

## STUDY OF DOSAGE OF PROPHYLACTIC INTRAVENOUS EPHEDRINE FOR SPINAL-INDUCED HYPOTENSION DURING CAESAREAN SECTION IN JHARKHAND POPULATION

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### Abstract

**Background:** Spinal anaesthesia-induced hypotension occurs frequently, particularly in the elderly and in patients undergoing caesarean section. spinal anaesthesia induced hypotension (SAIH) is caused by arterial and venous vasodilatation resulting from the sympathetic block Ephedrine has traditionally been considered the vasoconstrictor of choice. **Material & Method:** Out of 70, 35 were administered with ephedrine, and 35 controlled groups were administered the same quantity of normal saline during spinal anaesthesia. Hemodynamic and neonatal outcomes were noted and compared. **Results:** In the comparison of the systolic BP time interval between both groups at 1, 3, 4, 15 minutes, significant values ( $p < 0.001$ ). The comparison of rescue Ephedrine dosage in both groups APGAR scores s 1 minute of umbilical cord blood PH had a significant p value ( $p < 0.001$ ). **Conclusion:** Present pragmatic study has confirmed that, IV infusion of Ephedrine for spinal induced hypotension during caesarean section is more effective than crystalloid preloading in the prevention of hypotension during caesarean complications.

## INTRODUCTION

Hypotension is a frequent complication in patients who undergo recurring spinal anaesthesia for caesarean delivery.<sup>[1,2]</sup> The incidence and severity of hypotension may be reduced by intravascular volume expansion with crystalloids immediately prior to the initiation of the block and by routine left uterine displacement of at least 15 degrees immediately following the block to prevent the occurrence of aortocaval compression.

In previous studies, hypotension during caesarean delivery has produced an increased base deficit in the neonate, although, Apgar scores have generally not been reduced significantly.<sup>[3,4]</sup> Maintenance of arterial blood pressure is felt to be important to ensure adequate regional perfusion. While spinal anaesthesia (SA) may confer significant benefits when compared to general anaesthesia, it is frequently associated with arterial hypotension. The aim of this study is to evaluate the dosage of prophylactic intravenous ephedrine for spinal induced hypotension during the caesarean section.

## MATERIALS AND METHODS

70 (seventy) female patients admitted at obstetrics and gynaecology department of Mahatma Gandhi Medical College and hospital Jamshedpur, Jharkhand. were studied.

### Inclusive Criteria

Patients aged between 20-48 years, ASA grade-I and grade-II were selected for study.

### Exclusion Criteria

Patients having allergic reaction to local anaesthetics and opioids, patients with coagulopathy (due to blood or liver diseases or anticoagulants). Patients with severe cardiac, respiratory, hepatic or renal disease and patients with pre-eclampsia and eclampsia were excluded from the study.

### Method

Out of seventy (70) patients Group-I was received 1 ml of 5mg injection Ephedrine intravenously. Group-II (controlled group) received on equal volume of normal saline intravenously immediately after the sub-arachnoids block with 10 mg of 0.5 % injection Bupivacaine heavy.

A through pre-anaesthetic evaluation was done a day before the scheduled operation to all patients and tablet PPI (Ranitidine 150 mg) orally was advised last night before surgery.

On the day of operation injection Metoclopramide 10 mg and injection Ranitidine 50 mg was given intravenously, 20 minutes before the induction of spinal anaesthesia.

Upon arrival of the patients at the operation theatre, baseline parameters were recorded with the help of multichannel cardiac monitor, preloading was done with injection ringer lactate solution (15 ml / Kg body weight) about 15 minutes before the intended time of intrathecal drug administration.

Under strict aseptic and antiseptic precautions, a lumbar puncture was performed at the L3-L4 intervertebral space using a midline approach with a 25 gauge Quincke spinal needle in the lateral decubitus position, and 10 mg of 0.5% injection bupivacaine heavy was administered intrathecally. Immediately, either 1ml of 5mg injection of Ephedrine or an equal volume of normal saline was given intravenously to the parturient according to the computer generated randomization method.

