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HEMODYNAMIC EFFECT OF OXYTOCIN GIVEN AS BOLUS WITH INFUSION VERSUS INFUSION ONLY IN PATIENTS UNDERGOING ELECTIVE CAESARIAN SECTION

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ABSTRACT

Background: Oxytocin is the most commonly used uterotonic agent in obstetrics. It is routinely administered after both normal and operative delivery to initiate and maintain adequate uterine contractility for minimizing blood loss and preventing postpartum hemorrhage. Larger dose of oxytocin injected rapidly is known to produce various adverse effects such as hypotension, nausea, vomiting, chest pain, headache, flushing, myocardial ischemia, ST-T segment changes, pulmonary edema, severe water intoxication and convulsions. **Aim of the study**: Comparison between the effects of oxytocin on hemodynamic stability given either as bolus and continue with infusion or infusion only. **Patient and methods**: 120 patients undergoing elective C/S under GA was randomly divided into two equal groups (bolus group: giving oxytocin as 5 units direct IV bolus and continue with 10u\hour infusion) and (Infusion group: giving oxytocin as IV infusion of 10u\hour only). **Results**: oxytocin causes decrement in SBP, DBP, and MAP in both groups after its administration, there was no significant change in HR in the infusion group while there was a significant decrement in HR in the bolus group. The comparison between the two groups showed no significant difference in the change in SBP, DBP and MAP, while there was a significant difference in HR change between the bolus and infusion group in which the HR decrement was significant only in the bolus group. **Conclusion**: it is concluded that the use of oxytocin IV bolus and continue with infusion can cause a significant decrease in HR in comparison with the use of infusion method without bolus, it is also concluded that both methods caused a significant decrement in SBP, DBP and MAP.

KEYWORDS: Oxytocin bolus, oxytocin infusion, oxytocin side effect, Oxytocin effect on hemodynamics.

INTRODUCTION

Administration of medications that increase uterine tone is important for preventing postpartum hemorrhage, but the usual first-line treatment, oxytocin, May put the woman in labor at risk for hypotension due to its prominent vasodilation effect.[1]

Oxytocin is the most commonly used uterotonic agent in obstetrics. It is routinely administered after both normal and operative delivery to initiate and maintain adequate uterine contractility for minimizing blood loss and preventing postpartum hemorrhage.[2]

Several regimens of oxytocin have been tested during cesarean delivery (CD) with variable wanted (uterotonic) and unwanted (cardiovascular) effects.[3]

Oxytocin is commonly administered either intramuscularly (IM) or intravenously (IV). International guidelines, including the World Health Organization, currently recommend both routes equally.[4] There are potential advantages to each route. IV administration may have a clinical advantage, as it leads to a faster response and a higher peak in plasma oxytocin levels[5], however, IM injection confers practical advantages,

requiring fewer skills and less equipment to administer, making it a more serviceable option in a wider array of settings.

We aimed to compare the hemodynamic effects (heart rate, blood pressure) of equivalent doses of oxytocin as IV bolus and IV infusion, versus IV infusion only.

PATIENTS AND METHODS

This study is prospective randomized clinical trial. The study was conducted in elective operation theaters in (BAGHDAD MEDICAL CITY AND ALYARMUK HOSPITAL) IN Baghdad, Iraq. From (9-March 2020 to 1-December 2020).

A total of 120 patient where scheduled for elective cesarean section under general anesthesia.

Patient where randomly allocated to two groups (each of consisted 60 patient).

Bolus group: received intravenous bolus of 5U OF OXYTOCIN and intravenous infusion of 10 U \ Hour.

Infusion group: received intravenous infusion of 10 U\ hour of oxytocin.

Rescue drugs: Methergine.
Approval were obtained from Iraqi committee for medical specialization as well as written informed consent from all patients.

Any Patient with elective C-section under general anesthesia, single gestation, aged between 18-44 years and ASA II is included in this study.

Exclusion criteria

- Preeclampsia.
- Placenta Previa and accrete.
- Bleeding disorders.
- Preoperative systolic blood pressure less than 90 mmHg.

Weight were measured to each patient.

Base line blood pressure and pulse rate recorded before induction using noninvasive blood pressure monitoring apparatus for monitoring blood pressure and pulse oximetry for monitoring pulse rate. Two large bore IV cannula (20 G) were inserted to all patient from both groups and then put them on left lateral position. All patient pre medicated with 10 mg IV metoclopramide, 50 mg IV ranitidine and 8 mg dexamethasone. Preoxygenation is done for all patients for 5 minutes then General anesthesia was induced using Propofol anesthetizing dose (loss of verbal communication), ketamine (0.5 mg\kg), suxamethonium (1 mg\kg), and then rocuronium (0.6mg\kg) and maintenance by isoflurane. IV paracetamol was given as analgesia. After intubation we recorded a second reading of BP and PR. After delivery of baby oxytocin was given to all patients in the study groups in two ways:

- Bolus group received 5 unit bolus followed by infusion of 10 unit \ hour.
- Infusion group received 10unit\hour infusion only.

