



## Research Paper

# A Comparative Study on Hemodynamic Effects of Intravenous Oxytocin Boluses of 2 Units versus 5 Units Followed by Infusion for Prevention of Postpartum Haemorrhage in Parturients for Elective Caesarean Section – A Randomised Controlled Trial

Authors

Dr Charutha Balachandran<sup>1</sup>, Dr Priyanka Dhankhar<sup>2</sup>, Dr Pragati Saxena<sup>3</sup>

<sup>1</sup>Clinical Tutor, North West Bengal Medical College, Siliguri

<sup>2</sup>Consultant Anaesthetist Sikar

<sup>3</sup>Junior Resident, Department of Anaesthesiology, RMCH Bareilly

## Abstract

**Objective:** To evaluate and compare the efficacy, haemodynamic stability and adverse effects of oxytocin 2 units bolus followed by infusion at 10 units/hour versus oxytocin 5 units bolus followed by infusion at 10 units/hour for prevention of PPH in patients posted for elective caesarean section.

**Method:** The study was conducted in 80 parturients divided in two groups scheduled to undergo elective Caesarean Section under spinal anaesthesia. Post baby delivery Group I patients received oxytocin bolus of 2 units diluted in 5ml normal saline given over 10 seconds and Group II patients received oxytocin bolus of 5 units followed by oxytocin infusion at the rate of 10 U/h in both groups. HR and NIBP were recorded till the end of surgery. Any need for supplemental uterotonic or adverse effects was noted

**Results:** Heart rate response was less in Group I (2 units bolus) patients compared to Group II.

The drop in blood pressure in Group I was between 4-8 minutes and in Group II was between 8-20 minutes which was a statistically significant different

Both the groups attained a well contracted uterus at approximately 20 minute. The incidence of adverse effects were less in Group I.

**Conclusions:** From our study we conclude that slow i.v injection of 2 units bolus dose of oxytocin followed by 10 units per hour infusion for 2 hours is sufficient enough for prevention of postpartum haemorrhage with minimal alterations in hemodynamic variables like heart rate and blood pressure and less adverse effects.

**Keywords:** oxytocin, Post partum haemorrhage.

## Background

Postpartum haemorrhage (PPH) is a major cause of maternal mortality worldwide and accounts for more than 30% of maternal deaths. PPH is commonly associated with retained products of conception requiring evacuation of the uterus and uterine atony, requiring aggressive uterotonic therapy. Oxytocin plays a central role in

prophylaxis and treatment of PPH. It is routinely administered after delivery whether spontaneous or operative by bolus and/or infusion to initiate and maintain adequate uterine contractility after placental delivery and thus minimise blood loss and prevent post partum haemorrhage. Adverse hemodynamic effects are known to occur after intravenous oxytocin, notably tachycardia,

hypotension. especially when given as i.v bolus. Although many practitioners use i.v 5 units oxytocin during elective caesarean delivery there is limited evidence to substantiate this practice .Doses above 5 units have not been found to be associated with improved uterine tone . 2 units of bolus administration resulted in similar effects on uterus as compared to 5 units but with better preservation of hemodynamics, less nausea, there was also no difference in the need for additional uterotonics between the two groups. Hence a study is undertaken to assess and compare effects of intravenous bolus dose of 2 units and 5 units of oxytocin followed by infusion after elective caesarean section.

### Methods and Materials

**Study Design:** Prospective randomized controlled double blind study.

**Study Setting:** The study was conducted in 80 parturients divided into two groups scheduled to undergo elective Lower Segment Caesarean Section under spinal anaesthesia between Jan 2020-august 2020.

Patients were randomly allocated to one of the following groups

**Group I:** 2 units oxytocin intravenous bolus+20 u in 500ml RL @10U/hr Group II: 5units oxytocin intravenous bolus + 20U in 500 ml RL@ 10U/hr

### Inclusion Criteria

1. Pregnant women who were to undergo elective lower segment caesarean section.
2. ASA I or II patients.
3. Age between 18- 30 yr.
4. Singleton pregnancies.

