



## COMPARATIVE STUDY OF CARBETOCIN VERSUS OXYTOCIN FOR THE PREVENTION OF POST PARTUM HEMORRHAGE IN TWIN PREGNANCY

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**ABSTRACT** Postpartum hemorrhage (PPH) remains a significant cause of maternal mortality, particularly in developing countries like India. Twin pregnancies are associated with a higher risk of PPH due to factors such as increased uterine size, uterine atony, and retained placental tissue. The World Health Organization (WHO) recommends Oxytocin for PPH prevention, but its short duration of action and storage requirements limit its effectiveness. Carbetocin, a long-acting synthetic analogue of Oxytocin, has emerged as a promising alternative. This study aimed to compare the efficacy of Carbetocin and Oxytocin in preventing PPH during the active management of the third stage of labor in twin pregnancies. A total of 60 women with twin pregnancies were enrolled and randomly assigned to receive either Carbetocin or Oxytocin. Blood loss, incidence of PPH, and need for additional uterotonics were evaluated. The results showed that Carbetocin significantly reduced blood loss and the need for additional uterotonics compared to Oxytocin. However, both drugs had similar overall effectiveness in preventing PPH. Carbetocin was also associated with a lower incidence of uterine atony and a higher likelihood of firm uterine tone. In conclusion, Carbetocin appears to be a promising alternative to Oxytocin for PPH prevention in twin pregnancies. It offers the advantages of longer duration of action, heat stability, and reduced need for additional interventions. Further studies are needed to confirm its superiority over Oxytocin and to explore its potential in other high-risk populations.

### KEYWORDS :

#### INTRODUCTION

Despite advancements in modern obstetrics, maternal mortality remains a significant issue. In India, the current maternal mortality ratio stands at 113 per 100,000 live births, with postpartum hemorrhage (PPH) as the leading cause of maternal death, contributing to nearly 25% of global maternal fatalities. The incidence of PPH in India is reported at 2-4%. The American College of Obstetricians and Gynecologists (ACOG) defines PPH as blood loss exceeding 1,000 mL or associated with hypovolemic symptoms within 24 hours post-birth.<sup>1,2,3</sup>

Twin pregnancies are particularly prone to PPH due to factors like increased uterine and placental size, higher rates of uterine atony, and retained placental tissue. Managing PPH in such cases requires careful attention to optimize maternal outcomes. The World Health Organization (WHO) recommends the use of uterotonics, particularly Oxytocin (10 IU IM), for active management of the third stage of labor to prevent PPH. However, Oxytocin requires cold storage, and its short duration of action (8 minutes) can lead to uterine atony and PPH recurrence.<sup>2,3</sup>

Carbetocin, a long-acting synthetic analogue of Oxytocin, has emerged as a promising alternative. Its heat-stable nature and longer half-life ( $42 \pm 9$  minutes) provide more prolonged uterine contractions, making it effective in preventing PPH. While Carbetocin has shown potential, further studies, including randomized control trials, are needed to confirm its superior efficacy over Oxytocin.<sup>2,4</sup>

This prospective randomized control trial at Pt. J.N.M. Medical College and Dr. Bhim Rao Ambedkar Memorial Hospital, Raipur, aims to compare the effectiveness of Carbetocin (100 mcg IM) and Oxytocin (10 IU IM) in preventing postpartum hemorrhage (PPH) during the active management of the third stage of labor in twin pregnancies. The primary goal is to assess and compare the efficacy of both drugs in reducing postpartum blood loss. Additionally, the study will evaluate the incidence of PPH and the need for additional uterotonics in managing PPH in twin pregnancies for both Carbetocin and Oxytocin groups.

#### MATERIALS AND METHODOLOGY

In this study, 60 women with twin pregnancies over 34 weeks were enrolled, with 30 participants in each group. The exclusion criteria included hypersensitivity to the medications, coagulation disorders, severe anemia, placenta previa, abruptio placentae, uterine abnormalities, retained placenta, and triplet or higher-order pregnancies. After obtaining informed consent, participants were randomly assigned to receive either Carbetocin (100 mcg IM) or

Oxytocin (10 IU IM) immediately following the delivery of the second baby, with blood loss measured quantitatively.

All participants underwent routine antenatal evaluations and were closely monitored during labor for progress, required interventions, and mode of delivery. Blood loss during the third stage of labor was recorded, along with any complications such as perineal, vaginal, or cervical tears. Details about the newborns, including birth weight, need for resuscitation, and NICU admissions, were also documented. Postpartum outcomes and counseling on breastfeeding, contraception, and immunization were provided.

Hemoglobin levels were assessed 24 hours after delivery, and the difference between pre- and post-delivery levels was calculated. In cases of postpartum hemorrhage, additional uterotonics were administered according to protocol: Oxytocin infusion, followed by Misoprostol (800 mcg sublingual) and Carboprost (250 mcg IM) if necessary.

#### Review Of Studies Comparing Carbetocin With Oxytocin

In studies conducted by Marc Boucher et al. (2002), the efficacy of Carbetocin and Oxytocin in preventing postpartum hemorrhage was compared. The outcomes of these studies focused on the need for additional uterotonics, uterine massage, mean prenatal and postpartum hemoglobin differences, and blood loss. The findings showed that a significantly lower number of patients required additional uterotonics and uterine massage in the Carbetocin group compared to the Oxytocin group, with a p-value of 0.02 for both variables. However, there was no significant difference in blood loss or the mean hemoglobin difference between the two groups. This comparison demonstrates the potential benefits of Carbetocin in reducing the need for additional interventions during the management of postpartum hemorrhage compared to Oxytocin. However, both drugs showed similar results in terms of overall blood loss and hemoglobin changes.<sup>5</sup>

| Study Variables                                        | Carbetocin (N=83) | Oxytocin (N=77)   | P value              |
|--------------------------------------------------------|-------------------|-------------------|----------------------|
| Need for additional uterotonics                        | 37                | 49                | 0.02                 |
| Uterine massage                                        | 36                | 48                | 0.02                 |
| Mean prenatal and postpartum hemoglobin difference (%) | 10.6 $\pm$ 9.3    | -12.9 $\pm$ 9.4   | Not significant (NS) |
| Blood loss (mL)                                        | 413.3 $\pm$ 197.5 | 410.4 $\pm$ 194.1 | NS                   |

A study by G. Attilakos et al. (2010) compared Carbetocin and Oxytocin in managing postpartum hemorrhage (PPH) among 188 and

189 women, respectively. Fewer women in the Carbetocin group required additional oxytocics (33.5% vs. 45.5%,  $p = 0.023$ ), particularly for PPH treatment (10.6% vs. 18.5%,  $p = 0.043$ ). Both groups had similar rates of blood loss over 1000 ml (4.8%) and blood transfusions (2.1% vs. 2.6%). Hemoglobin drop, uterine tone, and secondary PPH showed no significant differences between the group.<sup>6</sup>