5 minutes after giving oxytocin we recorded the third reading of blood pressure and pulse rate.

The bleeding was assessed by obstetrician and rescue drugs was given when needed (methergine) and when hypotension occurred fluid resuscitation was given, and vasopressor was given when needed. At the end of the procedure the muscle relaxant was reversed using neostigmine (0.04-0.08 mg/kg) and atropine (0.02-0.04 mg/kg). When the patient was fully awake and can lift her head for 5 seconds extubation was done and then transferred to recovery room for monitoring.

IBM SPSS version 26 was used for this study statistical analysis. Participant characteristic data are presented as mean, SD and percentages. One way ANOVA were used to assess the difference between participant's hemodynamic criteria (HR change and MAP change) and general characteristics factors (P-value =0.05).

Pearson's correlation was used to assess the correlations between participant's hemodynamic criteria (HR change and MAP change) and age and gravida factors ($R \geq \pm 0.3$ P value=0.05).

Paired t test was used to compare pre-oxytocin and post-oxytocin hemodynamic vital signs (P-Value = 0.05).

Independent samples t-test was used to compare between the infusion and bolus group (P-Value = 0.05).

RESULTS

A total of 120 pregnant women going through C-section were the subjects of this study, divided into 2 different groups; 60 women received oxytocin by infusion method (infusion group) and 60 women received oxytocin first by bolus and continue with infusion method (bolus group), the group mean age (± SD) was 29(±7); for infusion group was 28(±7) and for bolus group was 29(±7), the gravida mean (± SD) was 3 (±2) for both of the group.(table 1).

Tabe 1: description of the study group characteristics.

	Infusion Group		**Bolus Group**	
	Mean	Std. Deviation	Mean	Std. deviation
Age (years)	28	7	29	7
Gravida	3	2	3	2

83.33% of the women were multigravida, while 16.67% were prim gravida, 93.3% of the study women didn't require any rescue drug, while only 5% and 1.7% required 1 and 2 ampule of rescue drug respectively.

Table 2: Rescue drug administration and gravida in study groups.

		Infusion Group			Bolus Group		
		No.	Percent	% Total	No.	Percent	% Total
Rescue Drug	Non	56	93.3%	50%	56	93.35	50%
	0.2 mg	4	6.7%	66.7%	2	3.3%	33.3%
	0.4 mg	0	-	-	2	3.3%	100%
Gravida	Primigravida	12	20%	60%	8	13.3	40%
	Multigravida	48	80%	48%	52	86.7%	52%

Table 3: Relation between hemodynamic vital signs change and Age in the study groups.

	Hemodynamic changes	Pearson R	p-Value
All patients	MAP changes	-0.093	0.310
	HR changes	-0.151	0.099
Infusion group	MAP changes	0.125	0.340
	HR changes	0.035	0.792
Bolus group	MAP changes	0.060	0.647
	HR changes	-0.319	**0.013**

Comparison of hemodynamic vital signs before oxytocin administration between infusion and bolus group: no significant difference in all hemodynamic vital signs before induction, after induction and before Oxytocin administration between infusion and bolus group as shown in table 4.

Comparison of hemodynamic vital signs before oxytocin administration between infusion and bolus group: no significant difference in all hemodynamic vital signs before induction, after induction and before Oxytocin administration between infusion and bolus group as shown in table 4.

Comparison of change in vital signs change after oxytocin administration between infusion and bolus group: HR decrease was significantly higher in bolus group Mean (±SD) = -6.00 (±9.36) with p-Value = 0.002, no significant difference in SBP, DBP and MAP change between the two groups as shown in table 5.

Table 4: Comparison of hemodynamic vital signs before oxytocin administration between infusion and bolus group.

