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Clinical characteristics of pregnant women who undergo elective cesarean section under subarachnoid block

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Abstract
Objective: *In this study our main goal is to evaluate the clinical characteristics of pregnant women who undergo elective cesarean section under subarachnoid block.*
Method: *This randomized Controlled trial (RCT) study was carried out at Obstetric Operation Theatre under supervision of Department of Anaesthesia, Analgesia and Intensive Care Medicine, BSMMU from 12 months. A total of 90 parturient admitted for elective caesarean section in Obstetrics and Gynaecology Department of BSMMU were included in the study divided into two groups. Where Group P was the phenylephrine group and Group E was the ephedrine group. Each group had sample size of 45.*
Results: *During the study, in group P, 64.4% belong to 21-30 years age group, 26.7% belong to 31-39 years age group and only 8.9% belong to ≤20years age group. Whereas in group E quite similar results were found where 73.3% belong to 21-30 years age group, 22.2% belong to 31-39 years age group and only 4.4% belong to ≤20years age group. Mean heart rate was higher in group E than group P. Heart rate was very highly statistically significant at 3 minutes, 6 minutes, 9 minutes, 12minutes before delivery, 5 minutes, 10 minutes, 15 minutes, 20 minutes, 25 minutes, 30 minutes, 35 minutes after delivery. Mean systolic blood pressure was significantly higher in group P than group E. systolic blood pressure was statistically significant at baseline, 3 minutes, 6 minutes, 9 minutes, 12 minutes before delivery and at 20 minutes, 25 minutes, 30 minutes, 35 minutes, 40 minutes, 45 minutes after delivery. But it was statistically not significant at 15 minutes before delivery and 5 minutes, 10 minutes, 15 minutes and 50 minutes after delivery.*
Conclusion: *Subarachnoid (spinal) block is a safe and effective alternative to general anesthesia involving the lower extremities and surgeries below the umbilicus. Further studies are needed for better outcome.*
Keywords: *Elective cesarean section, Subarachnoid block (SAB), anaesthetic technique.*

Introduction

Subarachnoid block (SAB) is generally the most preferred and commonly practiced anaesthetic technique for caesarean section (CS) that requires highest degree of care because the anaesthesiologist has to look after two individuals, the mother and the fetus. It has many advantages of being easy administration technique, rapid onset of action, relatively less adverse effects, cost-effectiveness and the most important thing that patient remains aroused throughout the procedure. [1] It has also been shown to block the stress response to surgery, decrease intra operative blood loss, and lower the incidence of post-operative thromboembolism and decreases morbidity and mortality in high risk patients. [2]There is an opportunity for the mother to be awake during delivery to experience and participate in the birthing process as well as to interact and bond with the baby. It is induced by injecting local anesthetic into the cerebrospinal fluid in the subarachnoid space at either L2-3, L3-4, L4-5 intervertebral space.

Like any other medical procedure, there are risks associated with subarachnoid block. These can occur even though when patient is monitored carefully and anaesthesiologist takes special precaution to avoid them. It is estimated that around 80% of patients undergoing caesarean section under subarachnoid block develop hypotension during the procedure without prophylactic management. [3]In this study our main goal is to evaluate the clinical characteristics of pregnant women who undergo elective cesarean section under subarachnoid block.

Objective

General Objective

- To evaluate the clinical characteristics of pregnant women who undergo elective cesarean section under subarachnoid block.

Specific Objective

- To detect heart rate at different time intervals of the patients.
- To evaluate demographic status of the patients.

Methodology

Study Type

This study was a randomized Controlled trial (RCT) study.

Place and period of study

The study was carried out at Obstetric Operation Theatre under supervision of Department of Anaesthesia, Analgesia and Intensive Care Medicine, BSMMU from 12 months.

Sample Size

A total of 90 parturients admitted for elective caesarean section in Obstetrics and Gynaecology Department of BSMMU according to the inclusion and exclusion criteria. Patients were randomly divided into two groups using consecutive closed envelopes with random numbers processed by a health care provider who was not involved with the study in any respect. Where Group P was the phenylephrine group and Group E was the ephedrine group. Each group had sample size of 45.