#### Outcomes Of The Study

| Outcome                                         | Carbetocin (N=188) | Oxytocin (N=189) | P Value |
|-------------------------------------------------|--------------------|------------------|---------|
| <b>Additional Oxytocics</b>                     | 63 (33.5%)         | 86 (45.5%)       | 0.023   |
| Breakdown: 5-10 Oxytocin                        | 21 (11.2%)         | 29 (15.3%)       | 0.11    |
| Breakdown: Other Oxytocics                      | 42 (22.3%)         | 57 (30.2%)       | 0.10    |
| <b>Additional Oxytocics for PPH Prophylaxis</b> | 43 (22.9%)         | 51 (27.0%)       | 0.57    |
| <b>Additional Oxytocics for PPH Treatment</b>   | 20 (10.6%)         | 35 (18.5%)       | 0.043   |
| <b>Estimated Blood Loss &gt;1000 ml</b>         | 9 (4.8%)           | 9 (4.8%)         | 0.39    |
| <b>Women transfused with blood</b>              | 4 (2.1%)           | 5 (2.6%)         | 0.99    |
| <b>Hemoglobin mean fall</b>                     | 1.6                | 1.6              | 0.84    |
| <b>Fundal height above umbilicus on Day 1</b>   | 37 (19.7%)         | 32 (16.9%)       |         |
| <b>Secondary PPH</b>                            | 0                  | 0                |         |
| <b>Uterine Tone on Day 1</b>                    | 9 (5-10)           | 9 (7-10)         | 0.73    |

A study by Giovanni Larciprete et al. (2013) compared blood loss in women receiving Carbetocin or Oxytocin during and after caesarean sections. Both drugs were similarly effective in minimizing blood loss, with no significant differences observed at 2 and 12 hours post-surgery. However, during surgery, none of the women in the Carbetocin group experienced blood loss greater than 1000 ml, whereas 4 women in the Oxytocin group did, indicating a potential advantage for Carbetocin in controlling excessive bleeding during caesarean sections.<sup>7</sup>

#### Estimated Blood Loss In Carbetocin Vs. Oxytocin Groups

| Time After Caesarean Section | Blood Loss Category | Carbetocin (A) (n=51) | Oxytocin (B) (n=51) | P Value |
|------------------------------|---------------------|-----------------------|---------------------|---------|
| During Caesarean Section     | <500 ml             | 39                    | 35                  | 0.18    |
|                              | 500-1000 ml         | 12                    | 12                  |         |
|                              | >1000 ml            | 0                     | 4                   |         |
| 2 Hours After Caesarean      | <500 ml             | 50                    | 50                  | 1.00    |
|                              | 500-1000 ml         | 1                     | 1                   |         |
|                              | >1000 ml            | 0                     | 0                   |         |
| 12 Hours After Caesarean     | <500 ml             | 51                    | 51                  | 1.00    |
|                              | 500-1000 ml         | 0                     | 0                   |         |
|                              | >1000 ml            | 0                     | 0                   |         |

In a study by Nuguelis Razali et al. (2015), Carbetocin and Oxytocin were compared for postpartum hemorrhage prevention. Carbetocin significantly reduced the need for additional uterotonics (38.8% vs. 57.2%,  $P = 0.001$ ). Other outcomes, such as mean operating time, blood loss, severe hemorrhage rates, and blood transfusions, showed no significant differences between the two groups.<sup>8</sup>

#### Comparison Of Carbetocin And Oxytocin

| Outcome                                 | Carbetocin (n=276) | Oxytocin (n=271) | P Value |
|-----------------------------------------|--------------------|------------------|---------|
| Need for additional uterotonics         | 107/276 (38.8%)    | 155/271 (57.2%)  | 0.001   |
| Mean operating time (minutes)           | 45.9 ± 16.0        | 44.5 ± 13.1      | 0.26    |
| Mean blood loss (ml)                    | 458 ± 258          | 446 ± 281        | 0.6     |
| Severe postpartum hemorrhage (≥1000 ml) | 15/276 (5.4%)      | 10/271 (3.7%)    | 0.33    |
| Blood transfusion rates                 | 6/276 (2.2%)       | 10/271 (3.7%)    | 0.30    |

A study by Manal M. El Behery and colleagues in 2015 compared the effectiveness of Carbetocin and Oxytocin in preventing postpartum hemorrhage (PPH) in a sample of 180 women, with 90 women in each group. The results showed that Carbetocin was significantly more effective in reducing the incidence of major PPH, the need for additional uterotonics, and the requirement for blood transfusion. Additionally, uterine tone was more frequently firm in the Carbetocin group compared to the Oxytocin group. Blood loss and hemoglobin difference were also more favorable in the Carbetocin group, though there was no significant difference in adverse effects between the two groups.<sup>9</sup>

#### Study Outcomes Table

| Outcome                                         | Carbetocin (n=90) | Oxytocin (n=90) | p-value |
|-------------------------------------------------|-------------------|-----------------|---------|
| Major Primary Postpartum Hemorrhage             | 2 (2.22%)         | 12 (13.33%)     | 0.03    |
| Postpartum Hemoglobin Level (g/dl)              | 11.14 ± 1.76      | 10.8 ± 1.68     | 0.09    |
| Uterine Tone (Soft)                             | 2 (2.22%)         | 15 (15.55%)     | 0.03    |
| Uterine Tone (Firm)                             | 88 (97.78%)       | 75 (86.45%)     |         |
| Need for Additional Uterotonics                 | 2 (2.22%)         | 64 (71.11%)     | 0.002   |
| Estimated Blood Loss (ml)                       | 689 ± 580         | 1027 ± 659      | 0.002   |
| Need for Blood Transfusion                      | 0 (0%)            | 14 (15.55%)     | 0.04    |
| Hemoglobin Difference (Admission to Postpartum) | 1.74 ± 0.87       | 0.94 ± 0.67     | 0.03    |
| Adverse Effects                                 | 2 (2.22%)         | 4 (4.44%)       | 0.08    |

Ahmed Mohamed Maged et al., 2015 compared the outcomes of Carbetocin and Oxytocin in terms of postpartum hemorrhage management. The amount of bleeding was significantly lower in the Carbetocin group (811 ± 389.17 ml) compared to the Oxytocin group (1010 ± 525.66 ml), with a P value of 0.034. The need for additional uterotonics was also lower in the Carbetocin group (20%) compared to Oxytocin (42%), showing a significant difference ( $P = 0.017$ ). Major postpartum hemorrhage (PPH) over 1000 ml occurred in 12% of the Carbetocin group and 22% of the Oxytocin group, though the difference was not statistically significant ( $P = 0.183$ ). The need for blood transfusion and the hemoglobin difference before and after delivery showed no significant differences between the two groups.<sup>10</sup>

| Outcome                      | Carbetocin   | Oxytocin      | P Value |
|------------------------------|--------------|---------------|---------|
| Amount of bleeding (ml)      | 811 ± 389.17 | 1010 ± 525.66 | 0.034   |
| Need for other uterotonics   | 10 (20%)     | 21 (42%)      | 0.017   |
| Major PPH (>1000 ml)         | 6 (12%)      | 11 (22%)      | 0.183   |
| Need for blood transfusion   | 6 (12%)      | 9 (18%)       | 0.401   |
| Hb before delivery (g/dl)    | 11.45 ± 1.45 | 11.27 ± 1.43  | 0.55    |
| Hb 24h after delivery (g/dl) | 10.85 ± 1.51 | 10.71 ± 1.5   | 0.645   |
| Hb difference (g/dl)         | 0.6 ± 0.28   | 0.56 ± 0.25   | 0.529   |