The hemodynamic parameters such as heart rate, systolic BP, percentage saturation of oxygen (SPO2) and electrocardiogram were recorded at 1 minute intervals till delivery of the baby and thereafter at 5-minute intervals until. At the end of surgery, I.V. fluid was administered in the form of Ringer lactate at the rate of 10 mg / kg body weight per hour. A decrease in systolic BP of more than 20% from baseline was considered as "hypotension" and treated with rapid infusion of ringer lactate and 5 mg intravenous Ephedrine; a heart rate < 60 beats per minute, or bradycardia, was also treated with intravenous 0.6mg Atropine sulphate. Apgar scores of babies were recorded at 1 and 5 minutes.

Duration of study was February – 2022 to February – 2023

Statistical analysis: Various parameters e.g. demographic hemodynamic, Apgar score in both groups were compared with z test and noted. The statistical analysis was carried out in SPSS software.

## RESULTS

Table 1: Comparison of demographic variable parameters - Age groups (in years), height (cms), weight (kg) were insignificant ( $p < 0.001$ )

Table 2: Comparison of systolic Blood pressure at different interval at 1, 2, 3, 4 and 15 minutes was significant ( $p < 0.001$ )

Table 3: Comparison of hemodynamic data and clinical manifestation

- Hypertension was observed 20 (57.1 %) at group-A, 26 (74.2%) in group-B
- Rescue Ephedrine – 21 (60 %) in group-A, 26 (74.2%) in group-B
- Rescue dosage (mg%) – 3.01 ( $\pm 0.2$ ) in group-A, 4.05 ( $\pm 0.3$ ) in group-B, t test level 17 and  $p < 0.001$  (highly significant)

Table 4: Comparison study of Neonatal outcome

- Apgar score 1 minutes – 8.97 ( $\pm 0.18$ ) group-A, 8.85 ( $\pm 0.30$ ) in group-B, t test level was 2.02 and p value was significant ( $p < 0.05$ )
- Apgar score 5 minutes – 9.96 ( $\pm 0.16$ ) in group-A, 9.85 ( $\pm 0.30$ ) in group-B, and p value was insignificant
- Umbilical cord PH – 7.34 ( $\pm 0.04$ ) in group-A, 7.30 ( $\pm 0.02$ ) in group-B, t test was 5.24 and  $p < 0.001$ .