Parameter		Study group		p-Value
		Infusion (M±SD)	Bolus (M±SD)	
Systolic BP	Before induction	134.9 ± 13.3	131.6 ± 18.6	0.266
	After intubation	133.2 ± 15.7	135.26 ± 18.6	0.513
	Before Oxytocin	129.93 ± 14.3	134.53 ± 16	0.099
Diastolic BP	Before induction	83.43 ± 14.1	79.66 ± 13	0.131
	After intubation	80.63 ± 13.9	82.6 ± 15.4	0.465
	Before Oxytocin	78.2 ± 14.5	80.16 ± 13.9	0.45
Mean arterial pressure	Before induction	100.58 ±12.81	96.97 ± 13.37	0.134
	After intubation	98.15 ± 13.73	100.15 ± 15.71	0.459
	Before Oxytocin	95.44 ± 13.76	98.28 ± 13.87	0.262
Heart rate	Before induction	105.4 ± 15.76	107.7 ± 16.97	0.443
	After intubation	105.33 ± 16.91	109.43 ± 15.54	0.169
	Before Oxytocin	101.06 ± 16.58	104.13 ± 11.86	0.246

Table 5: Comparison of change in vital signs change after 5 min of oxytocin administration between infusion and bolus group.

Vitals	Study Group		p-Value
	Infusion (M±SD)	Bolus (M±SD)	
HR Change	-0.47 ± 10.06	-6.0 ± 9.36	0.002
SBP Change	-15.93 ± 15.85	-13.83 ± 14.78	0.454
DBP Change	-11.37 ± 13.9	-11.87 ± 16.55	0.858
MAP Change	-12.89 ± 14.12	-12.52 ± 14.86	0.890

Relation between hemodynamic vital signs changes and study group characteristics:

- Age: Pearson correlations revealed no significant correlation between age and MAP change and HR change; (r = - 0.093 and - 0.151) respectively as illustrated in figure 1 and table 3.
- Gravida: Pearson correlations revealed no significant correlation between gravida and MAP change and HR change; (r = 0.015 and 0.060) respectively as illustrated in figure 2.
- Rescue drug: there was a significant need for using rescue drug with higher decrease in MAP (P= 0.045). as shown in table 6.