A study by Kabir N et al. (2015) compared the outcomes of Carbetocin and Oxytocin in managing postpartum hemorrhage (PPH). The study included 47 participants in each group. The results showed that there was no incidence of massive blood loss in the Carbetocin group, while 8.5% of women in the Oxytocin group experienced it, with a significant p-value of 0.002. The need for fundal massage, additional uterotonics, and blood transfusion was also significantly higher in the Oxytocin group. The average blood loss within 24 hours was lower in the Carbetocin group (325 ml) compared to the Oxytocin group (389 ml), with a p-value of 0.003. Primary PPH was observed in 6.4% of the Oxytocin group, while none in the Carbetocin group.<sup>11</sup>

| Outcome                         | Carbetocin (n=47)       | Oxytocin (n=47)                 | p-value |
|---------------------------------|-------------------------|---------------------------------|---------|
| Massive Blood Loss              | 0                       | 4 (8.5%)                        | 0.002   |
| Fundal Massage Required         | 0                       | 5 (10.6%)                       | 0.002   |
| Blood Transfusion Requirement   | 0                       | 3 (6.4%)                        | 0.07    |
| Need for Additional Uterotonics | 0                       | 5 (10.6%)                       | 0.002   |
| Average Blood Loss (24 hours)   | 325 ml                  | 389 ml                          | 0.003   |
| Primary PPH                     | Yes: 0<br>No: 47 (100%) | Yes: 3 (6.4%)<br>No: 44 (93.6%) | 0.07    |

A study conducted by Robabeh Taheripana et al. (2017) compared the efficacy of Carbetocin and Oxytocin in postpartum hemorrhage management. The results showed that Carbetocin led to less hemoglobin drop, reduced bleeding volume, and decreased need for additional uterotonics compared to Oxytocin. Uterine height was also reduced more effectively with Carbetocin at various time intervals. Furthermore, Carbetocin group had lower pulse rates and fewer massage times needed, with slightly increased respiratory rates. Both drugs had comparable effects on systolic blood pressure.<sup>12</sup>

| Outcome                 | Oxytocin (n=110) | Carbetocin (n=110) | P Value |
|-------------------------|------------------|--------------------|---------|
| Hemoglobin Drop Changes | 2.05 ± 1.2       | 1.1 ± 1.01         | 0.010   |
| Bleeding Volume (mg/dl) | 552.64 ± 156     | 430.68 ± 118       | 0.003   |

|                              |              |              |       |
|------------------------------|--------------|--------------|-------|
| Additional Uterotonic (mg)   | 2.36 ± 0.4   | 1.1 ± 0.3    | 0.033 |
| Uterine Height in 2 hrs (cm) | 19.18 ± 1.6  | 18.42 ± 1.3  | 0.000 |
| Uterine Height in 4 hrs (cm) | 18.28 ± 1.2  | 17.4 ± 1.1   | 0.000 |
| Uterine Height in 24 hrs(cm) | 17.14 ± 1.1  | 16.4 ± 1.08  | 0.000 |
| Massage Times (seconds)      | 4.26 ± 0.8   | 3.7 ± 0.6    | 0.003 |
| Pulse Rate (no.)             | 90.16 ± 6.6  | 87.38 ± 5.2  | 0.031 |
| Respiratory Rate (no/min)    | 17.34 ± 1.3  | 17.82 ± 1.8  | 0.033 |
| Systolic Blood Pressure      | 108.77 ± 7.9 | 108.82 ± 8.8 | 0.450 |

Kok Min Seow et al. (2017)<sup>13</sup> presents the outcomes from a study comparing two groups: a control group treated with Oxytocin and a study group treated with Carbetocin. The outcomes measured include fetal body weight, operative time, blood loss, lochia, hemoglobin levels before and after surgery, heart rate, the need for additional uterotonics, and the incidence of blood transfusion. Significant differences were observed in operative time and heart rate, with the Carbetocin group having shorter operative times and higher heart rates. Other outcomes, such as fetal body weight and blood loss, showed no statistically significant differences between the groups.

| Outcome                                        | Control Group (Oxytocin) | Study Group (Carbetocin) | P-value |
|------------------------------------------------|--------------------------|--------------------------|---------|
| Fetal Body Weight 1 (g)                        | 2157 ± 484               | 2190 ± 477               | 0.79    |
| Fetal Body Weight 2 (g)                        | 2272 ± 486               | 2284 ± 490               | 0.93    |
| Operative Time (min)                           | 49.9 ± 13.8              | 40.8 ± 7.1               | 0.001   |
| Intraoperative Blood Loss (cc)                 | 922.8 ± 430              | 871 ± 305                | 0.06    |
| Lochia 2 hours Post-operation (cc)             | 150 ± 50                 | 125 ± 25                 | 0.12    |
| Hemoglobin (Hb) Pre-operation (g/dL)           | 11.7 ± 1.7               | 11.5 ± 1.5               | 0.61    |
| Hemoglobin (Hb) 24 hours Post-operation (g/dL) | 10.0 ± 1.7               | 9.9 ± 1.5                | 0.71    |
| Hb Drop (g/dL)                                 | 1.7 ± 1.5                | 1.6 ± 1.4                | 0.89    |
| Incidence of Blood Transfusion (%)             | 10.3% (4/39)             | 0%                       | 0.098   |
| Heart Rate (beats/min)                         | 75 ± 25                  | 112 ± 35                 | 0.002   |
| Need for Additional Uterotonics (%)            | 23.1% (9/39)             | 8% (2/25)                | 0.12    |

In Laura Sotillo et al.'s (2018)<sup>14</sup> study, the outcomes between the control group (Oxytocin) and the study group (Carbetocin) were compared. The operative time was similar between the two groups, with 40.1 minutes for the control and 38.7 minutes for the study group ( $P = 0.62$ ). Blood loss during surgery was slightly lower in the Carbetocin group (629 ml) than the Oxytocin group (682 ml), though this was not statistically significant ( $P = 0.27$ ). Hemoglobin levels dropped more in the Oxytocin group (1.7 g/dl) compared to the Carbetocin group (1.2 g/dl), showing a significant difference ( $P = 0.02$ ). Similarly, hematocrit levels fell more in the Oxytocin group (5) compared to the Carbetocin group (3.7), which was also significant ( $P = 0.03$ ). The need for additional uterotonics, intravenous iron therapy, and blood transfusions was higher in the Oxytocin group, with blood transfusions being significantly more frequent ( $P = 0.03$ ). Lastly, the need for anemia treatment was significantly higher in the Oxytocin group ( $P = 0.009$ ).

| Outcome                           | Control Group (Oxytocin) | Study Group (Carbetocin) | P-value |
|-----------------------------------|--------------------------|--------------------------|---------|
| Operative Time (minutes)          | 40.1                     | 38.7                     | 0.62    |
| Blood Loss During Operation (ml)  | 682                      | 629                      | 0.27    |
| Hemoglobin (g/dl) Before Surgery  | 12.5                     | 12.4                     | 0.52    |
| Hemoglobin (g/dl) After Surgery   | 10.9                     | 11.2                     | 0.21    |
| Hemoglobin Drop (g/dl)            | 1.7                      | 1.2                      | 0.02    |
| Hematocrit (%) Before Surgery     | 37.1                     | 37.2                     | 0.79    |
| Hematocrit (%) After Surgery      | 32.5                     | 33.7                     | 0.79    |
| Hematocrit Drop (%)               | 5                        | 3.7                      | 0.03    |
| Need for Additional Uterotonics   | 7 (8.15%)                | 3 (3.8%)                 | 0.23    |
| Need for Intravenous Iron Therapy | 6                        | 3                        | 0.23    |
| Blood Transfusions                | 8                        | 1                        | 0.03    |

#### Outcomes of the Study by Caglar Cetin et al. (2023)<sup>58</sup>

| Characteristics | Group 1: Carbetocin (n=75) | Group 2: Oxytocin (n=75) | Group 3: Carbetocin + Tranexamic Acid (n=75) | Group 4: Oxytocin + Tranexamic Acid (n=75) | P Value |
|-----------------|----------------------------|--------------------------|----------------------------------------------|--------------------------------------------|---------|
|-----------------|----------------------------|--------------------------|----------------------------------------------|--------------------------------------------|---------|

|                  |    |   |       |
|------------------|----|---|-------|
| Anemia Treatment | 14 | 3 | 0.009 |
|------------------|----|---|-------|

