

ORIGINAL ARTICLE

Effects of Oxytocin on Heart Rate and Blood Pressure During Cesarean Section Under Spinal Anaesthesia

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ABSTRACT

Introduction: Noninvasive blood pressure and heart rate have typically been used to assess maternal haemodynamic changes after Caesarean section under spinal anaesthesia. To avoid a postpartum haemorrhage in women who have Caesarean Sections, oxytocin is the first-line uterotonic treatment (PPH). Aim: The purpose of this study is to determine the influence of oxytocin on hemodynamic parameters like as heart rate (HR) and blood pressure (BP) after caesarean surgery.

Material and Methods: This study included 121 pregnant women aged 18 to 36 years old with an ASA grade I physical status and a term pregnancy (37 weeks or more) that underwent an elective caesarean delivery under spinal anaesthesia. The study design of this research was Cross-sectional. This research lasted six months (January 2021 to June 2021). This study was conducted at Obstetrics and Gynecology Operation theatre of Shalamar Hospital, Lahore. Hemodynamic parameters were measured non-invasively and compared the results before given the drug (oxytocin) considers as a baseline, then immediately after given the drug, after 1 minute and after 5 minutes of drug given.

Results: The effects of oxytocin on hemodynamic parameters in C section patients under spinal anaesthesia were studied by the researcher. The purpose of this study was to assess the effects of oxytocin on hemodynamic parameters from baseline to after 5 mints of therapy. A total sample size of 121 women received oxytocin and their blood pressure and heart rate were monitored at after the dose given, after 1 mint and then after 5minutes. The patients included in present study were from mainly two age groups: one age group was 18-26 years and other age group was 27-36 years. The frequency and percentages of different age group as 71 (58.7 %) patients were from age group of 18-26 years and 50 (41.3%) patients were from 27-36 years. The mean HR at baseline, after given the dose, at after 1 and 5 minutes was (88.66±8.816), (92.14±9.678), (109.74±18.01) and (95.90±8.646) respectively; however difference was statistically significant. The mean systolic blood pressure (SBP) at baseline was (112.82±12.08) and changed after given the dose, at 1 and 5 minutes as (112.72±11.17), (101.98±12.98), (111.89±12.55) respectively. Also the mean diastolic blood pressure (DBP) at baseline was 68.04±11.57 and decreased after given the drug and at 1 minutes to 67.74±12.31 and 58.95±9.291 respectively but returned to 67.26±9.295 at 5 minutes. To summarise, the differences in hemodynamic measures from baseline to 5 minutes after oxytocin delivery were statistically significant (p value; 0.05).

Keywords: Spinal anaesthesia, Blood Pressure, Heart rate, Cardiac output, Cesarean section, Oxytocin, Haemodynamics, Uterus, Mean Arterial Pressure.

INTRODUCTION

The oxytocin hormone is a neuropeptide that functions as a neurotransmitter and is essential for reproduction. This neuropeptide performs two crucial tasks in the body: After childbirth, the womb (uterus) contracts and lactation occurs. The hormone oxytocin induces the uterine muscles to contract and increases the creation of prostaglandins, which intensifies the contractions. Manufactured oxytocin is sometimes used to induce labour if it hasn't started naturally, or to increase contractions to make childbirth more comfortable. Synthetic oxytocin is also commonly used to constrict the womb and speed up placenta delivery and lessen the danger of heavy haemorrhage. Oxytocin promotes milk ejection from the breast ducts while nursing. Syntocinon and pitocin (both synthetic oxytocin) are other names for oxytocin; carbetocin is another term for oxytocin (analogue of oxytocin). Oxytocin production and secretion are controlled by a positive feedback system, in which the release of oxytocin causes an action that drives further production. Oxytocin is released when the uterus contracts during childbirth, for example. It allows for greater contractions and the release of more oxytocin. The milk-ejection reflex is also governed by a positive feedback mechanism, whereby nipple sucking during nursing increases oxytocin production and secretion in the bloodstream, causing milk to be released into the breast. Until the baby stops sucking, this positive feedback cycle continues. The creation of oxytocin during childbirth is governed by a self-limiting phenomenon, and the hormone's release is halted after the baby is delivered. Oxytocin deficiency in a nursing mother.