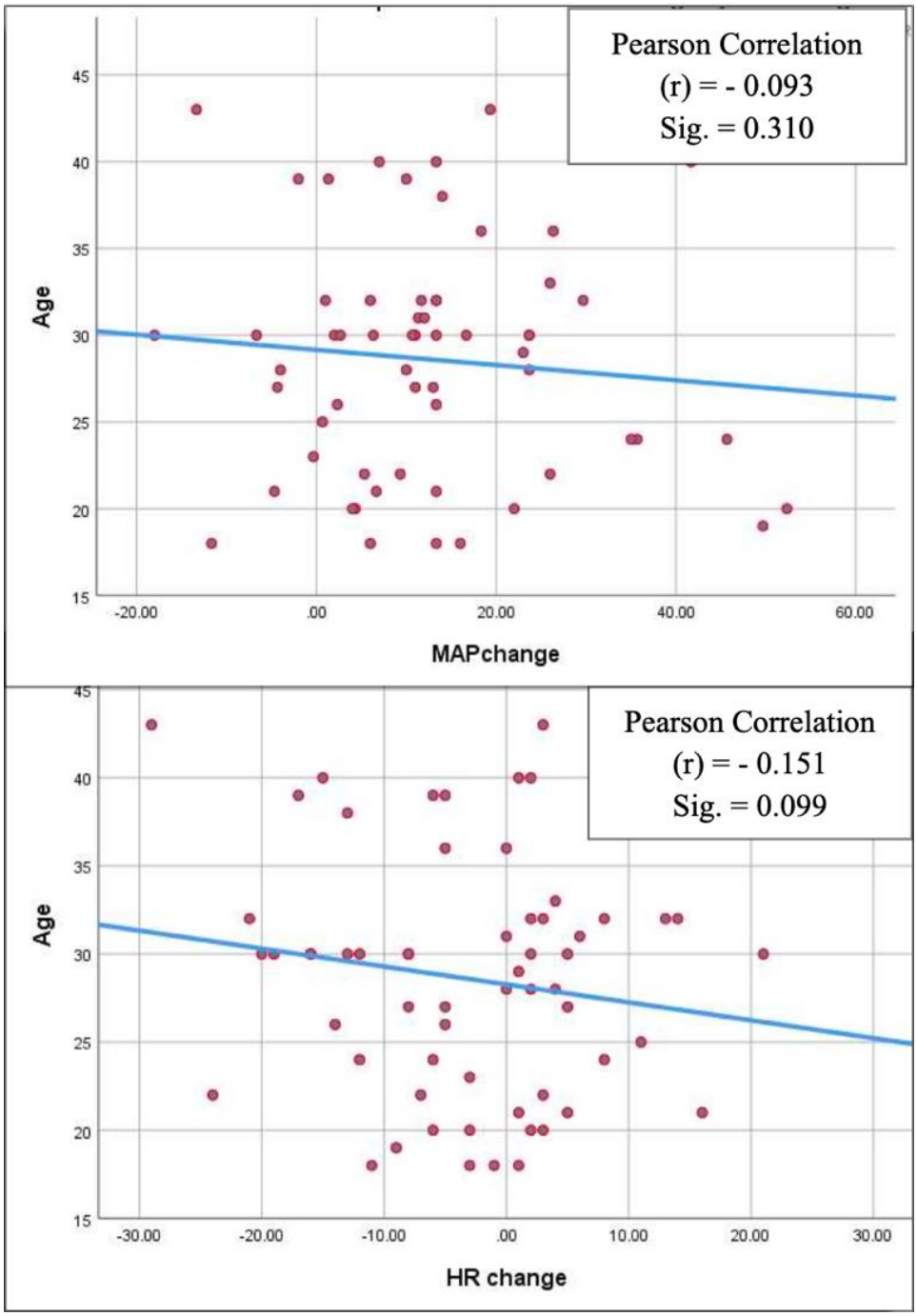

Figure 1: Pearson correlations between age and hemodynamic change of the study group.

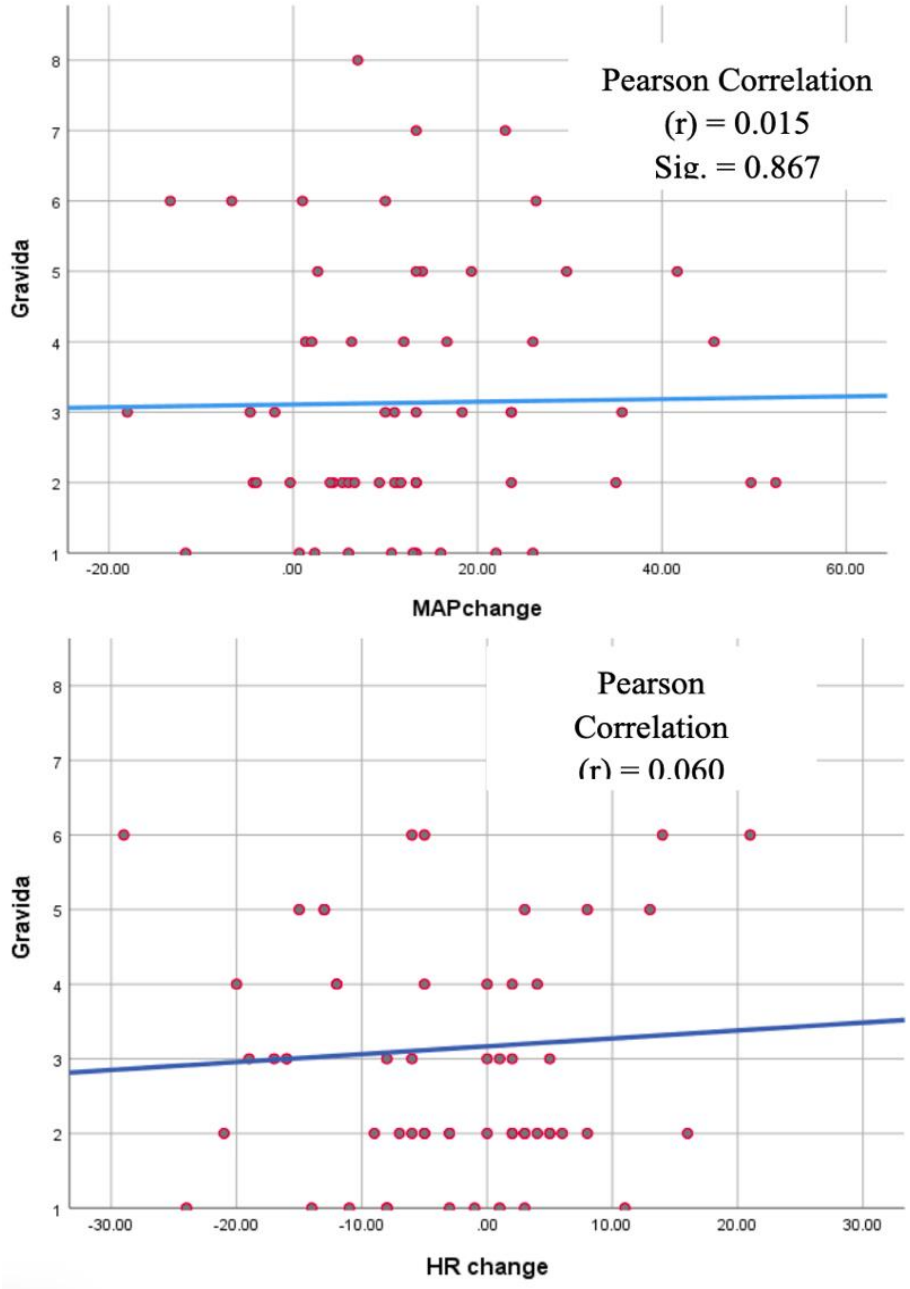

Figure 2: Pearson correlations between gravida and hemodynamic change of the study group.