M. Widmer et al. (2018) compared the effects of Carbetocin and Oxytocin in a large sample of women to prevent postpartum hemorrhage. It included over 14,000 participants in both groups. The results showed that both drugs had similar outcomes in terms of blood loss, additional uterotonics, and surgical interventions, with slight variations in risks.<sup>15</sup>

| Outcomes                         | Carbetocin (N=14,771) | Oxytocin (N=14,768) | Relative Risk (95% CI) |
|----------------------------------|-----------------------|---------------------|------------------------|
| Blood loss >500 ml               | 1,327                 | 1,343               | 0.99                   |
| Use of additional uterotonic     | 1,339                 | 1,528               | 1.03                   |
| Blood transfusion                | 229                   | 198                 | 1.16                   |
| Manual removal of placenta       | 79                    | 95                  | 0.83                   |
| Additional surgical intervention | 159                   | 138                 | 1.15                   |

KY Tse et al. (2020) conducted a study comparing the outcomes of using Oxytocin and Carbetocin. The total blood loss and operating time were similar between the two groups, with no significant difference. Postpartum hemorrhage, blood transfusions, and hysterectomy rates were also comparable.<sup>16</sup>

| Outcome                  | Oxytocin (n=752) | Carbetocin (n=484) | P value |
|--------------------------|------------------|--------------------|---------|
| Total Blood Loss (ml)    | 540              | 536                | 0.91    |
| Operating Time (minutes) | 41.5             | 42.5               | 0.44    |
| Postpartum Hemorrhage    | 61               | 38                 | 0.87    |
| Blood Transfusion        | 40               | 45                 | 0.07    |
| Hysterectomy             | 7                | 3                  | 0.75    |

#### Study Outcome Summary by Zakia M. Ibrahim et al (2020):

The study compared the effectiveness of Carbetocin and Oxytocin in preventing postpartum hemorrhage. The Carbetocin group had significantly lower blood loss and need for interventions compared to the Oxytocin group.<sup>17</sup>

| Outcome                             | Carbetocin Group (n=80) | Oxytocin Group (n=80) | P value |
|-------------------------------------|-------------------------|-----------------------|---------|
| Gauze, drapes, and gowns weight (g) | 1224                    | 1379                  | <0.001  |
| Blood in suction unit (ml)          | 200                     | 300                   | <0.001  |
| Total blood loss (ml)               | 424                     | 679                   | <0.001  |
| Need for blood transfusion          | 0                       | 8                     | <0.001  |
| Need for additional uterotonics     | 0                       | 68                    | <0.001  |

Ahmad Ben Tareef et al. (2021) conducted a study comparing the effects of Oxytocin and Carbetocin in 752 and 641 participants, respectively. The study measured estimated blood loss (EBL) during vaginal delivery, elective cesarean delivery (CD), and in-labor CD. It also assessed the rates of primary postpartum hemorrhage (PPH), the need for blood transfusion, and the administration of a second uterotonic. The results showed that Oxytocin was associated with lower blood loss during vaginal delivery, a reduced rate of PPH, and a decreased need for blood transfusions compared to Carbetocin.<sup>18</sup>

#### Outcomes of the Study:

| Outcome                                      | Oxytocin (N=752) | Carbetocin (N=641) | P-value |
|----------------------------------------------|------------------|--------------------|---------|
| <b>EBL by physician (ml), Mean (SD)</b>      |                  |                    |         |
| Vaginal Delivery                             | 298 (149)        | 332 (172)          | 0.003   |
| Elective CD                                  | 661 (184)        | 677 (197)          | 0.49    |
| In-Labor CD                                  | 716 (213)        | 745 (259)          | 0.37    |
| <b>Primary PPH, n (%)</b>                    | 50 (6.6%)        | 66 (10.3%)         | 0.01    |
| <b>Blood Transfusion, n (%)</b>              | 2 (0.3%)         | 9 (1.4%)           | 0.02    |
| <b>Second Uterotonic Administered, n (%)</b> | 66 (8.8%)        | 77 (12%)           | 0.05    |

Caglar Cetin et al (2023) compared four groups receiving different combinations of carbetocin, oxytocin, and tranexamic acid. The findings showed no significant difference in prepartum hemoglobin and hematocrit levels across groups. However, groups receiving oxytocin had higher decreases in hemoglobin and hematocrit post-delivery, as well as greater need for additional uterotonics. Postpartum blood loss and need for transfusions were relatively low in all groups. Significant differences were noted in the decrease in hemoglobin and hematocrit concentrations and the need for additional uterotonics.<sup>19</sup>

|                                     |                |              |                 |                 |          |
|-------------------------------------|----------------|--------------|-----------------|-----------------|----------|
| Prepartum Hemoglobin (g/dL)         | 12.5 ± 1       | 12.2 ± 1.16  | 12.37 ± 1.09    | 12.12 ± 0.87    | 0.113    |
| Prepartum Hematocrit (g/dL)         | 37.58 ± 2.64   | 36.74 ± 3.64 | 37.26 ± 3.14    | 36.47 ± 2.48    | 0.108    |
| Decrease in Hemoglobin (g/dL)       | 1.03 ± 1.04    | 1.3 ± 0.85   | 1.04 ± 0.9      | 1.41 ± 0.87     | <0.001 * |
| Decrease in Hematocrit (g/dL)       | 3.07 ± 3.23    | 3.55 ± 2.44  | 2.13 ± 3.09     | 4.25 ± 2.52     | <0.001 * |
| Postpartum Blood Loss (mL)          | 277.19 ± 208.1 | 294.13 ± 198 | 274.33 ± 199.57 | 283.97 ± 178.11 | 0.445    |
| Postpartum Blood Loss ≥500 mL (%)   | 8 (10.7%)      | 9 (12%)      | 7 (9.3%)        | 6 (8%)          | 0.864    |
| Postpartum Blood Loss ≥1,000 mL (%) | 1 (1.3%)       | 1 (1.3%)     | 0               | 1 (1.3%)        | 1.000    |
| Presence of Episiotomy (%)          | 33 (44%)       | 35 (46.7%)   | 32 (42.7%)      | 35 (46.7%)      | 0.948    |
| Presence of Tears (%)               | 15 (20%)       | 22 (29.3%)   | 14 (18.7%)      | 26 (34.7%)      | 0.075    |
| Presence of Atony (%)               | 0              | 2 (2.7%)     | 2 (2.7%)        | 0               | 0.338    |
| Need for Additional Uterotonics (%) | 15 (20%)       | 28 (37.3%)   | 6 (8%)          | 22 (29.3%)      | <0.001 * |
| Need for Blood Transfusion (%)      | 1 (1.3%)       | 4 (5.4%)     | 3 (4%)          | 3 (4%)          | 0.600    |

## RESULTS

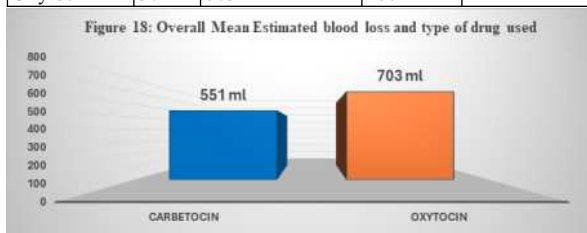
The present study was done to “Compare the effectiveness of “Carbetocin v/s Oxytocin for Prevention of Post Partum Hemorrhage in Twin Pregnancy”

To test the above hypothesis the outcome variables that were studied were-

1. Mean Estimated Blood loss
2. Hemoglobin difference (Pre and Post Delivery Hemoglobin)
3. Need for additional uterotonics
4. Need for surgical intervention
5. Need for blood transfusion

**Table 32: Overall Mean Estimated Blood Loss And Type Of Drug Given**

| Drug given | Cases | Mean Estimated blood loss(in ml) | Std. Deviation | P value |
|------------|-------|----------------------------------|----------------|---------|
| Carbetocin | 30    | 551                              | 214            | .021    |
| Oxytocin   | 30    | 703                              | 277            |         |



The mean estimated blood loss was 551 ml in the Carbetocin group whereas it was greater in the Oxytocin group i.e. average 703 ml, this result was found to be significant(p value=0.021).