Oxytocin was initially discovered to play a crucial function in uterine contractions and milk release after delivery. (Danielle A Baribeau 1, 2015) Oxytocin action and signaling are mediated by Oxytocin receptors, which are present in both the heart and large vessels. (J. Gutkowska, 2014) . The tale of oxytocin begins before conception, continues after delivery, and then goes from the brain to the heart and throughout the body, influencing a wide range of physiological functions and emotions (happiness, attraction, love, and tenderness).. (Navneet Magon, 2011) The start of labor in a pregnant woman who has no medical indications for induction is defined as Elective induction of labor. Pitocin is indicated to make uterine contractions during delivery and to control PPH. (2021) Postpartum haemorrhage (PPH) is still a serious healthcare issue in underdeveloped nations, and it is a leading cause of mother mortality and morbidity. Uterine atony is the most common cause of PPH. To preventing the PPH there is need to administration of medications that increase uterine tone and usually oxytocin is the first-line treatment. (Rosseland et al., 2013) journal Psychological Science. (Pappas, June 04, 2015) Postpartum haemorrhage (PPH) is one of the most common causes of maternal death, with uterine atony accounting for nearly half of all occurrences. The use of uterotonic medicines can help to minimise PPH. The use of oxytocin as a preventative measure has been demonstrated to reduce the incidence of PPH by up to 40%. (Gangadharaiyah et al., 2017)

Oxytocin required special attention and caution during its administration because errors are associated with the high doses in most cases which may cause excessive uterine activity. (Pedro Hidalgo-Lopezosa, 2016) Oxytocin is a medicine that is used to

cause uterine contractions in order to induce labour, speed up labour, and control haemorrhage after delivery. Cesarean section adoption has been steadily growing in recent years due to improved mother and foetal outcomes. The purpose of this study was to see how oxytocin affected hemodynamic parameters such as heart rate (HR) and blood pressure (BP) after caesarean delivery. (Nihad Khalawe Tektook, 2019)

The use of uterotonics medications as a preventative measure minimises mean blood loss and, as a result, maternal morbidity and mortality. (Mannaerts et al., 2018) The fact that we only looked at elective patients with a low risk of postoperative haemorrhage is a significant limitation of our study.

Objectives: The current study's goal is to see how oxytocin affects hemodynamic parameters such as heart rate (HR) and blood pressure (BP) after caesarean delivery. We investigated the hemodynamic effects of oxytocin during an elective caesarean section in a seemingly healthy patient..

MATERIALS AND METHODS

Study Design: The study design of this research was Cross-sectional.

Setting: This study was conducted at Obstetrics and Gynecology Department of Shalamar Hospital, Lahore.

Duration: This study was conducted for 6 months (January 2021 to June 2021) .

Sample size/Statistical Power: This sample size has been calculated keeping in view two different studies. In one study it was 25% increase in heart rate while it was 15% in other one. As keeping both as reference and power of 80% and confidence interval of 95%, total sample size will be 121. Sample size was calculated with the reference of two studies. (J S Thomas 1, 2007 Jan, Moertl et al., 2011)

Sampling Technique: The randomized convenient sampling technique was used in this research.

Study Instruments: A study questionnaire was used that was included patient's demographic characteristics and information.

Inclusion Criteria: In this study, 121 pregnant women aged 18 to 36 years old with an ASA grade I physical condition and a term pregnancy (37 weeks or more) received a spinal anaesthesia elective caesarean delivery.

RESULTS

The research was carried out over a six-month period (January to June 2021). A total of 121 patients receiving ASA grade 1 elective caesarean section were chosen at random using inclusion and exclusion criteria. All results were expressed in the form of mean± Standard deviation. The anaesthetic technique and monitoring the haemodynamic parameters were identical for all patients. The highest HR was measured after the oxytocin bolus was delivered, in addition to minutely assessments of heart rate (HR) and non-invasive blood pressure (NIBP). The last measurement of HR and NIBP taken before oxytocin was used as a baseline for subsequent alterations. No other contractile intervention, such as medication or uterine massage, was required in this trial. With the comparison of baseline values, all computations are based on similar hemodynamic parameters. Any negative effects were noted, but no negative effects were discovered. The study drug's maximum hypotensive impact was obtained around 30-40 seconds after administering the pill. To see if there was any link between the categorical variables, the paired T test was performed. P values less than 0.05 were considered significant, whereas those greater than 0.05 were considered insignificant.

The patients included in present study were from mainly two age groups: one age group was 18-26 years and other age group was 27-36 years. Table shows the frequency and percentages of different age group as 71 (58.7 %) patients were from age group of 18-26 years and 50 (41.3%) patients were from 27-36 years. Hypertension, Diabetes Mellitus, Asthma and Chronic Heart Disease were Comorbidities included in this study. There were 14

(11.6%) patients with hypertension, 15 (12.4 %) patients with diabetes mellitus and 7 (5.8%) patients with asthma in present study. There was no patient with chronic heart disease.