Table 6: Comparison between hemodynamic vital signs changes and study group characteristics.

	Rescue drug use		p-Value
	Nill (Mean±SD)	Yes(Mean±SD)	
MAP Changes	-12.0 ± 13.42	-22.58 ± 23.77	0.045
HR Changes	-2.89 ± 9.62	-8.0 ± 15.06	0167

Relation between hemodynamic vital signs changes and infusion group characteristics:

- Oxytocin: Post oxytocin MAP, SBD and DBP means were significantly lower than before oxytocin infusion (P= 0.001) as shown in table 7.
- Age: Pearson correlations revealed no significant correlation between age and MAP change and HR change; (r = 0.125 and 0.035) respectively as shown in table 3.
- Gravida: Pearson correlations revealed significant positive correlation between gravida and HR change (r = 0.325) meaning the more gravida; the less decrease in HR and no significant correlation with MAP change(r= 0.138) as illustrated in figure 3.
- Gravida group: HR change was significantly highly decrease in prim gravida than multigravida, P= 0.009; with Means (±SD) = -7.1 (±8.60) and 1.21(±9.77) respectively as shown in table 8.

Table 7: Relation between hemodynamic vital signs changes and oxytocin in infusion group characteristics.

	Infusion group (Mean±SD)		p-Value
	Pre-oxytocin	5 min. after oxytocin	
HR	101.06 ± 16.5	100.6 ± 14.9	0.721
SBP	129.93 ± 14.2	114 ± 17.3	0.001
DBP	78.2 ± 14.5	66.83 ± 16.1	0.001
MAP	95.44 ± 13.7	82.55 ± 15.4	0.001

Table 8: Relation between hemodynamic vital signs changes and gravida in infusion group characteristics.

	Infusion group (Mean±SD)		p-Value
	Primigravida	Multigravida	
HR changes	-7.17 ± 8.6	1.21 ± 9.77	0.009
MAP changes	-14.17 ± 6.39	-12.57 ± 15.49	0.729

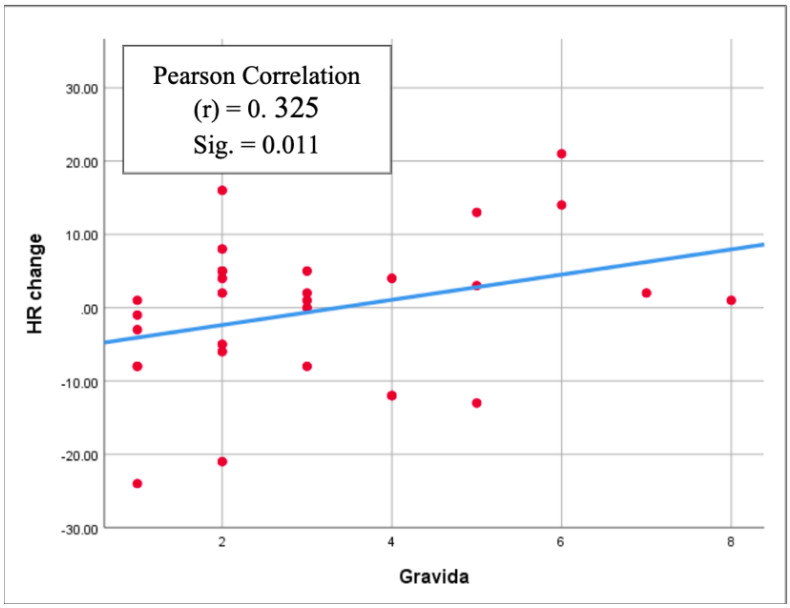

Figure 3: Pearson correlations between gravida and HR change of the infusion group.

Relation between hemodynamic vital signs changes and bolus group characteristics:

- Oxytocin: Post oxytocin HR, MAP, SBD and DBP means were significantly lower than before oxytocin infusion (P= 0.001) as shown in table 9.
- Age: Pearson correlations revealed significant negative correlation between age and HR change; (r = - 0.319) meaning that the older age the higher HR decrease as illustrated in figure 3.5, while no significant correlation with MAP change(r = 0.06) as shown in table 3.
- Gravida: Pearson correlations revealed no significant correlation between gravidity and HR change and MAP change (r = -0.244 and -0.180) respectively.
- Gravida group: no significant difference in means of all hemodynamic vital signs between gravidity groups as shown in table 10.