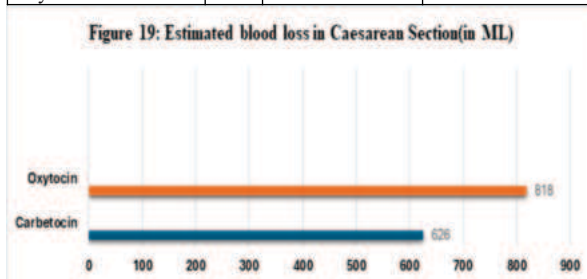
This observation was further divided upon and compared with respect to:

- Mode of delivery
- Total baby weight (twin A+B)
- Period of gestation
- Parity of the participants.

## Mean Estimated Blood Loss According To Mode Of Delivery

**Table 32.1 Estimated Blood Loss (in ml) in Caesarean Section**

| Type of drug used | N  | Mean Estimated Blood loss(ml) | p value |
|-------------------|----|-------------------------------|---------|
| Carbetocin        | 22 | 626 ml                        | 0.021   |
| Oxytocin          | 21 | 818 ml                        |         |

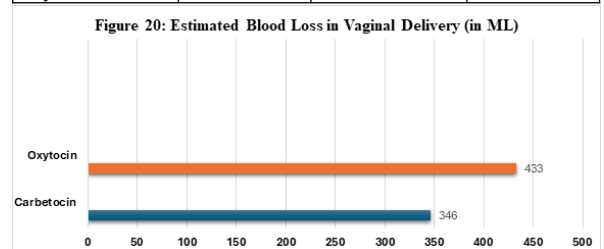


The estimated blood loss during caesarean section was lesser in the Carbetocin group as compared to Oxytocin group (626 m v/s 818 ml respectively).

This finding was found to be statistically significant. (p value=0.021)

**Table 32.2: Mean Estimated Blood Loss In Vaginal Delivery**

| Type Of Drug Used | N | Estimated Blood loss(ml) | P value |
|-------------------|---|--------------------------|---------|
| Carbetocin        | 8 | 346 ml                   | 0.021   |
| Oxytocin          | 9 | 433 ml                   |         |



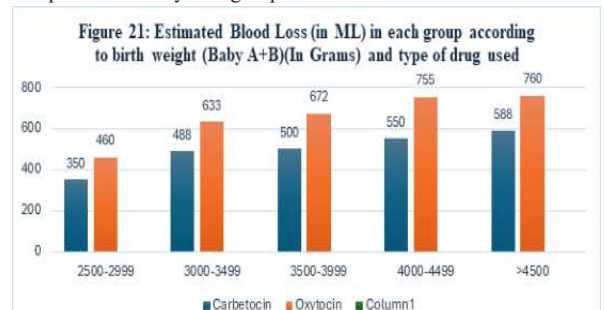
The mean estimated blood loss in participants who received Carbetocin was comparatively lesser as compared to the Oxytocin group (346 ml v/s 433 ml respectively) and this result was found to be statistically significant(p value=0.021).

**Table 32.3 - Estimated Blood Loss In Each Group According To The Total Baby Weight And The Type Of Drug Used**

| Birth weight (Baby A+B) | Car beto cin | Mean estimated blood loss | Std. Devi atio n | Birth weight (Baby A+B) | Oxy to cin | Mean estimate d blood loss | Std. Devi ation |
|-------------------------|--------------|---------------------------|------------------|-------------------------|------------|----------------------------|-----------------|
| 2500-2999               | 1            | 350                       | 143              | 2500-2999               | 4          | 460                        | 379             |
| 3000-3499               | 6            | 488                       | 331              | 3000-3499               | 4          | 633                        | 243             |
| 3500-3999               | 5            | 500                       | 263              | 3500-3999               | 1          | 672                        | 143             |
| 4000-4499               | 8            | 550                       | 294              | 4000-4499               | 8          | 755                        | 171             |
| >4500                   | 10           | 588                       | 260              | >4500                   | 13         | 760                        | 202             |
| Total                   | 30           | 551                       | 277              | Total                   | 30         | 703                        | 214             |

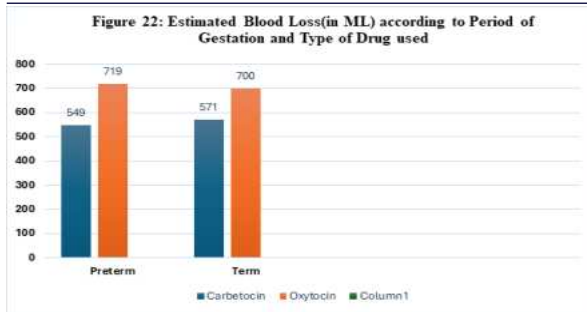
It was observed that the mean blood loss increased with the progressive increase in total birth weight (combined birth weight of Twin A + Twin B).

The mean estimated blood loss was lesser in the Carbetocin group as compared to the Oxytocin group.



**Table 32.4 Estimated Blood Loss According To Period Of Gestation And Type Of Drug Used**

| Period of Gestation | Carbetocin (Mean blood Loss in ml ± Standard Deviation) | Oxytocin (Mean blood Loss in ml ± Standard Deviation) | P value |
|---------------------|---------------------------------------------------------|-------------------------------------------------------|---------|
| Preterm             | 549±117                                                 | 619±289                                               | 0.020   |
| Term                | 571±256                                                 | 683±270                                               | 0.33    |

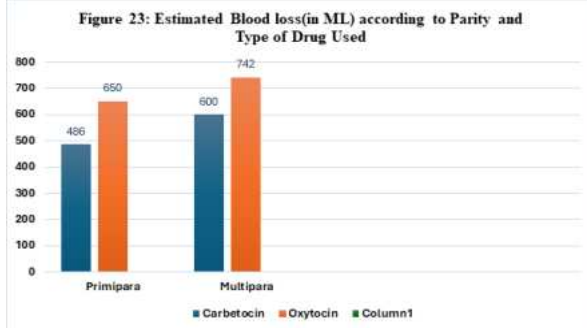


It was observed that, the mean estimated blood loss was higher in term gestation in both the groups, however when the participants were independently compared it was found that the mean estimated blood loss in Carbetocin was lesser compared to Oxytocin (549 ml v/s 619 ml respectively) and this result was found to be statistically significant (p value=0.020)

In term gestations, the mean estimated blood loss was lesser in the Carbetocin group when compared to Oxytocin group (571 ml v/s 683 ml) however this difference was not found to be statistically significant (p value=0.33).

