

2022, Volume 9, ID 656

DOI: [10.15342/ijms.2022.656](https://doi.org/10.15342/ijms.2022.656)

## RESEARCH ARTICLE

# Outcome of Oxytocin on Haemodynamic Change During Caesarean Section under Spinal Anaesthesia

Mainuddin Ahmed <sup>a</sup> , Monowar Hossain Talukder <sup>b</sup>, Khondaker Shaheen Hossain <sup>c</sup>, Md. Belal Uddin <sup>d</sup>, Faruk Ahmed <sup>e</sup>

<sup>a</sup> Assistant Professor, Department of Anaesthesiology, Abdul Malek Ukil Medical College, Noakhali, Bangladesh

<sup>b</sup> Assistant Professor, Department of Anaesthesiology, Abdul Malek Ukil Medical College, Noakhali, Bangladesh

<sup>c</sup> Assistant Professor, Department of Anaesthesiology, Abdul Malek Ukil Medical College, Noakhali, Bangladesh

<sup>d</sup> Assistant Professor, Department of Anaesthesiology, 250 Bedded Shaheed Shaikh Abu Naser Specialized Hospital, Khulna, Bangladesh

<sup>e</sup> Assistant Professor, Department of Paediatrics, Abdul Malek Ukil Medical College, Noakhali, Bangladesh

### ABSTRACT

**Background:** Oxytocin is generally used in obstetric exercise as a uterotonic drug for induction and augmentation of labor and stays the drug of desire for facilitating uterine contractions all through vaginal and operative delivery. It is now spreading up to far-flung areas. The infusion method of oxytocin is protected in the caesarean area beneath spinal anaesthesia.

**Objective:** This is to evaluate the hemodynamic modifications precipitated by oxytocin given as an I/V bolus or infusion to limit uterine bleeding in cesarean section.

**Methods:** This prospective interventional study was carried out at the Department of Anesthesiology, 250 Bed General Hospital, Noakhali, Bangladesh, from January to December 2020. A whole range of fifty sufferers ASA grade I had been selected. Thirty affected people in every group. In crew A, the parturient acquired oxytocin 5IU of I/V in bolus, and in team B, infusion of oxytocin 5IU diluted with 5ml everyday saline given I/V over two min by way of the use of infusion pump. The learning about duration started out simply earlier than oxytocin is given, and it used to be persisted for an additional 10 min. Systolic and diastolic BP, MAP, coronary heart rate, and uterine bleeding have been recorded every 1 min.

**Results:** In our study, every group had n=25. All outcomes are expressed as mean± standard deviation. The studied groups became statistically matched for age, gestational age, weight, coronary heart rate, systolic and diastolic blood pressure, suggesting arterial pressure. The implied distinction of all hemodynamic parameters at 2 to 5 minutes of oxytocin administration has been statistically significant (p<0.05).

**Conclusion:** Oxytocin remains the first-line uterotonic after vaginal and caesarean delivery. The hemodynamic changes were more marked in the I/V bolus of oxytocin than infusion technique. Recent research elucidates the therapeutic range of oxytocin during caesarean delivery and receptor desensitization. A slower injection of oxytocin can effectively minimize cardiovascular side effects and equally effectively reduce blood loss without compromising the therapeutic benefits. Evidence-based protocols for preventing and treating uterine atony during cesarean delivery are recommended.

**KEYWORDS:** Oxytocin, Infusion, Haemodynamic, Intravenous.

**Correspondence:** Dr. Mainuddin Ahmed. Address : Assistant Professor, Department of Anaesthesiology, Abdul Malek Ukil Medical College, Noakhali, Bangladesh. Email: [maindr67@gmail.com](mailto:maindr67@gmail.com)

**Copyright** © 2022 Mainuddin A et al. This is an open access article distributed under the [Creative Commons Attribution 4.0 International](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