Table 9: Relation between hemodynamic vital signs changes and oxytocin in bolus group characteristics.

	Bolus group (Mean±SD)		p-Value
	Pre-oxytocin	5 min. after oxytocin	
HR	104.13 ± 11.86	98.13 ± 14.35	0.001
SBP	134.53 ± 15.98	120.7 ± 15.75	0.001
DBP	80.16 ± 13.89	68.3 ± 14.37	0.001
MAP	98.28 ± 13.87	85.76 ± 13.75	0.001

Table 10: Relation between hemodynamic vital signs changes and gravida in bolus group characteristics.

	Bolus group (Mean±SD)		p-Value
	Primigravida	Multigravida	
HR changes	-2.75 ± 10.91	-6.5 ± 9.12	0.296
MAP changes	-3.33 ± 12.89	-13.94 ± 14.74	0.060

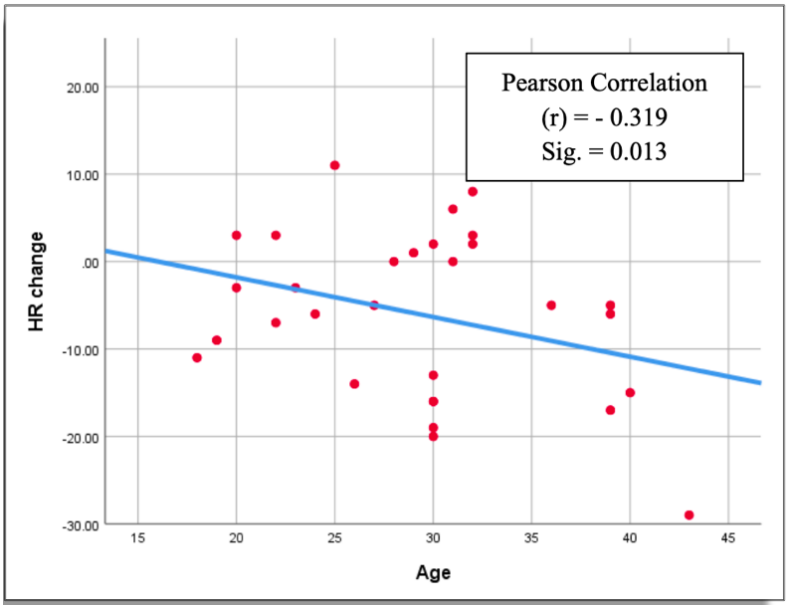

Figure 4: Pearson correlations between age and HR change of the bolus group.

DISCUSSION

Our study showed that the mean age of women undergone elective c/s was 29 years old which is the mean age for women in reproductive age, there was no significant correlation between age and the change in MAP and HR in overall study group, however the bolus group shows significant negative correlation between the age and the change in HR which means the more increase in age the more decrease in HR.

Also our study shows that the gravidity mean was 3.83% was multigravida and 13% was prim gravida with no significant correlation between the gravida and the change in HR and MAP in the study group, however there was a significant decrease in HR in prim gravida than multigravida in the infusion group, a rare case of oxytocin induced maternal bradycardia during labor was recorded by N Abulads et al[6], a young healthy term prim gravida in spontaneous labor, after giving oxytocin infusion the patient developed sudden bradycardia this study agrees with our finding that there is a significant decrement in HR in prim gravida women receiving oxytocin infusion.

The comparison between the change in vital signs between the infusion and bolus groups shows no significance difference in all hemodynamic vital signs before induction, after induction and intubation and just before oxytocin administration.

The comparison between the changes in vital signs between the infusion and bolus groups after oxytocin administration shows that there was a significant decrement in HR in the bolus group.

A study by Rajasri G Yaliwal et al. (2020).[7] A Randomized Control Trial of 3 IU IV Oxytocin Bolus with 7 IU Oxytocin Infusion versus 10 IU Oxytocin Infusion during C/S, the study shows that There was no significant difference between the two groups in heart rate at 1, 3, 5 and 10 minutes after administration of the oxytocin. This study is contradictive to our study, which might be due to the use of different doses than those used in our study or due to use of spinal anesthesia.

A study by J.S Thomas et al. 2007.[8] On the Hemodynamic effects of oxytocin given as IV. Bolus or infusion (5u of oxytocin given either as bolus or infusion over 5 minutes) on women undergoing C/S.