Data Collection Procedure

This study was conducted at Obstetric Operation Theatre of Bangabandhu Sheikh Mujib Medical University (BSMMU). After receiving of approval from the Institutional Review Board (IRB), BSMMU and informed written consent from each individual 90 patients were enrolled in this study undergoing elective caesarean section who had fulfilled the inclusion and exclusion criteria. Preoperative evaluation was done with thorough history, physical examination and relevant laboratory investigations. All patients were randomly divided into two groups using consecutive closed envelopes with random numbers processed by a health care provider who was not involved with the study in any respect Where Group P (n=45): 100 µg phenylephrine and in Group E (n=45): 10 mg Ephedrine was

induced. Demographic and clinical data including age, weight, height, body mass index (BMI) and American Society of Anaesthesiologist (ASA) physical status scores were recorded for all patients. All patients had the standard monitoring including continuous electrocardiography (ECG) (lead II), heart rate (HR), non-invasive blood pressure (NIBP) measured and oxygen saturation via continuous pulse oximetry (SpO2). Intravenous (IV) access with 18G IV cannula was established preferably on the non-dominant hand vein. Injection Ranitidine 50 mg and Metoclopramide 10 mg was given intravenously half an hour before operation.

Data analysis

The statistical analysis was carried out using the Statistical Package for Social Sciences version 23.0 for Windows. Qualitative variables of this study have been expressed as percentage. Quantitative variables are expressed as mean ± standard deviation. Comparison was calculated by Chi-square test for the categorical variables & unpaired t-test for the continuous variables. P values <0.05 were considered as statistically significant.

Results

In table-1 shows distributions of the patients according age group where in group P, 64.4% belong to 21-30 years age group, 26.7% belong to 31-39 years age group and only 8.9% belong to ≤20years age group. Whereas in group E quite similar results were found where 73.3% belong to 21-30 years age group, 22.2% belong to 31-39 years age group and only 4.4% belong to ≤20years age group. The following table is given below in detail:

Table-1: Distributions of the patients according age group

variables	Group P (n=45) n (%)	Group E (n=45) n (%)	p-value
Age (years)			
≤20	4 (8.9)	2 (4.4)	0.575
21 - 30	29 (64.4)	33 (73.3)	
31 - 39	12 (26.7)	10 (22.2)	
Mean ± SD	28.16 ± 4.62	27.91 ± 4.59	0.802

In table-2 shows demographic characteristics of the patients where in group P mean BMI was 24.98 ± 2.53 and in group E it was 24.88 ± 2.48. The following table is given below in detail:

Table-2: Demographic characteristics of the patients

variables	Group P (n=45) Mean ± SD	Group E (n=45) Mean ± SD	p-value
Weight	65.93 ± 5.87	66.18 ± 6.00	0.846
Height	1.62 ± 0.04	1.63 ± 0.04	0.538
BMI	24.98 ± 2.53	24.88 ± 2.48	0.859

Table-3 shows the comparison of parturient according to gestational age between the two groups. The highest number of parturient in both the group were at 37+ weeks of gestation. The following table is given below in detail:

Table 3: Distribution of the parturient according to gestational age

Gestational age (weeks)	Group P (n=45) n (%)	Group E (n=45) n (%)	p-value
36+	1 (2.2)	6 (13.3)	0.025*
37	3 (6.7)	0 (0.0)	
37+	19 (42.2)	11 (24.4)	
38	5 (11.1)	9 (20.0)	
38+	7 (15.6)	8 (17.8)	
39	4 (8.9)	2 (4.4)	
39+	6 (13.3)	4 (8.9)	
40	0 (0.0)	5 (11.1)	

P value <0.05 is considered as significant. Chi-square test was done to measure the level of significance
*- significant

Table-4 shows heart Rate at different time intervals between two groups. Mean heart rate was higher in group E than group P. Heart rate was very highly statistically significant at 3 minutes, 6 minutes, 9 minutes, 12minutes before delivery, 5 minutes, 10 minutes, 15 minutes, 20 minutes, 25 minutes, 30 minutes, 35 minutes after delivery. However, it was statistically not significant at the baseline, 40 minutes, 45 minutes, 50 minutes after delivery. The following table is given below in detail:

Table-4: Heart Rate at different time intervals between two groups

Heart rate (bpm)	Group P (n=45)	Group E (n=45)	p-value
Baseline	81.73 ± 5.36	83.22 ± 3.35	0.118ns
Before delivery			
At 3 minutes	84.02 ± 5.20	87.20 ± 2.94	0.001**
At 6 minutes	83.93 ± 4.68	87.82 ± 3.52	<0.001***
At 9 minutes	82.51 ± 5.50	87.09 ± 4.35	<0.001***
At 12 minutes	80.87 ± 5.27	84.53 ± 3.59	<0.001***
At 15 minutes	77.61 ± 4.91	84.83 ± 3.74	<0.001***
After delivery			
At 5 minutes	88.69 ± 5.21	96.44 ± 3.68	<0.001***
At 10 minutes	88.62 ± 4.24	96.89 ± 4.49	<0.001***
At 15 minutes	86.53 ± 5.14	92.07 ± 5.03	<0.001***
At 20 minutes	83.87 ± 5.25	89.42 ± 5.49	<0.001***
At 25 minutes	83.60 ± 5.57	87.36 ± 3.75	<0.001***
At 30 minutes	81.58 ± 5.96	86.00 ± 3.69	<0.001***
At 35 minutes	81.67 ± 5.54	83.98 ± 4.78	0.037*
At 40 minutes	82.18 ± 6.02	83.49 ± 4.36	0.240ns
At 45 minutes	82.21 ± 6.32	83.15 ± 3.31	0.407ns
At 50 minutes	79.00 ± 4.96	82.89 ± 4.17	0.078ns

Values are expressed as mean ± SD. P value <0.05 is considered as significant. Unpaired t test was done to measure the level of significance
- highly significant, * - very highly significant, ns- non significant

In table-5 shows systolic Blood pressure. Mean systolic blood pressure was significantly higher in group P than group E. systolic blood pressure was statistically significant at baseline, 3 minutes, 6 minutes, 9 minutes, 12 minutes before delivery and at 20 minutes, 25 minutes, 30 minutes, 35 minutes, 40 minutes, 45 minutes after delivery. But it was statistically not significant at 15 minutes before delivery and 5 minutes, 10 minutes, 15 minutes and 50 minutes after delivery. The following table is given below in detail:

Table 5: Systolic Blood pressure at different time intervals between two groups

Systolic blood pressure (mmHg)	Group P (n=45)	Group E (n=45)	p-value
Baseline	119.29 ± 5.13	116.84 ± 5.33	0.029*
Before delivery			
At 3 minutes	126.07 ± 5.82	114.22 ± 5.74	<0.001***
At 6 minutes	125.76 ± 5.35	113.36 ± 7.12	<0.001***
At 9 minutes	122.04 ± 4.98	111.22 ± 8.72	<0.001***
At 12 minutes	117.60 ± 6.38	110.71 ± 7.24	<0.001***
At 15 minutes	113.11 ± 8.74	111.42 ± 5.07	0.550ns
After delivery			
At 5 minutes	111.62 ± 7.98	110.69 ± 5.43	0.518ns
At 10 minutes	110.58 ± 8.52	111.00 ± 4.23	0.767ns
At 15 minutes	110.42 ± 8.28	109.13 ± 4.85	0.370ns
At 20 minutes	111.71 ± 5.93	108.98 ± 5.81	0.030*
At 25 minutes	112.93 ± 6.10	108.98 ± 6.06	0.003**
At 30 minutes	112.84 ± 5.71	108.80 ± 5.01	0.001**
At 35 minutes	115.27 ± 7.43	110.29 ± 4.70	<0.001***
At 40 minutes	113.91 ± 6.50	110.42 ± 5.48	0.007**
At 45 minutes	115.71 ± 7.45	111.15 ± 6.23	0.004**
At 50 minutes	111.73 ± 5.52	109.78 ± 6.14	0.464ns

Values are expressed as mean ± SD. P value <0.05 is considered as significant. Unpaired t test was done to measure the level of significance

*- significant, **- highly significant, *** - very highly significant, ns- non significant

Table-6 shows diastolic Blood pressure at different time intervals of the patients. Diastolic blood pressure was statistically significant at 3 minutes, 6 minutes, 9 minutes, 12 minutes before delivery. But it was statistically not significant at baseline, 15 minutes before delivery and 5 minutes, 10 minutes, 15 minutes, 20 minutes, 25 minutes, 30 minutes, 35 minutes, 40 minutes and 50 minutes after delivery. The following table is given below in detail:

Table 6: Diastolic Blood pressure at different time intervals between two groups

Diastolic blood pressure (mmHg)	Group P (n=45)	Group E (n=45)	p-value
Baseline	66.22 ± 5.16	66.73 ± 6.40	0.678ns
Before delivery			
At 3 minutes	73.33 ± 7.79	63.71 ± 5.64	<0.001***
At 6 minutes	73.20 ± 7.30	63.02 ± 6.28	<0.001***
At 9 minutes	70.27 ± 6.52	62.02 ± 6.94	<0.001***
At 12 minutes	66.22 ± 6.81	61.07 ± 4.63	<0.001***
At 15 minutes	64.00 ± 5.70	61.92 ± 4.52	0.298ns
After delivery			
At 5 minutes	59.53 ± 6.01	61.16 ± 4.37	0.147ns
At 10 minutes	59.20 ± 5.74	60.82 ± 4.60	0.143ns
At 15 minutes	59.89 ± 5.27	59.84 ± 4.06	0.964ns
At 20 minutes	60.44 ± 5.46	59.16 ± 3.53	0.187ns
At 25 minutes	60.64 ± 5.87	59.36 ± 4.55	0.247ns
At 30 minutes	61.91 ± 5.48	59.96 ± 4.03	0.057ns
At 35 minutes	60.42 ± 5.44	59.80 ± 3.56	0.523ns
At 40 minutes	61.71 ± 5.45	60.69 ± 3.95	0.311ns
At 45 minutes	64.05 ± 6.89	60.95 ± 3.79	0.014*
At 50 minutes	62.64 ± 6.79	61.00 ± 3.61	0.524ns

Values are expressed as mean ± SD. P value <0.05 is considered as significant Unpaired t test was done to measure the level of significance

*- significant, *** - very highly significant, ns- non significant

Discussion

In the current study, 3(6.7%) parturients in group P and none of the parturients in group E developed bradycardia which was treated by 0.5 mg atropine. The difference was statistically not significant (p=0.241). One study observed that 1 out of 30 women developed bradycardia who received phenylephrine and none in the women receiving ephedrine which was statistically not significant. The occurrence of bradycardia was less in their study because they used phenylephrine 80 µg as a prophylactic dose.[4] The results of our study are consistent with one study where none of the parturient receiving ephedrine developed bradycardia whereas 5(12.5%) parturient receiving phenylephrine developed bradycardia.[5] Another study also found that maternal bradycardia was more frequent with phenylephrine than with ephedrine which was expected to be due to increase in blood pressure with an α agonist leading to reactive bradycardia (baroreceptor reflex) which was responsive to atropine without any adverse consequences.[6]

In the current study, 2(4.4%) parturient in group P and 8(17.8%) parturient in group E developed tachycardia which was found to be statistically significant (p=0.044). The result of this study is coherent with one report in which they reported significantly (p<0.05) higher number of parturient receiving ephedrine developed tachycardia.[7]. However,another study conducted a similar study where neither bradycardia, nor tachycardia was noted because their definition of bradycardia was heart rate <50 bpm and of tachycardia was heart rate > 130 bpm. The incidence of tachycardia in group E can be explained by its mechanism of action as it has mixed action directly as well as indirectly on α and β receptors whereas phenylephrine has pure α agonist property.[8]

In our study, we observed that the baseline systolic blood pressure, diastolic blood pressure were not significantly comparable between two groups. But the mean systolic blood pressure, diastolic blood pressure was significantly higher than in group E till the delivery of the baby. However, the mean systolic blood pressure after delivery of the baby was higher in group P than in group E which was statistically significant but the mean diastolic blood pressure after the delivery of the baby was high in group P than in group E but was not statistically significant. The result of our study is consistent with one study which confirmed that single intravenous dose of phenylephrine 100µg was effective for treating hypotension after spinal anaesthesia for caesarean section. [9]

Furthermore, the result of our study is not consistent with one study because they preloaded the patients with 10ml/kg normal saline.[7]One article found that ephedrine was found to be more effective than phenylephrine in the prevention of maternal hypotension. This may have been because a lower dose of phenylephrine was used in their study compared to this study.[10]In our study, maintenance of systolic blood pressure can also be explained by administration of crystalloid at the time of induction of subarachnoid block called co-loading at the rate of 20 ml/kg.

In the current study statistical differences were observed in systolic and diastolic blood pressure in group P and group E till the delivery of the baby but the diastolic blood pressure was better maintained with phenylephrine than with ephedrine, this finding is consistent with one study.[11]

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