (14)** | **23 (11.5)** | |
| Absent | **91 (91)** | **86 (86)** | **177 (88.5)** | |
| **Nausea** | | | | **4.58, df=1, p= 0.03, Significant** |
| Present | **24 (24)** | **38 (38)** | **62 (31)** | |
| Absent | **76 (76)** | **62 (62)** | **138 (69)** | |
| **Headache** | | | | **0.29, df=1, p> 0.05** |
| Present | **18 (18)** | **21 (21)** | **39 (19.5)** | |
| Absent | **82 (82)** | **79 (79)** | **161 (80.5)** | |

**Table 4 –Association of amount of blood loss after delivery in women who received carbetocin and oxytocin: (N=200)**

| Variable | Women who received Carbetocin (n= 100) (%) | Women who received Oxytocin (n= 100) (%) | Total (N=200) (%) | Chi-square test |
|---|---|---|---|---|
| **PPH** | **38 (38)** | **53 (53)** | **91 (45.5)** | **4.54, df=1, p= 0.03, Significant** |
| **No PPH** | **62 (62)** | **47 (47)** | **109 (54.5)** | |

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**Figure 1: Bar diagram showing age- wise distribution of participants:**

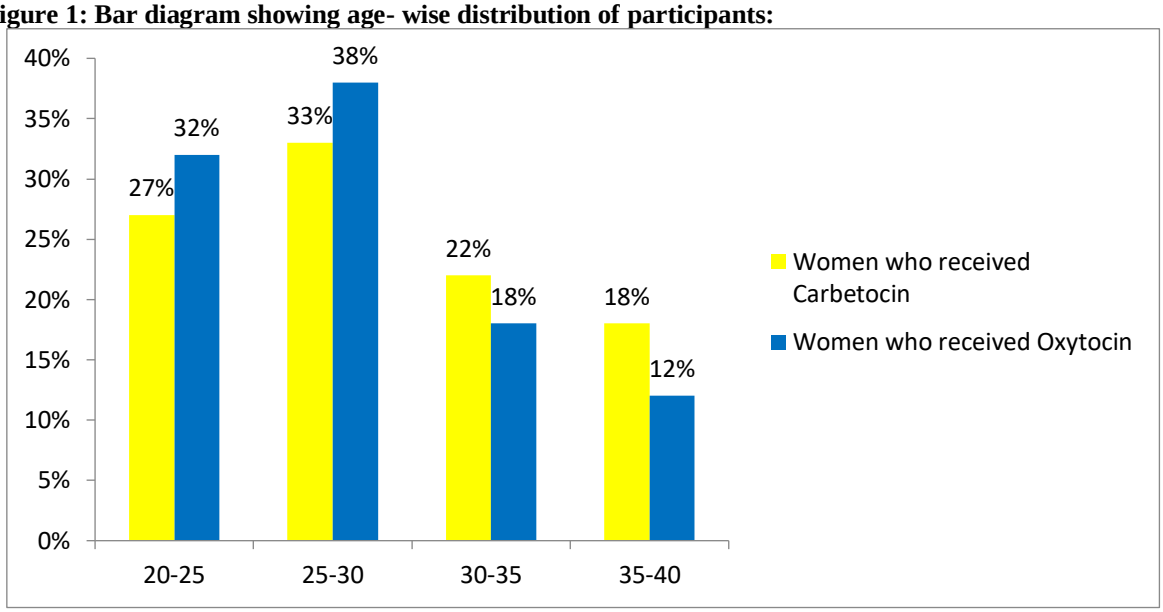



**Figure 6.2(a):Pie chart showing distribution of women who received carbetocin according to parity:**

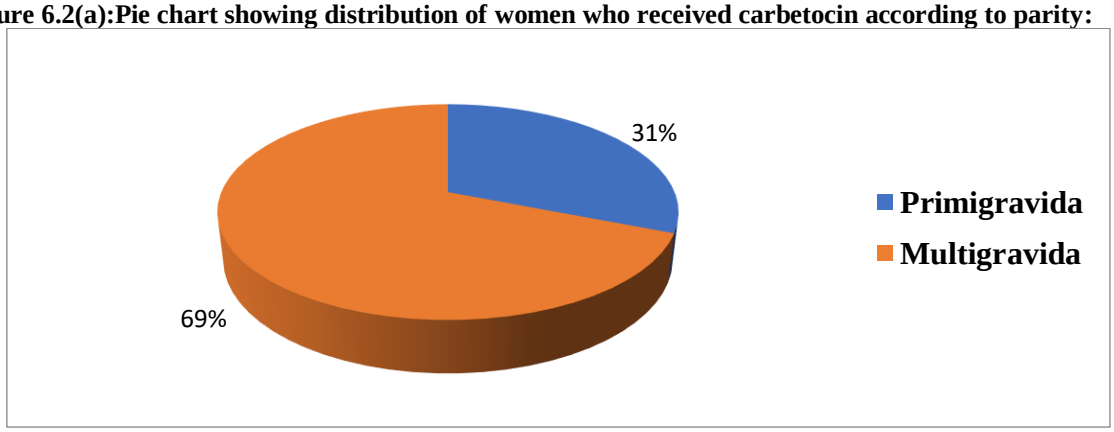
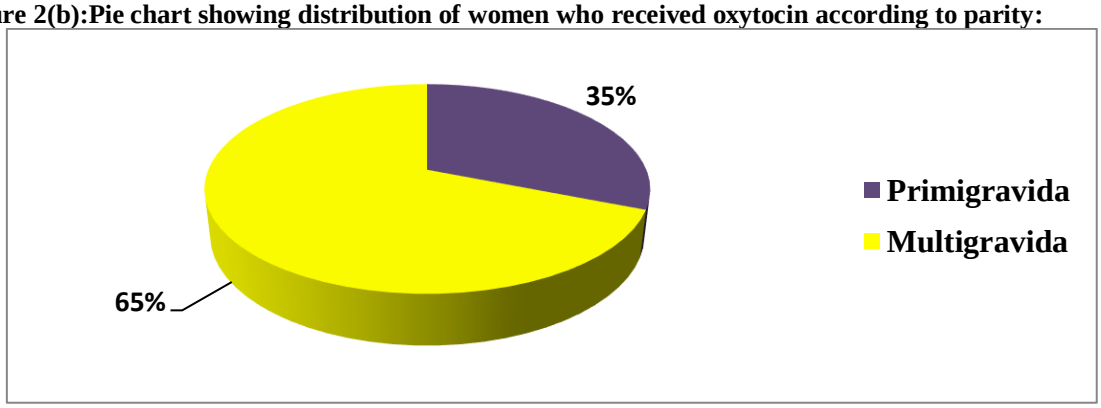



