DOI: 10.7860/JCDR/2023/61647.18345

Original Article

Anaesthesia Section

Comparison of Bolus Ephedrine vs Mephentermine in the Management of Hypotension during Spinal Anaesthesia for Caesarean Section: A Randomised Clinical Trial

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ABSTRACT

Introduction: Ephedrine and mephentermine are synthetic sympathomimetic drugs used as vasopressors. Ephedrine has direct and indirect effects on α, β1, and β2 receptors, and it also releases endogenous norepinephrine from synaptic storage sites. This leads to an elevation in Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP). On the other hand, mephentermine indirectly stimulates beta-adrenergic receptors and to some extent alpha-adrenergic receptors as well. Its primary effect is cardiac stimulation, which increases peripheral vascular resistance and contributes to an increase in blood pressure.

Aim: The aim of this study is to examine the efficacy of ephedrine and mephentermine in the treatment of hypotension during Lower Segment Caesarean Section (LSCS).

Materials and Methods: This double-blinded randomised clinical trial was conducted in the Department of Anaesthesiology among 90 pregnant females scheduled for caesarean delivery at Hind Institute of Medical Sciences, Sitapur, India from January 2021 to December 2022. Patients who developed hypotension (SBP <90 mmHg or <20% of the baseline) after receiving spinal anaesthesia were included in the study and divided into two groups. Group A received an intravenous bolus of 6 mg of ephedrine, and group B received an intravenous bolus of 6 mg of mephentermine. The variables studied included age, height, weight, Mean Arterial Pressure (MAP), Heart Rate (HR), SBP, DBP, bolus doses, and any side effects that occurred. HR, SBP, and DBP were recorded at baseline and then monitored every two minutes for a total of 10 minutes, and then every five minutes until the end of surgery. Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) software version 21.0 for Windows, and the results were represented as numbers (%) and mean±Standard Deviation (SD).

Results: The mean age of patients in group A and group B was 24.35 years and 24.72 years, respectively. All vital parameters were comparable. The need for bolus doses after hypotension was significantly higher in group B (1.68±0.81) than in group A (mean 1.28). The statistically significant complications identified were tachycardia, nausea, and vomiting, which were more prevalent in group B with 13 and 16 patients, respectively.

Conclusion: In this study, the authors found that ephedrine was more effective than mephentermine in terms of the requirement for bolus doses and the occurrence of intraoperative side effects. The requirement for bolus doses and occurrence of significant complications were higher in the group that received mephentermine. Therefore, ephedrine bolus immediately following spinal anaesthesia would be a safe and effective technique for preventing hypotension in females scheduled for LSCS.