**Table 32.5- Estimated Blood Loss According To Parity And Type Of Drug Used**

| Parity    | Carbetocin<br>(Mean blood loss in ml Standard Deviation) | Oxytocin<br>(Mean blood loss in ml Standard Deviation) | P value |
|-----------|----------------------------------------------------------|--------------------------------------------------------|---------|
| Primipara | 486151                                                   | 6500                                                   | 0.08    |
| Multipara | 600                                                      | 742                                                    | 0.0217  |

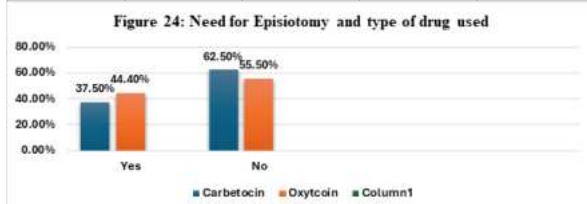


It was seen that the mean estimated blood loss was lesser in primipara patients as compared to multipara patient (568 ml v/s 684 ml respectively).

When parity and estimated blood loss was compared in each group it was seen that, the mean estimated blood loss in primipara patients was lesser in the Carbetocin group as compared to Oxytocin group (486 ml v/s 650 ml respectively) however, this finding was not found to be statistically significant (p value=0.08). In multipara patient, mean estimated blood loss was lower in the Carbetocin group as compared to Oxytocin (600 ml vs 742 ml respectively) and this result was found to be statistically significant (p value=0.0217).

**Table 32.6- Need For Episiotomy**

|     | Carbetocin<br>(n=8) | Average<br>Estimated<br>Blood Loss | Oxytocin<br>(n=9) | Average<br>Estimated<br>Blood Loss |
|-----|---------------------|------------------------------------|-------------------|------------------------------------|
| Yes | 3(37.5%)            | 350 ML                             | 4(44.4%)          | 350 ML                             |
| No  | 5(62.5%)            |                                    | 5(55.5%)          |                                    |



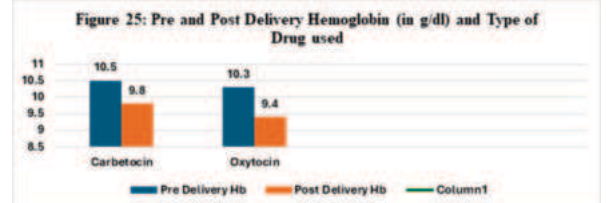
Out of total 17 patients who underwent vaginal delivery 7 patients were given episiotomy during delivery, in which 3 were in Carbetocin

group and 4 in the Oxytocin group.

The average estimated blood loss was found to be equal in both the groups. (Average=350 ML in each group) and this indicated that presence of episiotomy is not a confounding factor.

**Table 33: Pre- And Post-delivery Hemoglobin And Type Of Drug Used**

| Type of Drug                  | Type of drug  | Cases | Mean | Std. Deviation | 95% Confidence Interval for Mean |             | P value |
|-------------------------------|---------------|-------|------|----------------|----------------------------------|-------------|---------|
|                               |               |       |      |                | Lower Bound                      | Upper Bound |         |
| Carbetocin                    | Pre Delivery  | 30    | 10.5 | 1.2            | 10.1                             | 11.0        | 0.048   |
|                               | Post Delivery | 30    | 9.8  | 0.7            | 9.6                              | 10.1        |         |
| Mean Difference in Hemoglobin |               |       |      |                |                                  |             | 0.7     |
| Oxytocin                      | Pre Delivery  | 30    | 10.3 | 1.2            | 9.9                              | 10.8        |         |
|                               | Post Delivery | 30    | 9.4  | 0.9            | 9.1                              | 9.8         |         |
| Mean Difference in Hemoglobin |               |       |      |                |                                  |             | 0.9     |

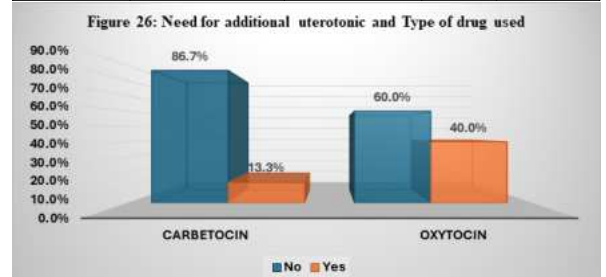


The mean difference in Hb % in pre-and post-delivery period was 0.7g/dl in the Carbetocin group and 0.9 g/dl in the Oxytocin group.

This result was found to be significant indicating that the average blood loss during delivery might have been comparatively lesser in the Carbetocin group (p value=0.048).

**Table 34: Need For Additional Uterotonic And Type Of Drug Used**

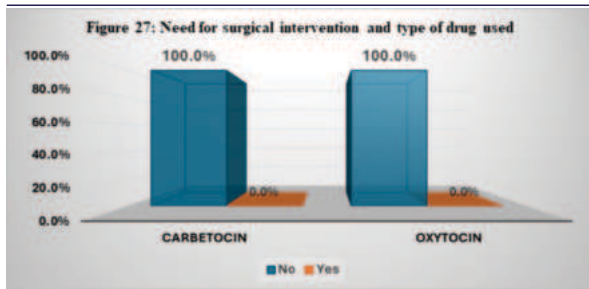
| Need for additional uterotonic | Type of drug used |          | Total  | P value |
|--------------------------------|-------------------|----------|--------|---------|
|                                | CARBETOCIN        | OXYTOCIN |        |         |
| No                             | 26                | 18       | 44     | 0.02    |
|                                | 86.7%             | 60.0%    | 73.3%  |         |
| Yes                            | 4                 | 12       | 16     |         |
|                                | 13.3%             | 40.0%    | 26.7%  |         |
| Total                          | 30                | 30       | 60     |         |
|                                | 100.0%            | 100.0%   | 100.0% |         |



In Carbetocin group, only 13.3% of the participants required additional uterotonics as compared to 40% in the Oxytocin group which was found to be statistically significant. (p value= 0.02).

**Table 35: Need For Surgical Intervention And Type Of Drug Used**

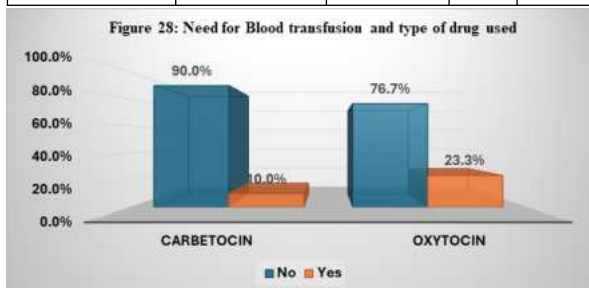
| Need for surgical intervention | Drug used  |          | Total  |
|--------------------------------|------------|----------|--------|
|                                | CARBETOCIN | OXYTOCIN |        |
| No                             | 30         | 30       | 60     |
|                                | 100.0%     | 100.0%   | 100.0% |
| Yes                            | 0          | 0        | 0      |
|                                | 0.0%       | 0.0%     | 0.0%   |
| Total                          | 30         | 30       | 60     |
|                                | 100.0%     | 100.0%   | 100.0% |



None of the patients, in either of the study groups required surgical intervention.

**Table 36: Need For Blood Transfusion And Type Of Drug Used**

| Blood transfusion | Type of Drug used |          | Total | P value |
|-------------------|-------------------|----------|-------|---------|
|                   | CARBETOCIN        | OXYTOCIN |       |         |
| No                | 27                | 23       | 50    | 0.016   |
|                   | 90.0%             | 76.7%    | 83.3% |         |
| Yes               | 3                 | 7        | 10    |         |
|                   | 10.0%             | 23.3%    | 16.7% |         |
| Total             | 30                | 30       | 60    |         |



Out of the 60 patients that were studied, 10 patients (16.7%) required blood transfusion.