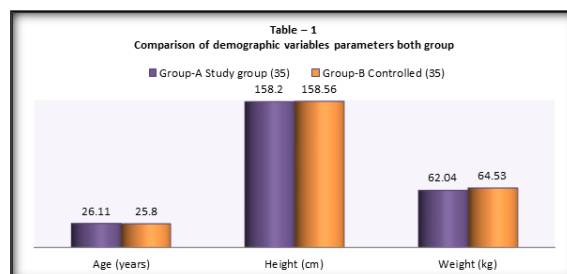


Table 1: Comparison of demographic variables parameters both group

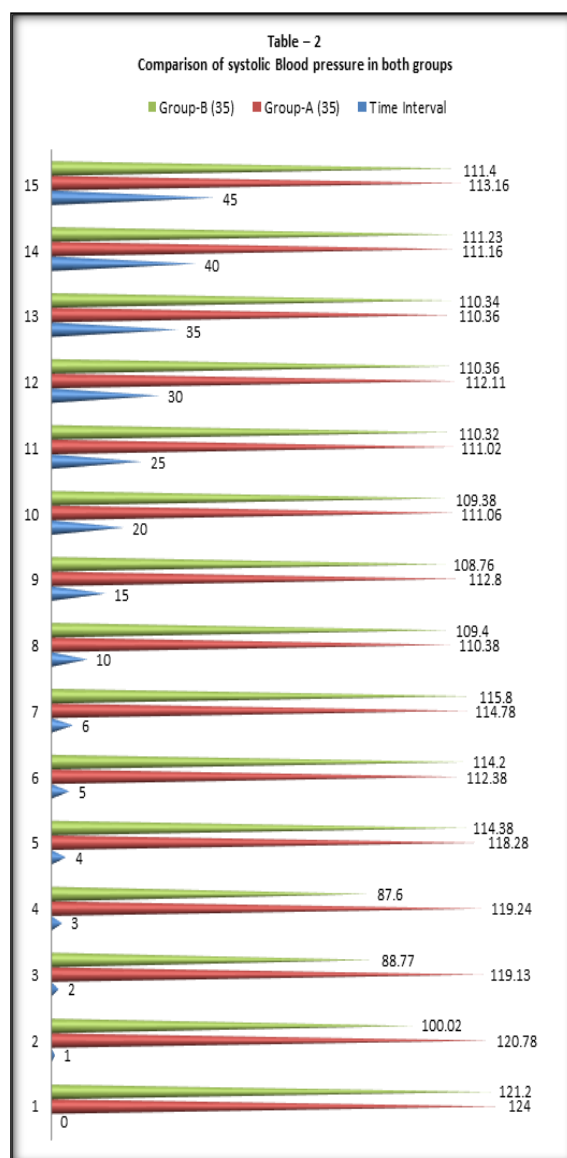


Figure 2: Comparison of systolic Blood pressure in both groups

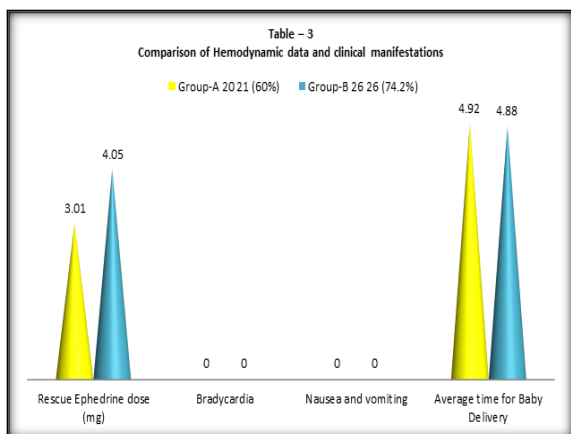


Figure 3: Comparison of Hemodynamic data and clinical manifestations

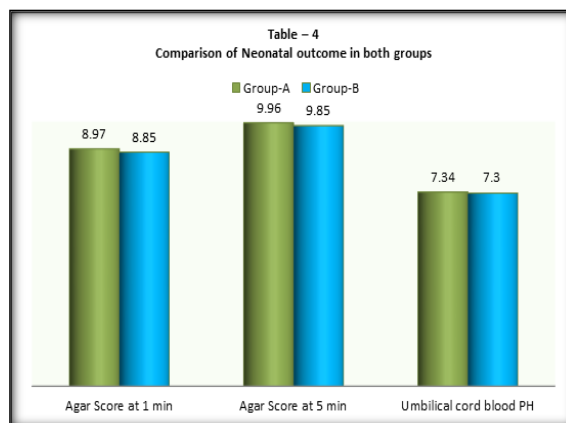


Figure 3: Comparison of Neonatal outcome in both groups

Table 1: Comparison of demographic variables parameters both group

Parameters	Group-A Study group (35)	Group-B Controlled (35)	t test	p value
Age (years)	26.11 (± 3.32)	25.80 (± 2.82)	0.42	p>0.67
Height (cm)	158.20 (± 3.32)	158.56 (± 4.28)	0.08	p>0.93
Weight (kg)	62.04 (± 5.18)	64.53 (± 6.82)	1.72	p>0.09

Table 2: Comparison of systolic Blood pressure in both groups

Time Interval	Group-A (35)	Group-B (35)	t test	p value
0	124 (± 4.96)	121.20 (± 4.32)	2.51	p>0.01
1	120.78 (± 14.58)	100.02 (± 22.28)	4.61	P<0.001
2	119.13 (± 15.9)	88.77 (± 13.58)	8.59	P<0.001
3	119.24 (± 9.90)	87.6 (± 8.87)	14.08	P<0.001
4	118.28 (± 5.48)	114.38 (± 7.28)	2.53	P<0.001
5	112.38 (± 7.38)	114.20 (± 7.80)	1.03	p>0.32
6	114.78 (± 5.8)	115.8 (± 7.28)	0.64	p>0.51
10	110.38 (± 6.04)	109.40 (± 3.68)	1.15	p>0.25
15	112.8 (± 6.70)	108.76 (± 3.28)	3.20	P<0.002
20	111.06 (± 5.38)	109.38 (± 3.88)	1.49	P>0.14
25	111.02 (± 5.10)	110.32 (± 5.28)	0.56	p>0.57
30	112.11 (± 6.10)	110.36 (± 3.07)	1.51	p>0.13
35	110.36 (± 6.10)	110.34 (± 3.17)	0.015	p>0.98
40	111.16 (± 6.77)	111.23 (± 3.89)	0.05	p>0.95
45	113.16 (± 9.00)	111.40 (± 3.64)	1.07	p>0.28