This study showed that in the bolus group; A rapid increase in HR of (17) beats min−1 was seen at 35 s in the bolus group, with an apparent rebound bradycardia at 120s compared with (10) beats min−1 in the infusion group. A matter which disagree with our study which shows marked decrease in heart rate in bolus group after 5 minutes of oxytocin administration, it has been demonstrated in previous studies that oxytocin has biphasic effect, with rapid initial HR increase and decrease in systolic blood pressure followed by a fall in heart rate and increase in BP[7,9] so maybe we have not captured the rapid initial effect of oxytocin in our study because of the use of non-invasive monitoring.

A study done by professor per Olofsson et al. (2018)[10] on the effect of oxytocin and anesthesia on vascular tone in pregnant women, (5 U oxytocin or placebo injection during first trimester surgical evacuation of the gravid uterus under general anesthesia, Oxytocin or placebo was administered once either early or late in the procedure).This study concluded that oxytocin causes decrement in vascular tone and peripheral vasodilation in small arteries also caused fall in MAP and increase in HR, this study is contradictive to our study concerning the change in heart rate which might be due to the

different method of administering oxytocin, Or different time during which the HR was recorded.

A study done by DR. Suniti kale et al. (November 2019)[11] was about Intravenous oxytocin bolus and infusion versus infusion alone on the blood loss during C/S under spinal anesthesia. The monitoring of hemodynamic changes showed no significant changes in HR in the intraoperative period.

Which is also contradictive to our study which showed a significant changes in the bolus group which might be due to the time during which the HR was recorded or due to the use of different doses (Group A: 5U oxytocin bolus + 40U oxytocin infusion. Group B: 5 ml Saline bolus + 40 U oxytocin infusion) or the use of spinal anesthesia instead of GA.

A study by Golam Murshid et al. (2014).[12] A comparison between intravenous bolus and infusion technique on hemodynamic changes. In this study there was an increase in the heart rate in both groups which was significantly higher in the bolus group. This study also disagree with our study which might be due to the use of spinal anesthesia instead of general anesthesia or different timing during which the HR was recorded (heartrate recorded in every 1 min).

In Jun-Seok Bae et al. (2011).[13] A comparison of hemodynamic effects of oxytocin given as {(0.5 IU/min) or bolus-continuous (2 or 5 IU prior to 0.25 IU/min continuous intravenous injection} in C/S. this study showed marked changes in HR in bolus-continuous groups but not in the continuous group, in addition the change in HR was lower in 2u bolus-continued group than those in 5u bolus-continued group, the study also shows the return of HR to baseline after 5 minutes of oxytocin administration, this is also contradictive to our study which might be due to the use of spinal anesthesia or different doses of oxytocin or the different time during which HR was recorded.

Our study also shows a significant decrement in SBP, DBP and MAP in the bolus group.

Butwick et al. 2010.[14] also published his study (a dose-response study) in which the patient undergone elective C/S he found that the use of smaller doses of oxytocin (0.5-3u) caused adequate uterine tone also he found out that the decrement in MAP occurred more frequently with the use of larger bolus doses of oxytocin of more than 1 unit . Consequently, he concluded that the use of 5 unit of oxytocin bolus is no longer recommended in elective C/S. this study agrees with our study that the bolus use of oxytocin caused a significant decrement in MAP.

A study done by professor per Olofsson et al.[10] on the Effects of oxytocin and anesthesia on vascular tone in pregnant women: a randomized double-blind placebo-controlled study using non-invasive pulse wave analysis. This study concluded that oxytocin causes decrement in vascular tone and peripheral vasodilation in small arteries also caused a fall in MAP and increase in HR, this study agrees with our study that bolus group causes significant decrement in blood pressure.

Our study also shows a significant decrement in SBP, DBP and MAP in the infusion group, while the comparison of the changes in SBP, DBP and MAP shows no significant difference between the bolus and infusion group.

A study by Rajasri G Yaliwal et al. (2020).[7] A Randomized Control Trial of 3 IU IV Oxytocin Bolus with 7 IU Oxytocin Infusion versus 10 IU Oxytocin Infusion during C\S for Prevention of Postpartum Hemorrhage, this study agrees with our study in that There was no significant difference between the two groups with respect to the blood pressure, at 1, 3, 5 and 10 minutes after administration.

A study by Yoshiro Miyoshi et al. (2020)[15] compared the benefit and hemodynamic side effect of oxytocin between IV infusion with and without bolus injection during C/S under spinal anesthesia, this study actually agrees with Thomas et al. that the combination of IV bolus and infusion increased the risk of hemodynamic side effect and that vasopressors were used more frequently in IV bolus group compared with infusion alone method. This study is contradictive to our study, and that might be due to the use of spinal anesthesia which could cause more hypotension than G.A.