Table 1: Frequency and percentages of co-morbidities

Co-morbidities		Yes	No
History of Hypertension	Frequency	14	107
	Percentage%	11.6%	88.4%
Asthma	Frequency	7	114
	Percentage%	5.8%	94.2%
Diabetes Mellitus	Frequency	15	106
	Percentage%	12.4%	87.6%
Chronic Heart disease(CHD)	Frequency	00	00%
	Percentage%	00%	100%

Table 2: Parameters of current study:

Parameter	Baseline	After the dose given	After 1 mint	After 5 mints
Heart Rate	88.66±8.8	92.14±9.678	109.74±18.01	95.90±8.646
Minimum	72	70	12	64
Maximum	110	133	140	119
Systolic B.P	112.82±12.08	112.7±11.17	101.9±12.98	111.89±12.55
Minimum	90	86	11	11
Maximum	141	141	132	150
Diastolic B.P	68.04±11.6	67.74±12.31	58.95±9.291	67.26±9.241
Minimum	43	26	32	41
Maximum	98	98	87	100

Tachycardia and Hypotension was seen in patients under present study as determined by mean± S.D, minimum and maximum values of Heart rate, systolic and diastolic B.P compared from baseline to 5 minutes following oxytocin administration as shown in this table.

The changes in Heart rate from baseline to after 5 mints due to effect of drug which is oxytocin. Baseline HR was 88.66, then after the dose given the HR was 92.14, after one mint HR was 109.74 and after 5 mints HR was 95.90.

The effect on heart rate after given the Oxytocin were the blood pressure was recorded from the patients immediately after the dose given, after 1 mint and then after 5 minutes non-invasively.

The effect of oxytocin on Diastolic Blood pressure were as the mean of diastolic BP before given the oxytocin was 68.04, after given the oxytocin were 67.74, after 1 mint 58.95 and after 5 minutes was 67.26.

Table 3: Comparisons of mean of Variables

	Mean of HR	Mean of BP (systolic)	Mean od BP (diastolic)
Before given oxytocin Baseline	88.66	112.82	68.04
Immediately, after given the oxytocin	92.14	112.72	67.74
After '1' mint	109.74	101.98	58.95
After '5' mint	95.9	111.89	67.26

Comparison of mean of variables shows in this which shows the mean of Heart rate and Blood pressure before given the oxytocin, immediately after given the oxytocin, after 1 mint and after 5 minutes. To summarise, the differences in hemodynamic measures from baseline to 5 minutes after oxytocin delivery were statistically significant.

DISCUSSION

Sample size was calculated with the reference of two studies. (Moertl et al., 2011) This was the first study we knew of that compared the detailed acute hemodynamic effects of oxytocin. The purpose of this study was to assess the effect of oxytocin on maternal haemodynamic parameters before and after elective

Caesarean birth in a non-invasive setting. Carbetocin, a synthetic oxytocin derivative with a longer half-life, has been shown in prior research to have beneficial effects on uterine contraction when compared to oxytocin. The use of uterotonic medications as a preventative measure has considerably reduced maternal morbidity and mortality. In earlier literature, the medication widely recommended is oxytocin. (Moertl et al., 2011) The goal of this study was to assess the hemodynamic changes that occurred before and after oxytocin was given as an I/V bolus or infusion to reduce uterine haemorrhage during a caesarean section under spinal anaesthesia. In this study, uterotonic medication was also a significant impact. According to a study (Thomas and J., 2006), a drop in MAP of 8(8.7) mmHG and a modest increase in HR was clinically favored.

A Thomas and colleagues (J S Thomas 1, 2007 Jan) discovered a 14 mmHG decrease in MAP following a percent u bolus at 1 minute, but a maximal decrease of 27 mmHG at 25s when invasive pressure monitoring was used. After an initial recovery, both HR and MAP were found to be significantly different from baseline. Golam Murshid's research was similar to Thomas and his colleague's research. (Murshid and colleagues, 2012). In a large trial on caesarean birth, a 100 g I/V carbetocin bolus was compared to a 5 u oxytocin (current study medicine) bolus followed by a 2.5 u per hour infusion. Carbetocin elicited less requests for extra uterotonics, with a similar rate of nausea but a higher rate of vomiting. (Sartain et al., 2008).

CONCLUSION

The effects of oxytocin on hemodynamics in the current study include a considerable but brief rise in heart rate (tachycardia) and a reduction in blood pressure (hypotension) following caesarean section. To summarise, the differences in hemodynamic measures from baseline to 5 minutes after oxytocin delivery were statistically significant.

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