### INTRODUCTION

Oxytocin is commonly used in obstetric practice as a uterotonic drug for induction and augmentation of labour. It remains the drug of choice for facilitating uterine contractions during vaginal and operative delivery [1, 2]. The frequency of cesarean section births continues to rise worldwide [3] steadily. Even though the cesarean procedure has become very safe over the years, it is still associated with high maternal and perinatal mortality and morbidity [4]. The overall postoperative morbidity rate associated with cesarean births is 35.7% [5]. The greater mortality and morbidity prices would possibly be

attributable to the surgical technique and the preferred anesthetic approach. Maternal hypotension is an identified complication of the subarachnoid block that can compromise the welfare of each mom and fetus welfare. Now and again, it may also lead to a risky complication, cardiac arrest, main to an amazing variety of mortality and morbidity [6]. Oxytocin, ergot derivatives, and prostaglandins are significantly used in medical exercise [7]. Oxytocin promotes uterine clean muscle contraction, which is imperative for decreasing blood loss from the web page of placental attachment following delivery. Oxytocin

is also related to preventable maternal and fetal destructive activities, although the peripartum duration, leading to the renewed hobby in new procedures for enhancing oxytocin administration for obstetric warning signs [6]. The doses agenda of oxytocin pills in induction and augmentation ought to intention to provoke nice contraction main to diminished blood loss, properly uterine contraction, and suitable obstetric consequences [7] after caesarean area uterus relaxes. During pregnancy, oxytocin is indicated to initiate or enhance uterine contractions. Where this is suited and regarded appropriate for a motive of the foetal or maternal situation to acquire vaginal delivery, we use some method to contract the uterus ergometrine motives nausea, vomiting, and vasoconstriction due to multiplied blood strain and CVP [8]. Oxytocin reasons uterine contraction as nicely as minimizing bleeding after caesarean section.

### MATERIALS AND METHODS

This prospective interventional study was carried out at the Department of Anesthesiology, 250 Bed General Hospital, Noakhali, Bangladesh, from January to December 2020. We recruited 50 sufferers present process optional caesarean area ASA grade-I had been chosen randomly as per inclusion and exclusion standards in two groups. In team A, the parturient acquired a 5IU oxytocin IV bolus, and crew B obtained a gradual infusion of oxytocin diluted with 5ml regular saline over two minutes through the use of an infusion pump. Each parturient is premedicated with a cap. Omeprazole 20mg orally. One cap. at night earlier than and one cap. On the morning of the operation.

Arterial blood stress and coronary heart rate, Spo2 have been recorded. Then the affected person used to be stored in a supine role on the left side with a wedge in the proper buttock, and oxygen was once given intraoperatively with a nasal cannula. After checking out the peak and first-class of the block, urinary catheterization used to be accomplished, and health care professionals are allowed to begin the operation. After transport of the fetus crew, A acquired 5IU oxytocin (inj. Piton-S) bolus (Approximately over 1 sec), and crew B acquired 5IU oxytocin (inj. Piton-S) IV infusion slowly diluted with 5 ml everyday saline over two min. Baseline information used to be taken earlier than oxytocin is given. The patient was once monitored each 3min interval up to the shipping of the fetus. After transport of the fetus affected, the person was once monitored systolic and diastolic BP, MAP, coronary heart rate, oxygen saturation, uterine contraction, uterine bleeding, and any negative impact used to be recorded in each 1min in statistics sheet. The learning about duration was once begun before oxytocin was given, and it once persevered for a similarly 10 min. The find out the length of 10 min used to be set after a small pilot study. The patient used to be discovered by a physician the country of uterine contraction expressed as mild, average, or completely contracted. All the applicable data for every find out was once recorded on a predefined statistics sheet with the assistance of volunteers as per requirements. The end result was analyzed statistically through an unpaired-t check with a p price <0.05 with a 95% assured limit.

### RESULTS

The present study was analyzed in the light of comparison among the subject groups, each group having n=25. The

studied groups became statistically matched for age, gestational age, weight, heart rate, systolic and diastolic blood pressure, and mean arterial pressure. All results are expressed as mean  $\pm$  standard deviation.

**Table 1: Demographic data (N=50)**

	A		B		P
	Mean	SD	Mean	SD	
Age(yrs) Mean $\pm$ SD	24.3	6.0	25.3	4.8	0.489
Gestational age(weeks) Mean $\pm$ SD	39.5	0.7	39.6	0.8	0.36
Weitht(Kg) Mean $\pm$ SD	59.4	3.0	59.9	2.3	0.327

Values were expressed as mean $\pm$ SD. Analysis was done by unpaired t-test. There was no significant difference between the groups.