Table 3: Comparison of Hemodynamic data and clinical manifestations

Parameter	Group-A (35)	Group-B (35)	t test	p value
Hypotension	20 (57.1%)	26 (74.21%)	-	-
Reactive Hypertension	--	--	--	--
Rescue Ephedrine	21 (60%)	26 (74.2%)	--	--
Rescue Ephedrine dose (mg)	3.01 (± 0.2)	4.05 (± 0.3)	17	P<0.001
Bradycardia	--	--	--	--
Nausea and vomiting	--	--	--	--
Average time for Baby Delivery	4.92 (± 05)	4.88 (± 0.7)	0.27	p>0.78

Table 4: Comparison of Neonatal outcome in both groups

Parameter	Group-A	Group-B	t test	p value
Agar Score at 1 min	8.97 (± 0.18)	8.85 (± 0.30)	2.02	P<0.05
Agar Score at 5 min	9.96 (± 0.16)	9.85 (± 0.30)	1.91	p>0.06
Umbilical cord blood PH	7.34 (± 0.04)	7.30 (± 0.02)	5.27	p>0.001

## DISCUSSION

A study of the dosage of prophylactic IV ephedrine for spinal anaesthesia-induced hypotension during caesarean section in the Jharkhand population is presented. The patients undergoing caesarean section were administered Ephedrine, and the remaining half were administered the same quantity of normal saline. Blood pressure, especially systolic, was recorded 1, 2, 3, 4 and the 15-minute interval study had a significant p value (Table-2). The Ephedrine group had 25 (57.1%) hypotensive patients, while the control group had 26 (74.2%); the Rescue Ephedrine dosage (mg) mean value was 3.01 (0.2%) in the Ephedrine group and 4.05 (0.3%) in the control group; the t test was 17 and  $p < 0.001$ , and the p value was highly significant (Table-3). In the comparison of neonatal outcomes, Apgar scores at 1 minute were 8.97 ( $\pm 0.18$ ) in group-A, 8.85 ( $\pm 0.30$ ) in group, t test was 2.02,  $p < 0.01$  p value was significant. The umbilical cord blood PH 7.34 ( $\pm 0.04$ ) in group 0A and 7.30 ( $\pm 0.02$ ) group, t test was 5.29 and  $p < 0.001$  (p value was highly significant) (Table-4). These findings are more or less in agreement with previous studies.<sup>[6,7,8]</sup>

The incidence of hypotension is higher in caesarean sections due to cardiac changes of the parturient. Compression of inferior vena cava by hypertrophic uterus and development of collateral venous plexus circulation in the epidural space, lead to a decrease in the amount of CSF (cerebro spinal fluid) in the lumbo-sacral area and a higher cephalad spread of local anaesthesia.<sup>[9]</sup>

Since the storage of endogenous norepinephrine is depleted in patients under long term treatment with ACE inhibitors (or angiotension II receptor antagonists). This leads to the proposal that these patients would benefit from use of a direct acting sympathomimetic drug such as ephedrine. Ephedrine is the vasopressor of choice for hypotension prevention after spinal anaesthesia during caesarean section because of its ability to keep utero placental blood flow maintained as ephedrine's action is mainly indirect, through stimulating norepinephrine release from sympathetic nerve endings and the utero placental circulation is largely devoid of direct sympathetic innervations, so it is considered resistant to the vasoconstrictive effects of ephedrine.<sup>[10]</sup>

It is also reported that Ephedrine was injected intramuscularly and observed hypertension whenever spinal anaesthesia was not successful.<sup>[11]</sup> Hence prophylactic IV ephedrine administered either by infusion or multiple bolus has been considered as gold standard method for preventing hypotension. Moreover the effect of IV bolus of ephedrine on arterial pressure is transient

and it lasts for only 10-15 minutes.<sup>[12]</sup> It is reported that hypotension after the delivery of foetus usually ignored, as it may be related to excessive blood loss during c-section.

## CONCLUSION

A short period of hypotension (less than 2 minutes) is frequently associated with spinal anaesthesia for caesarean sections. Prophylactic IV ephedrine infusion is more effective than fluid preload in the prevention of hypotension due to spinal anaesthesia without causing significant tachycardia or hypertension.

### Limitation of Study

Owing to the tertiary location of the research centre, the small number of patients, and the lack of the latest techniques, we have limited findings and results.

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