### Exclusion Criteria

1. Pregnant women for emergency caesarean section.
2. Patients who are already on oxytocin infusion for augmentation of labour.
3. Patients with active labour pain, ruptured membranes
4. Complicated Obstetrics with increased risk

- of uterine atony<sup>10</sup> like multiple gestation, high parity, macrosomia, polyhydramnios, prolonged labour precipitous labour,
5. Placenta previa<sup>70</sup> or accreta.
6. Cardiovascular instability like pre eclampsia, essential hypertension and patients with
7. Known drug allergy to oxytocin

After preanaesthetic checkup and 6 hrs fasting and baseline investigations, patient was shifted to OT and all baseline vitals recorded. Patient was given subarachnoid block by 0.5% bupivacaine and case was started after attaining T4 level of anaesthesia. As soon as the umbilical cord was clamped, immediately after baby delivery the study drug was given. The drug was given slowly over 10 seconds. All patients were immediately given an infusion of 20 U oxytocin in 500 ml ringer lactate at the rate of 10 U/hr. The last recording of NIBP and HR were recorded as the baseline prior to oxytocin bolus. HR and NIBP were recorded till the end of surgery. Need for supplemental uterotonic agents like further doses of oxytocin, ergometrine, carboprost, or any Adverse effects were noted.

### Statistical Analysis

IBM SPSS statistical software version 21 was used for statistical analysis. Base line parameters like Age, weight, BMI, Haemoglobin and base line hemodynamic parameters like Heart rate, Blood pressure etc were taken as explanatory parameters, Rescue drugs and adverse effects counts were taken as outcome variables. Descriptive analysis of all the explanatory parameters was done Statistical analysis was done using unpaired students t- test and Z- test for proportions, p value of < 0.05 was considered to be significant.

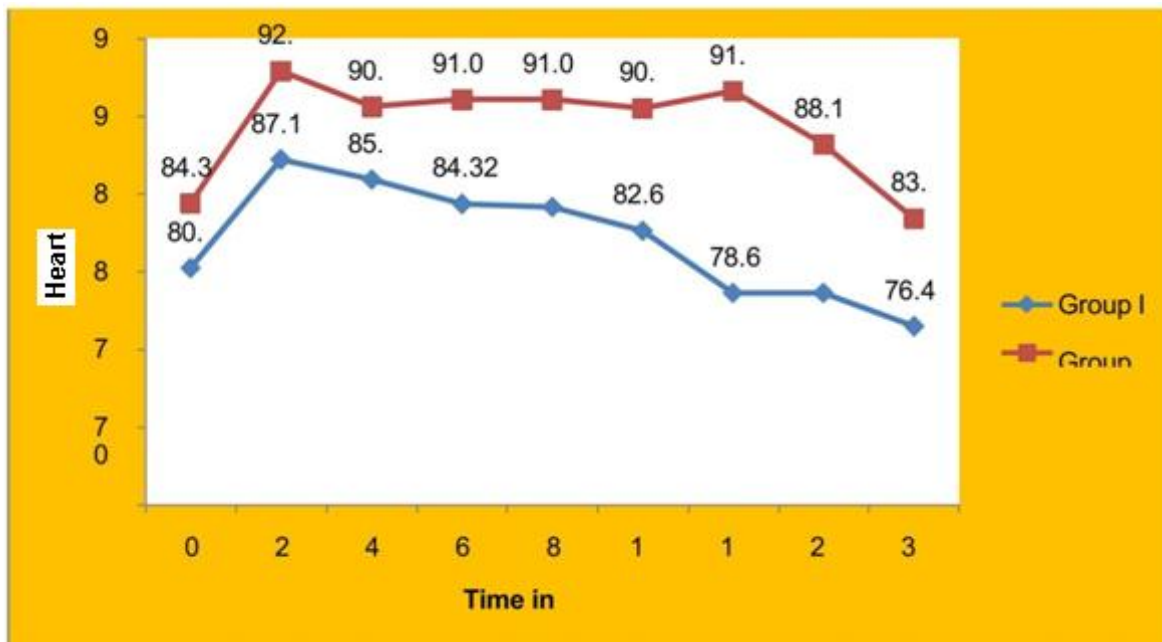
**Results**

Both the groups were similar in age and BMI.

**Table-1:** Comparison of maximum HR variations in two groups

Heart rate changes	Groups	N	Mean	Std. Deviation	P value
Base HR	I	40	80.20	14.64	0.16
	II	40	84.37	12.02	
2	I II	40	87.17	11.53	0.06
		40	92.9	15.2	
4	I	40	85.90	12.17	0.12
	II	40	90.6	15.1	
6	I	40	84.32	14.4	0.053
	II	40	91.05	16.1	
8	I	40	84.15	14.5	0.06
	II	40	90.05	13.5	
10	I	40	82.62	15.27	0.01*
	II	40	90.5	13.4	
15	I	40	78.6	12.66	<0.0001*
	II	40	91.6	14.09	
20	I	40	78.6	12.28	0.002*
	II	40	88.17	14.9	
30	I	36	76.44	9.67	0.009*
	II	30	83.9	12.41	
40	I	7	74.29	5.90	0.002*
	II	8	90.50	9.98	
50	I	0	-	-	-
	II	2	81	15.5	