**Table 2: Changes of heart rate (N=50)**

	A		B		P
	Mean	SD	Mean	SD	
<b>Pre-operative</b>	85.7	3.9	87.7	5.2	0.10
<b>1 min</b>	93.2	10	92.3	11	0.72
<b>2 min</b>	98	2.8	92.6	2.2	0.00
<b>3 min</b>	101	5.1	90	4.4	0.02
<b>5 min</b>	105	5.2	90	2.1	0.02
<b>7 min</b>	92.5	3.0	89.3	2.6	0.38
<b>10 min</b>	95	11	96	11	0.95

Values were expressed as mean $\pm$ SD. Analysis was done by unpaired t-test. The above table shows the systolic blood pressure of preoperative and just after giving oxytocin up to 10 minutes one minute interval. There were significant difference between the groups from 2min to 5min. (p<0.05).

**Table 3: Changes of systolic blood pressure (N=50)**

	A		B		P
	Mean	SD	Mean	SD	
<b>Pre-operative</b>	117	7.8	120	6.9	0.16
<b>1 min</b>	116	7.5	119	6.7	0.1
<b>2 min</b>	101	7.3	93.2	2.2	0.02
<b>3 min</b>	95.5	5.4	108	4.3	0
<b>5 min</b>	97.3	4.5	106	3.6	0.03
<b>7 min</b>	104	11	108	11	0.12
<b>10 min</b>	104	11	107	10	0.4

Values were expressed as mean $\pm$ SD. Analysis was done by unpaired t-test. The above table shows the heart rate of preoperative and just after giving oxytocin up to 10 minutes one-minute intervals. There was a significant difference between the groups from 2min to 5min. (p<0.05).

**Table 4: Changes of diastolic blood pressure (N=50)**

	A		B		P
	Mean	SD	Mean	SD	
<b>Pre-operative</b>	76.3	5.6	78.7	4.3	0.07
<b>1 min</b>	72.8	8.5	73.5	8.9	0.71
<b>2 min</b>	53.5	3.8	56.0	3.6	0.03
<b>3 min</b>	61.0	9.9	73.7	8.1	0.02
<b>5 min</b>	61.3	3.6	72.6	4.8	0.03
<b>7 min</b>	65.3	9.1	67.5	8.4	0.42
<b>10 min</b>	67.7	8.5	70.7	8.0	0.88

Values were expressed as mean±SD. Analysis was done by unpaired t-test. The above table shows the Diastolic blood pressure of preoperative and just after giving oxytocin up to 10 minutes one minute interval. There were significant difference between the groups from 2min to 5min. (p<0.05).

**Table 5: Changes of mean arterial pressure (N=50)**

	A		B		P
	Mean	SD	Mean	SD	
<b>Pre-operative</b>	90	6	92.4	3.9	0.06
<b>1 min</b>	85.4	5.8	88.3	6.2	0.94
<b>2 min</b>	65.3	5.4	73	6	0
<b>3 min</b>	64.2	6.2	74.7	7.3	0.03
<b>5 min</b>	64.7	4.2	74.3	5.3	0.01
<b>7 min</b>	67.9	5.3	70.8	6.4	0.25
<b>10 min</b>	65.6	6	73.1	4.7	0.16

Values were expressed as mean±SD. Analysis was done by unpaired t-test. The above table shows the mean arterial pressure of preoperative and just after giving oxytocin for up to 10 minutes observed one-minute interval. There was a significant difference between the groups from 2min to 5min p<0.05.

**Table 6: Distribution of PPH in both groups (N=50)**

Complications	Group A		Group B	
	n	%	n	%
<b>Ignored bleeding&lt;500ml</b>	25	100	25	100
<b>Postpartum haemorrhage</b>	0	0	0	0

The above table shows the PPH of patients and found all patients ignored bleeding <500ml in both groups.

**Table-7: Comparison of side effects between groups (N=50)**

Complications	Group A		Group B	
	N	%	N	%
<b>Nausea</b>	3	12%	4	16%
<b>Vomiting</b>	0	0	0	0

<b>Chest pain</b>	0	0	0	0
<b>Arrhythmia</b>	0	0	0	0
<b>Flushing</b>	0	0	0	0

The mean difference in the pre-operative and post-operative haematocrit was highest in group A, followed by group B. Nausea was seen in 7 out of 50 participants. It was compared between the two groups, and the difference was insignificant (Table 7).