A study done by DR. Suniti kale et al[11] was about Intravenous oxytocin bolus and infusion versus infusion alone on the blood loss during C\S under spinal anesthesia.

The monitoring of hemodynamic changes showed no significant changes in SBP, DBP, and MAP in the intraoperative period Which is also contradictive to our study which showed a significant changes in both groups, which might be due to the time during which the variables was measured or due to the use of different doses(Group A: 5U oxytocin bolus + 40U oxytocin infusion. Group B: 5 ml Saline bolus + 40 U oxytocin infusion) or the use of spinal anesthesia instead of GA.

In Jun-Seok Bae et al[13] Comparison of hemodynamic effects of oxytocin given as {(0.5 IU/min) or bolus-continuous (2 or 5 IU prior to 0.25 IU/min continuous intravenous injection} in cesarean section. This study showed marked changes in MAP in bolus-continuous groups but not in the continuous group. This is also contradictive to our study may be due to use of spinal anesthesia or different doses of oxytocin or the different time during which MAP was measured.

A study by J.S Thomas et al. (2007).[8] Who compared the hemodynamic changes between two groups, 5u of oxytocin given either as bolus or infusion over 5 minutes. Heart rate and blood pressure every 5 seconds using invasive intra-arterial blood pressure monitoring. The study also shows that the mean arterial pressure decreased by 27 (7.6) mmHg in the bolus group compared with 8 (8.7) mmHg in the infusion group. Which is also contradictive to our study which shows that both group had decrement in blood pressure with no significant differences between them, this contradiction May be due to use of spinal anesthesia in their study which may have affected the blood pressure readings somehow or due to use of different method for monitoring the BP (invasive intra-arterial monitoring every 5 seconds).

A study by Golam Murshid et al[12] About the Effect of oxytocin on hemodynamic change - A comparison between intravenous bolus and infusion technique. this study shows that slower infusion of 5u of oxytocin reduced cardiovascular side effect but the rapid bolus oxytocin caused a marked cardiovascular instability, the study also shows decrease in MAP of 24mmhg in the bolus group while the decrement in MAP in the slow infusion group was of 12mmhg which is also contradictive to our study and that might be due to the use of spinal anesthesia instead of GA which causes more hypotension.

In each group 4 patients needed rescue drug (methergine), in the infusion group all of the 4 patients needed only one ampule of methergine, in the bolus group two of the patient required 2 ampules of methergine and another two required only one ampule. Which means that there was no significant differences between the two groups in the need for rescue drugs and the efficacy of oxytocin.

Butwick et al[14] About the Minimum effective bolus dose of oxytocin during elective Caesarean delivery, there was no significant difference in uterine tone between the groups, this study agrees with our study, as he found that the use of smaller doses of oxytocin caused adequate uterine tone.

Dr. suniti kale et al[11] who compared the use of IV oxytocin bolus and infusion versus infusion alone on blood loss during c/s.

This study Found that blood loss was significantly less in group A: 5U oxytocin bolus + 40U oxytocin infusion and the need for additional oxytocin bolus was higher in group B: 5 ml Saline bolus + 40 U oxytocin infusion, which is contradictive to our study which might be due to the use of different doses of oxytocin.

Jun-seok bae et al[13] about Hemodynamic effects of continuous intravenous injection and bolus vs continuous intravenous injection of oxytocin in C/S found that the uterine tone significantly increased in the bolus-continued group compared with continuous group only, this study is also contradictive to our study which shows no significant difference in the effect of oxytocin between the two groups and that might be due to the use of different doses of oxytocin which was {(0.5 IU/min) or bolus-continuous (2 or 5 IU prior to 0.25 IU/min continuous intravenous injection}.

A study by Rajasri G Yaliwal et al. (2020).[7] A Randomized Control Trial of 3 IU IV Oxytocin Bolus with 7 IU Oxytocin Infusion versus 10 IU Oxytocin Infusion during C\S for Prevention of Postpartum Hemorrhage. This study concluded that Intravenous bolus of 3 IU with 7 IU infusion of Oxytocin is as safe as and effective more than intravenous infusion of10 IU of Oxytocin during C/S for the prevention of postpartum hemorrhage which is contradictive to our study that shows no differences in the efficacy between the two groups and that might be due to the use of different doses.

CONCLUSION

- We concluded that the use of oxytocin IV bolus and continue with infusion can cause a significant decrease in HR in comparison with use of infusion method without bolus.
- We also concluded that both methods caused a significant decrement in SBP, DBP and MAP.

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