**Figure 2(b):Pie chart showing distribution of women who received oxytocin according to parity:**




## DISCUSSION

In the present study, maximum number of participants who received carbetocin and oxytocin were present in the age group 25-30 years (40% and 38% respectively) followed by 20-25 years i.e. 28% and 32%. The least number of participants were present in the age group 35-40 years who received carbetocin and oxytocin i.e. 8% and 12%. In the present study, mean age of women who received carbetocin and oxytocin was 29.05 and 28 years respectively. **Reyes OA and Gonzalez GM et al (2011)** performed a study where the mean age of study patient in carbetocin group was 26.5 years and 26.7 years in oxytocin group. [13] In a study done by **Liu Het al (2020),** mean age of study population were 29.6 ± 3.6 in carbetocin group and 29.5 ± 3.7 in oxytocin group. [14] These findings were almost similar to the finding of our study.

In the present study, out of 100 patients who received carbetocin, 69 (69%) were multigravidae and 31

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(31%) were primigravidae. Similarly, out of 100 patients who received oxytocin, majority i.e. 65 (69%) were multigravidae and 35 (35%) were primigravidae. In a study done by **Mannaerts D et al (2018),** 22% women were primigravidae who received carbetocin and 27% women who received oxytocin were primigravidae. [15] This finding was almost similar to the finding of present study. In a study done by **Liu H et al (2020),** 83.1% women were primigravida who received carbetocin and 81.3% women who received oxytocin were primigravida. [14] In a study done by **Ghosh R et al (2024),** 43.5% women were primigravida who received carbetocin and 43.7% women who received oxytocin were primigravida. [16] These findings were different from the present study because of different study areas.

In the present study, out of total women, who received carbetocin, 38% had PPH and out of total women who received oxytocin, 53% had PPH. There was positive association (statistical significant with $p< 0.05$); as it was more in women who received oxytocin as compared to women who received carbetocin. In a study done in Bangladesh **by Akhter P et al**, post-partum haemorrhage was developed in 23(15.3%) and 31(20.7%) patients in carbetocin and oxytocin groups respectively. [17] **Amornpetchakul et al (2018)** found that intravenous carbetocin was more effective than intravenous oxytocin at preventing atonic PPH. [18]A study by **Ibrahim ZM et al in 2020** demonstrated that blood loss was significantly more among the oxytocin group (679.5 ± 200.25 vs. 424.75 ± 182.59 ml) in the carbetocin group ($p < 0.001$). [19]In a study done in **2022 by Huang X et al**,the incidence of PPH in the carbetocin group was lower than that in the oxytocin group (OR = 0.62, 95% CI (0.46, 0.84), $Z = 3.14$, $P = 0.002$). [20]The findings of all these studies were similar to the finding of our study showing that carbetocin was more effective than oxytocin in preventing PPH.

In the present study, nausea was more in women who received oxytocin (38%) as compared to women who received carbetocin (24%), showing positive association. It was statistically significant ($p< 0.05$).] In a study done by **Mannaerts D et al (2018),** nausea and vomitus to be present in a clinically relevant percentage of patients, 15% and 6% in oxytocin and carbetocin, respectively. [15] A study by **Ibrahim ZM et al (2020)** demonstrated that nausea, vomiting, and sweating were reported more significantly in oxytocin group patients. [19] These finding were similar to the finding of our study.

## CONCLUSION

Our findings conclude that carbetocin is better than oxytocin in preventing PPH. There was association of PPH after giving carbetocinand oxytocin means it was more in women receiving oxytocin as compared to carbetocin. Nausea as a side effect associated with carbetocin is also less as compared to oxytocin. The other side effects like vomiting and headache were more in women oxytocin but there is no significant association.

### Relevance of the study

This study helps to understand the effect of carbetocin and oxytocin in preventing PPH. It will also help to make the obstetricianunderstand about side effects of both drugs and their impact on reducing post- partum blood loss.

### Authors Contribution

The study was done under the continuous and expert guidance of Dr.Poonam Mani (Professor).

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