**Graph 1:** Comparison of trend of heart rate in two study groups (N=80)

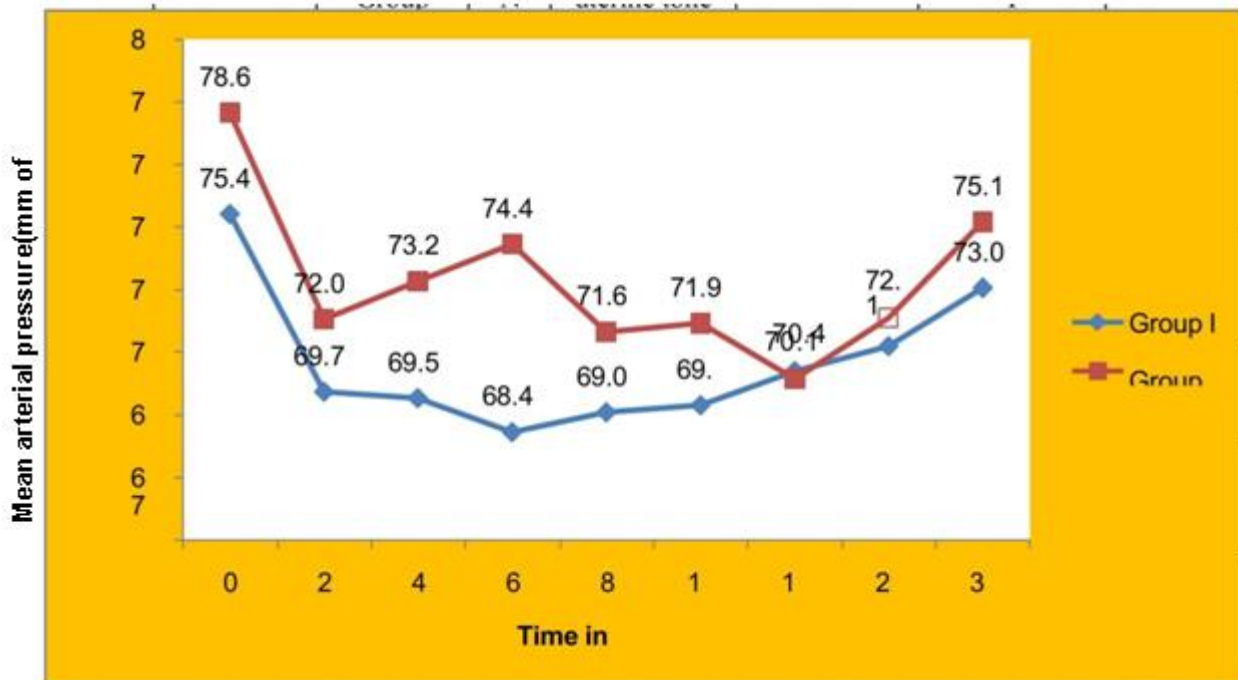


There was a statistically significant difference in heart rate response at 10,15,20 and 30 minutes with p value of 0.01, <0.0001, 0.002, 0.009 respectively

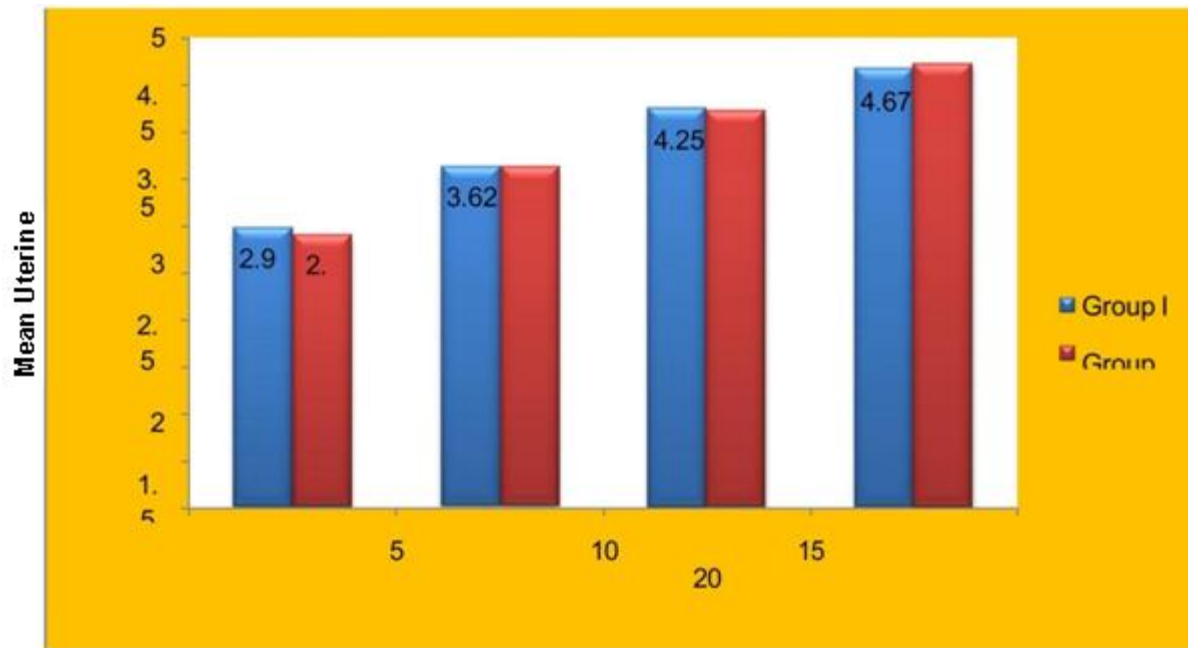
Table -2 Comparison of mean BP variations in two study groups (n=80)