Amongst these, 23.3% of the patients from the Oxytocin required blood transfusion as compared to 10% in the Carbetocin group. The need for blood transfusion was higher in the Oxytocin group. This finding was found to be statistically significant (p value=0.016).

## DISCUSSION:

Postpartum hemorrhage (PPH) affects 2-4% of women in India and remains a leading cause of maternal mortality in developing countries, accounting for nearly 25% of global maternal deaths, particularly in low-resource settings. The WHO recommends using Injection Oxytocin as the first-line uterotonic for preventing PPH during the active management of the third stage of labor. Although Oxytocin is effective, it requires higher doses for optimal uterine tone, increasing the risk of side effects and complications, such as nausea and hemodynamic instability. Due to its heat sensitivity and storage requirements, an analogue, Carbetocin, has been developed, offering a more stable alternative with a longer half-life and faster onset of action. The WHO endorses Carbetocin, along with misoprostol and ergometrine, for PPH prevention when Oxytocin is unavailable or unreliable. Various studies have assessed Carbetocin's efficacy across different birth settings, but research on its effectiveness in twin pregnancies is limited. This study investigates Carbetocin's effectiveness during the active management of the third stage of labor in twin gestations at or beyond 34 weeks of gestation, including both vaginal and cesarean deliveries.<sup>2,3,6</sup>

## Incidence of Twins:

During the study period, our institute recorded a total of 113 twin pregnancies out of 8,040 deliveries, resulting in an incidence of 14 twin pregnancies per 1,000 live births. In comparison, the overall incidence of twin pregnancies in India is reported to be 19 per 1,000 live births.<sup>25</sup>

## Age:

In this study, the predominant age group was 23-26 years in the Oxytocin group and 27-30 years in the Carbetocin group, both accounting for 43.3%. The mean ages were comparable: 25.6 ± 2.89 years for Oxytocin and 26.4 ± 4.84 years for Carbetocin. The younger demographic reflects the trend of earlier marriages in India, particularly in Chhattisgarh. Previous studies comparing Carbetocin

and Oxytocin for preventing postpartum hemorrhage reported mean ages of 29.5 and 29.7 years (Nuguelis Razali et al., 2015)<sup>8</sup>, 26.93 and 27.69 years (Robabeh Taheripanahe et al., 2017)<sup>12</sup>, 25 years (M. Widmer et al., 2018)<sup>15</sup>, 26 years in both groups (Paweena Amornpetkachul et al., 2018)<sup>20</sup>, and 28.7 and 28.3 years (Caglar et al., 2023)<sup>19</sup>. Notably, several studies included participants over 30 years, associated with higher postpartum hemorrhage risks, with mean ages of 34.5 and 33.9 years (Ky Tse et al., 2020)<sup>16</sup>, 35.15 and 35.4 years (Laura Sotillo et al., 2018)<sup>14</sup>, 34.5 and 33.7 years (Kok Min Seow et al., 2017)<sup>13</sup>, and 37.1 and 36.1 years (Giovanni et al., 2011)<sup>7</sup> for the Carbetocin and Oxytocin groups, respectively.

## Body Mass Index:

Maternal obesity modestly increases the risk of postpartum hemorrhage and is associated with a higher likelihood of intrapartum cesarean sections, mainly due to reduced uterine contractility. A study by Marie Blomberg et al. (2011)<sup>21</sup> found a positive correlation between maternal BMI and postpartum hemorrhage risk. In our study, 28.3% of participants had a normal BMI, while 53.3% were overweight, with 63.3% in the Oxytocin group. The Carbetocin group had a higher percentage of obese participants (23.3%). Similar BMI statistics were observed in other studies, including Nuguelis Razali et al. (2015)<sup>8</sup> and Ahmed Ben Tareef et al. (2021)<sup>18</sup>, both reporting an average BMI of 29. In contrast, a study by Manal EL Beherey et al. (2015)<sup>7</sup> in Egypt reported an average BMI of 32, highlighting the prevalence of obesity among reproductive-age women there.

## Parity:

Increasing parity elevates the risk of postpartum hemorrhage (PPH). In this study, primipara participants were equally distributed between the Carbetocin and Oxytocin groups (43.3% each), with 17 multipara participants in each group, indicating comparable parity across both groups.

Most studies report similar distributions of nulliparous and multiparous participants. For instance, Zakia et al. (2020)<sup>17</sup> had equal numbers of primigravida and multigravida in each group, while other studies noted comparable percentages of nulliparous participants across groups.

In our study, estimated blood loss was lower in primiparous patients (568 ml) compared to multiparous patients (684 ml). Among nulliparous patients, blood loss in the Carbetocin group was less than in the Oxytocin group (486 ml vs. 650 ml), though not statistically significant (p = 0.08). However, in multiparous patients, Carbetocin significantly reduced blood loss compared to Oxytocin (566 ml vs. 788 ml; p = 0.0217), demonstrating its effectiveness in promoting optimal uterine contractions and reducing blood loss associated with uterine atony.

## Gestational Age:

In this study, we included patients with a gestational age of ≥34 weeks, with an average gestational age of 36 weeks among participants. In the Carbetocin group, 66.7% were between 34 and 36 weeks, while 60% in the Oxytocin group fell within the same range, indicating comparable gestational ages.

Previous studies on twin pregnancies often included those >24 weeks, which can lead to significant discrepancies in fetal weight and blood loss. Therefore, our inclusion criterion focused on gestational ages ≥34 weeks to ensure comparability.

Gestational age is a critical risk factor for postpartum hemorrhage, as increased fetal weight stretches the uterine muscles. In twin pregnancies, the incidence of preterm births is notably high (65.1%) due to factors like uterine overstretching, placental complications, and maternal or fetal conditions.

## HYPERTENSIVE DISORDER IN PREGNANCY

When comparing blood loss by gestational age (Table 32.4), the Carbetocin group had significantly less blood loss in preterm patients (549 ml vs. 679 ml, p = 0.0206). Although the Carbetocin group also experienced less blood loss in term patients (571 ml vs. 683 ml), this difference was not statistically significant (p = 0.33).

Studies by Ky Tse et al. (2020)<sup>16</sup>, Laura Sotillo et al. (2018)<sup>14</sup>, and Kok-Min Sow et al. (2017)<sup>13</sup> report similar findings, with average gestational ages ranging from 35 to 37 weeks among various groups of

women with twin pregnancies.

In the present study, 14 participants had hypertensive disorders of pregnancy, with 64.2% in the Oxytocin group and 35.8% in the Carbetocin group, indicating a higher prevalence of hypertensive disorders among those receiving Oxytocin. One patient with eclampsia received Oxytocin as prophylaxis. Gestational hypertension and preeclampsia are notably more common in twin pregnancies compared to singleton pregnancies.

The mean estimated blood loss was greater in the Oxytocin group (703 ml) compared to the Carbetocin group (551 ml), likely due to the distribution of hypertensive patients (64.2% vs. 35.8%). Zakia M Ibrahim et al. (2020)<sup>17</sup> reported that Carbetocin outperformed Oxytocin, resulting in lower blood loss, reduced need for additional uterotonics, and less postoperative hemoglobin drop in patients with hypertensive disorders undergoing cesarean sections.

Robabbeh Taheripanah et al. (2017)<sup>12</sup> found no significant blood pressure changes after Carbetocin administration, suggesting that Carbetocin can be safely used in patients with hypertensive disorders requiring additional uterotonics.