## DISCUSSION

Oxytocin dosing in labouring mothers has been extensively studied for over three decades. The dosing has gradually evolved from a high to a low bolus dose. There has been a hesitancy to standardize the lowest possible dose. In elective cesarean The UK directive on caesarean sections endorses five units of oxytocin as a slow intravenous bolus dose after delivering the newborn [9]. A whole of 50 pregnant females aged 18 to 36 years, weighing between fifty-five kg to sixty-five kg belonging to bodily repute ASA grade I with the period being pregnant (37 weeks and above) endure non-obligatory caesarean area below spinal anaesthesia had been enrolled in this study. These sufferers have been divided into two businesses of thirty sufferers every fashioned with the aid of randomly chosen sufferers through the blind envelope method. Out of which 25 had been protected in crew A acquired 5IU oxytocin bolus (approximately over 1 sec) and 30 in team B, obtained 5IU oxytocin IV infusion diluted with 5ml ordinary saline over two minutes. This suggests that a slower infusion of 5IU oxytocin can efficaciously limit the cardiovascular side effects; however, speedy bolus oxytocin reasons marked cardiovascular instability besides compromising the therapeutic benefits. The modern find out about tested a common minimize in MAP of 24 mmHg varied from 19 to 32 mmHg in team A in the course of two to 5 minutes in wholesome ladies having an optional caesarean area who acquired 5IU of oxytocin as a speedy bolus. Whereas in crew B common limit in MAP of 12 mmHg vary from eight to 18 mmHg for the duration of two to 5 minutes. Oxytocin used for prophylaxis or administration of PPH in the placing of caesarean transport might also end result in a quantity of destructive maternal outcomes [8]. These include cardiovascular instability (hypotension, tachycardia, myocardial ischaemia, and arrhythmias), nausea, vomiting, headache, and flushing. Rarely, as a result of structural similarities with vasopressin, large doses of oxytocin may cause water retention, hyponatremia, seizures, and coma [10]. Although oxytocin causes less emetic effects compared with other uterotonics, the incidences of nausea and vomiting are 29 and 9%, respectively, after a bolus of 5 IU of oxytocin [11]. In the present study, it was observed that the changes in heart rate were significantly bigger in group A compared to group B for 2 to 5 minutes. However, the gentler increase of heart rate in the infusion group (group B) is preferable clinically. It is reassuring to the anaesthesiologist who prefers to maintain a cardiovascular status that this physiological insult can be avoided simply by giving a 5IU oxytocin infusion over 2 min. Thomas JS et al. and his colleague found in their study that the decrease in MAP of 8(8.7)

mmHg and the small increase in HR are certainly clinically preferable, which is closely resemble the present study [12]. Obviously, there have been discussions within the obstetric anaesthesia community about the correct dose of oxytocin and its method of administration [13]. A slow infusion of 5 IU of oxytocin produces less cardiovascular instability compared to a bolus of 5 IU, with no observed differences in uterotonic effect [14]. The haemodynamic consequences (as assessed by means of suggesting maximal exchange in cardiac output and systolic blood pressure) of a 2d oxytocin dose (5 IU) are attenuated in contrast with the consequences considered after the first dose of oxytocin (5 IU) [15]. This is supported by using

## CONCLUSION

Oxytocin remains the first-line uterotonic after vaginal and caesarean delivery. Recent research elucidates the therapeutic range of oxytocin during caesarean delivery and receptor desensitization. A slower injection of oxytocin can effectively minimize the cardiovascular side-effects as well as be equally effective in reducing blood loss without compromising the therapeutic benefits. Evidence-based protocols for preventing and treating uterine atony during caesarean delivery are recommended.

## ACKNOWLEDGMENTS

None.