Time in minutes	Group	N	Mean	Std. Deviation	P value
BASE BP	Group I	40	75.42	6.37	0.051
	Group II	40	78.65	8.10	
BP 2	Group I	40	69.73	8.26	0.26
	Group II	40	72.05	10.26	
BP 4	Group I	40	69.53	8.72	0.06
	Group II	40	73.27	9.29	
BP6	Group I	40	68.45	8.96	0.002*
	Group II	40	74.45	8.41	
BP 8	Group I	40	69.08	8.94	0.22
	Group II	40	71.65	10.05	
BP10	Group I	40	69.30	8.08	0.18
	Group II	40	71.92	9.45	
BP15	Group I	40	70.4	7.17	0.84
	Group II	40	70.15	7.50	
BP20	Group I	40	71.2	7.20	0.61
	Group II	40	72.10	8.49	
BP30	Group I	36	73.05	6.48	0.21
	Group II	30	75.16	7.03	
BP40	Group I	07	74.14	7.53	0.64
	Group II	09	76.11	9.23	
BP50	Group I	-	-	-	-
	Group II	01	77.00	-	

Graph – 2 - Comparison of trend of arterial pressure in two study groups (N=80)



There was a statistically significant difference in blood pressure between groups at 6 minutes with p value of 0.002.

**Graph – 3** - Comparison of trend of uterine tone in two study groups (N=80)

The uterine tone in both groups does not show any significant difference.

Need for rescue drugs were similar in both groups between 5-10 minutes. But the need for rescue drugs were less in Group I compared to Group II at 10-15 min

### Discussion

The most consistent cardiovascular changes observed after oxytocin are a dose-related decrease in arterial pressure due to peripheral vasodilatation, with a compensatory increase in HR and cardiac output.

In our study both the groups demonstrated an acute increase in HR at 2 minutes following bolus administration of drug. The rise in heart rate was more following 5 units bolus dose with maximum occurring between 10-30 minutes which was statistically significant with p value of 0.01, <0.0001, 0.002, 0.009 at 10,15,20 and 30 minutes respectively.

In our study both the groups demonstrated an acute decrease in BP at 2 minutes following bolus administration of. There was a significant difference in blood pressure between groups at 6 minutes with p value of 0.002. maximum fall in blood pressure was between 4-8minutes in Group I, and 8-20 minutes in Group II. The findings in our study show that both groups provides

adequate uterine contraction with no significant difference between the groups for the need for further uterotonics.

The additional drugs used in the study included ephedrine for hypotension with mean blood pressure less than 60 mm Hg. The drug used in 5 units group was higher when compared to 2 units i.e. 20% in 2 units group and 37.5% in 5 units group. Patients receiving 2 units bolus of oxytocin with infusion were more hemodynamically stable than patients receiving 5units bolus dose of oxytocin.

Similarly patients in 5 units bolus group had more incidence of nausea, vomiting.

### Conclusions

From our study we conclude that in elective caesarean section after extraction of placenta, slow i.v injection of 2 units bolus dose of oxytocin followed by 10 units per hour infusion for 2 hours is sufficient enough for prevention of postpartum haemorrhage with minimal alterations in hemodynamic variables like heart rate and blood pressure, less adverse effects and reduced need for rescue drugs compared to slow i.v injection of 5 units bolus dose followed by oxytocin infusion, with both the groups attaining a well contracted uterus at 20 minutes.

**Declarations****Funding:** None**Conflict of Interest:** None**References**

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