### ANAEMIA-

The WOMAN-2 trial found a strong link between pre-birth hemoglobin levels and the risk of postpartum hemorrhage. In our study of 60 participants, 73.3% had anemia, with 88.6% experiencing mild anemia and 11.3% moderate anemia. The Oxytocin group had a higher prevalence of mild anemia, while the Carbetocin group had more cases of moderate anemia. The mean hemoglobin levels were comparable at 9.89 g/dl for the Oxytocin group and 9.12 g/dl for the Carbetocin group. Severe anemia patients were excluded from the study due to increased postpartum hemorrhage risk.

### ESTIMATED BLOOD LOSS

The mean estimated blood loss was significantly lower in the Carbetocin group (551 ml) compared to the Oxytocin group (703 ml,  $p = 0.021$ ). When analyzed by mode of delivery, blood loss was also significantly less in the Carbetocin group for both cesarean sections (626 ml vs. 818 ml) and vaginal deliveries (346 ml vs. 433 ml). These findings align with previous studies, which consistently show reduced blood loss in the Carbetocin group compared to Oxytocin.

Previous studies corroborate these findings, indicating reduced blood loss with Carbetocin. For instance, Laura Sotillo et al. (2018)<sup>14</sup> reported a lower mean blood loss in Carbetocin (629 ml) compared to Oxytocin (682 ml), though not statistically significant ( $p = 0.27$ ). Similarly, Ky Tse et al. (2020)<sup>16</sup> found total blood loss in twin pregnancies to be lower with Carbetocin (509 ml) than with Oxytocin (657 ml), but this was also not significant.

In contrast, Kabir N et al. (2015)<sup>11</sup> noted significant differences, with four patients experiencing massive blood loss in the Oxytocin group compared to none in the Carbetocin group ( $p = 0.002$ ). However, other studies, including those by M. Bouchar et al. (2004)<sup>5</sup> and Giovanni et al. (2011)<sup>7</sup>, found no significant differences in blood loss between the two groups.

### Total Baby Weight (Twin A + Twin B)

Estimated blood loss is influenced by factors such as total fetal weight. Our study found that as the combined fetal weight increased, estimated blood loss also rose, with greater losses observed in the Oxytocin group (Table 32.3). Similarly, Diane Korb et al. (2023)<sup>22</sup> and Pierre Delorme et al. (2020)<sup>23</sup> reported no significant difference in postpartum hemorrhage rates in both groups for fetal weights exceeding 4000g. Likewise, Kok Min Seow et al. (2017)<sup>13</sup> and Laura Sotillo et al. (2018)<sup>14</sup> found no significant differences in estimated blood loss between the groups in twin pregnancies.

### Episiotomy

Episiotomy is a surgical incision in the perineum to assist in delivery, which can increase blood loss and lead to traumatic postpartum hemorrhage if not properly repaired. In our study, the presence of episiotomy did not significantly affect blood loss in patients who underwent vaginal delivery, with both the Carbetocin and Oxytocin groups experiencing 350 ml of blood loss each (8 cases in the Carbetocin group and 9 in the Oxytocin group). Thus, episiotomy was not a confounding factor for postpartum hemorrhage in this study.

Previous research has often considered episiotomy but did not analyze blood loss separately for comparison.

### Dosage Of Oxytocin

The standard dosage of 10 I.U. Oxytocin administered as a single intramuscular injection is recommended by WHO for managing the third stage of labor. Our study adhered to this protocol, administering 10 I.U. of Oxytocin post-delivery and comparing it to 100 mcg of intramuscular Carbetocin. This approach aimed to maintain practice standards and minimize variations in outcomes.

Previous studies comparing Carbetocin and Oxytocin utilized varying dosages and regimens of Oxytocin, which could lead to inconsistent results and complicate outcome analysis. Many studies indicate that Oxytocin often necessitates additional uterotonics, highlighting a persistent need for supplementary treatments in the Oxytocin group. However, some studies employed the same Oxytocin administration method as our current research.

### Hemoglobin Difference (Pre- and Post-Delivery)

The difference in hemoglobin levels serves as a reliable indicator of intrapartum blood loss, reflecting lost blood volume and ongoing losses. In our study, the mean hemoglobin difference was 0.7 g/dL in the Carbetocin group and 0.9 g/dL in the Oxytocin group, showing statistical significance ( $p = 0.048$ ).

Similarly, Paweena Amornpetkachul et al. (2018)<sup>20</sup> reported that post-delivery hemoglobin levels were significantly higher in the Carbetocin group ( $p < 0.01$ ), with a lower incidence of postpartum anemia. Caglar Cetin et al. (2023)<sup>19</sup> also found significant differences in hemoglobin levels between the two groups ( $p < 0.01$ ). Laura Sotillo et al. (2018)<sup>14</sup> noted a greater decrease in hemoglobin (1.7 vs. 1.2 g/dL) and hematocrit (5% vs. 3.7%) with statistical significance ( $p = 0.02$ ). In contrast, Pierre Delorme et al. (2020)<sup>23</sup> used the decline in hemoglobin after cesarean sections as a primary PPH indicator but found no significant difference. Other studies, including those by Jerome Dansereau et al. (1998)<sup>24</sup>, Nuguelis Razali et al. (2015)<sup>8</sup>, Kok-Min Seow (2017)<sup>13</sup>, and Manal M. El Behery et al. (2015)<sup>9</sup>, did not report significant differences in hemoglobin drop.

### Need For Additional Uterotonics

The need for additional uterotonics after prophylactic administration during the active management of the third stage of labor reflects the duration and effectiveness of the drugs. In our study, only 13.3% of participants in the Carbetocin group required additional uterotonics, compared to 40% in the Oxytocin group, a statistically significant difference ( $p = 0.02$ ).

While many studies use the need for additional uterotonics as a primary outcome, it can be subjective and vary by surgeon. For instance, Marc Bouchar et al. (2002)<sup>5</sup> found that 63.6% of participants in the Oxytocin group needed additional uterotonics versus 44.6% in the Carbetocin group, also statistically significant ( $p = 0.02$ ). Numerous trials have similarly shown a reduced need for additional uterotonics in the Carbetocin group, supporting its longer duration and sustained action.

However, some studies, such as those by Ky Tse et al. (2020)<sup>16</sup> and M. Widmer et al. (2018)<sup>15</sup>, did not find significant differences. Our study confirmed that a single bolus of Carbetocin is equivalent to a continuous infusion of Oxytocin (20 IU in 1000 ml). There were two cases of secondary postpartum hemorrhage in patients receiving Oxytocin, attributed to its shorter plasma half-life. These cases were managed conservatively with Oxytocin infusion, Tranexamic acid, and Misoprostol.

### NEED FOR BLOOD TRANSFUSION

Twin pregnancies have a higher risk of blood loss, often requiring blood transfusions, especially due to the prevalence of anemia. In our study, 10 patients required blood transfusions, with 70% in the Oxytocin group and 30% in the Carbetocin group. The lower transfusion requirement in the Carbetocin group was statistically significant ( $p = 0.016$ ). This finding aligns with other studies, such as Ahmed Ben Tareef (2021)<sup>18</sup> and Laura Sotillo (2018)<sup>14</sup>, showing significantly reduced transfusion needs in the Carbetocin group compared to Oxytocin. However, some studies found no significant difference in transfusion rates between the two groups.

### CONCLUSION

The study concludes that Carbetocin is more effective than Oxytocin in

preventing postpartum hemorrhage, resulting in less blood loss, a smaller drop in hemoglobin levels, reduced need for additional uterotonics, and fewer blood transfusions. While Carbetocin is more expensive than Oxytocin, considering the costs associated with additional uterotonics and Oxytocin's cold storage requirements, the benefit to maternal health outweighs the higher price.

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