## REFERENCES

- [1] Jackson GM, Sharp HT. Cervical ripening before induction of labour: a randomized trial of prostaglandin E2 gel versus low dose oxytocin. *Am J Obstet Gynecol.* 1994 Oct;171(4):1092-6. DOI: [10.1016/0002-9378\(94\)90042-6](https://doi.org/10.1016/0002-9378(94)90042-6)
- [2] Cunningham FG, Mac Donald PC, Gant Nf. Casearean section and caesarean hysterectomy in Williams obstetrics Norwalk. Appleton and Lange. 1989; 441-59.
- [3] Gori F, Pasqualucci A, Corradetti F, Milli M, Peduto VA. Maternal and neonatal outcome after cesarean section: the impact of anesthesia. *J Matern Fetal Neonatal Med.* 2007 Jan;20(1):53-7. DOI: [10.1080/14767050601134645](https://doi.org/10.1080/14767050601134645)
- [4] Liu S, Liston RM, Joseph KS, Heaman M, Sauve R, Kramer MS, et al. Maternal mortality and severe morbidity associated with low-risk planned cesarean delivery versus planned vaginal delivery at term. *CMAJ.* 2007 Feb 13;176(4):455-60. DOI: [10.1503/cmaj.060870](https://doi.org/10.1503/cmaj.060870)
- [5] Ronsmans C, Graham WJ; Lancet Maternal Survival Series steering group. Maternal mortality: who, when, where, and why. *Lancet.* 2006; 368(9542):1189-200. DOI: [10.1016/s0140-6736\(06\)69380-x](https://doi.org/10.1016/s0140-6736(06)69380-x)
- [6] Auroy Y, Narchi P, Messiah A, Litt L, Rouvier B, Samii K. Serious complication related to regional anaesthesia result in a prospective survey in France. *Anesthesiology.* 1997 Sep;87(3):479-86. DOI: [10.1097/00000542-199709000-00005](https://doi.org/10.1097/00000542-199709000-00005)
- [7] Dutt DC, Pharmacotherapeutics in obstetrics, Text book of obstetric and gerontology and contraception, 6th edition Calcutta; New central book agency (P) Ltd. 2004; 33:498.
- [8] Clark SL, Simpson KR, Knox GE, Garite TJ. Oxytocin: new perspectives on an old drug. *Am J Obstet Gynecol.* 2009 Jan;200(1):35.e1-6. DOI: [10.1016/j.ajog.2008.06.010](https://doi.org/10.1016/j.ajog.2008.06.010)
- [9] Ratnam SS, Bashket K RAO, Arulkumaran S. induction of labour, obstetrics and gynaecology, orient Longman Ltd. 1994; 16(2): 198.
- [10] Garfield RE, Beir S. Increased myometrial responsiveness to oxytocin during term and preterm labor. *Am J Ot Gyn.* 1989 Aug;161(2):454-61. DOI: [10.1016/0002-9378\(89\)90541-3](https://doi.org/10.1016/0002-9378(89)90541-3)
- [11] British National Formulary. 78th ed. London: British Medical Association and Royal Pharmaceutical Society of Great Britain; 2019. Joint Formulary Committee. Obstetrics, Gynaecology, and Urinary-tract Disorders; 823-4.
- [12] Thomas JS, Koh SH, Cooper GM. Haemodynamic effects of oxytocin given as i.v. bolus or infusion on women undergoing Caesarean section. *Br J Anaesth.* 2007 Jan;98(1):116-9. DOI: [10.1093/bja/ael302](https://doi.org/10.1093/bja/ael302)
- [13] Dansereau J, Joshi AK, Helewa ME, Doran TA, Lange IR, Luther ER, et al. Double-blind comparison of carbetocin versus oxytocin in prevention of uterine atony after cesarean section. *Am J Obstet Gynecol.* 1999 Mar;180(3 Pt 1):670-6. DOI: [10.1016/s0002-9378\(99\)70271-1](https://doi.org/10.1016/s0002-9378(99)70271-1)
- [14] Rosaeg OP, Licutti NJ, Labow RS. The effects of oxytocin on the contractile force of human atrial trabeculae. *Anesth Analg.* 1998 Jan;86(1):40-4. DOI: [10.1097/00000539-199801000-00008](https://doi.org/10.1097/00000539-199801000-00008)
- [15] Langesaeter E, Rosseland LA, Stubhaug A. Haemodynamic effects of repeated doses of oxytocin during Caesarean delivery in healthy parturients. *Br J Anaesth.* 2009 Aug;103(2):260-2. DOI: [10.1093/bja/aep137](https://doi.org/10.1093/bja/aep137)
- [16] Pinder AJ, Dresner M, Calow C, O'Riordan J, Johnson R. Haemodynamic changes caused by oxytocin during caesarean section under spinal anaesthesia. *Int J Obstet Anesth.* 2002 Jul;11(3):156-9. DOI: [10.1054/ijoa.2002.0970](https://doi.org/10.1054/ijoa.2002.0970)