Keywords: Complications, Foetal acidosis, Vasopressors

INTRODUCTION

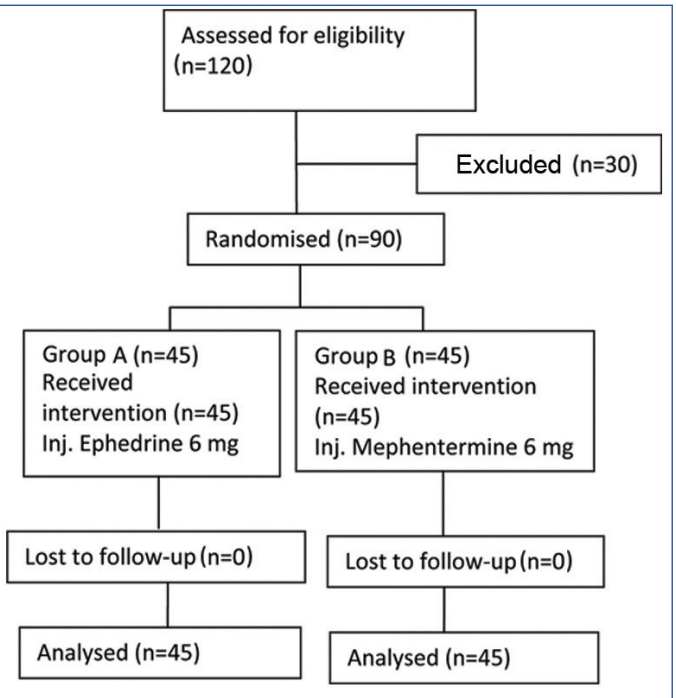
Spinal anaesthesia offers numerous advantages during caesarean delivery, such as rapid onset of action, effective neural block, minimal risk of local anaesthetic toxicity, and limited drug transfer to the fetus [1,2]. However, there are common and serious side effects associated with spinal anaesthesia, including maternal hypotension, bradycardia, dizziness, nausea, vomiting, cardiovascular collapse, fetal acidosis, and, in severe cases, fetal bradycardia [3]. The incidence of hypotension during spinal anaesthesia varies in different studies, ranging from 7.4% to 74.1% [4-6]. Choosing the most effective treatment strategy to achieve hemodynamic stability during spinal anaesthesia continues to be a challenge [7,8]. Various measures have been used to prevent maternal hypotension and bradycardia, such as volume preloading with crystalloid or colloid, administration of vasopressors, left uterine displacement, and frequent monitoring. Among these, intravascular volume expansion through preloading with intravenous fluids immediately before spinal anaesthesia induction and the use of vasopressors are common methods [9]. Vasopressor therapy plays a crucial role in managing hypotension when other measures fail. These medications primarily act on adrenergic receptors α1-, β1-, and β2-, producing distinct physiological consequences. Key considerations include the relative α and β adrenergic effects, onset and duration of action, and effects on the foetus. Ephedrine and mephentermine are two potent vasopressors commonly used to treat and prevent hypotension during spinal anaesthesia for caesarean section [10]. Ephedrine has been the drug of choice for over 30 years due to its safety record, availability, and familiarity among anaesthesiologists. It is a sympathomimetic agent that acts through both direct and indirect mechanisms [11]. Additionally, mephentermine, a sympathomimetic amine with alpha and beta adrenergic agonist actions, is commonly used by anaesthesiologists to manage hypotension induced by spinal anaesthesia [12]. Pharmacologically, mephentermine is an indirectly acting vasopressor that stimulates the release of endogenous catecholamines, and its impact on heart rate depends on vagal tone [13]. Despite the various preventive measures, the

incidence of hypotension following spinal anaesthesia in caesarean section remains high [4-6].

According to a survey conducted in the United Kingdom and published in 2001, ephedrine was chosen as the sole vasoconstrictor by 95.2% of obstetric anaesthesiologists [11]. The literature describes the doses of ephedrine for managing hypotension in detail [14]. Several articles have used intravenous doses of ephedrine ranging from 10-20 mg for prophylaxis against hypotension [15,16]. Different dosage regimens mentioned for treating hypotension with mephentermine include 30 mg intravenously, 30-45 mg intravenously, and 6 mg intravenous boluses [17]. Hypotension remains a significant complication of spinal anaesthesia and should be promptly and effectively treated to minimise patient discomfort, nausea, vomiting, and the risk of cardiac arrest. It is widely recognised that there is no definitive superiority of one vasopressor over the others in the literature, although arguments have been made in favor of each vasopressor at different times [15]. Therefore, the primary objective of this study was to compare the use of bolus ephedrine and mephentermine for managing hypotension during caesarean section under spinal anaesthesia, with a secondary objective of comparing the intraoperative adverse effects.

MATERIALS AND METHODS

A double-blinded randomised clinical trial was conducted in the Department of Anaesthesiology involving 90 pregnant females scheduled for caesarean delivery at Hind Institute of Medical Sciences, Sitapur, India, from January 2021 to December 2022. Prior to conducting the study, clearance and approval were obtained from the Institutional Ethics Committee (No. EC-HIMSA/MD/MS (20)/RD-13/01/2021). Non-probability convenience sampling technique was utilised, and a consort diagram was provided [Table/Fig-1]. A redesigned proforma was used to record the information after obtaining consent.



[Table/Fig-1]: CONSORT chart.

Sample size calculation: The following formulae was used for determining the sample size:

$$n=\frac{(\sigma_1^2+\sigma_2^2/\kappa)(z_{1-\alpha/2}+z_{1-\beta})^2}{\Delta^2}$$

$$n=\frac{(11.3^2+10.3^2)/1(2.57+1.64)^2}{9.35^2}$$

$$n=\frac{(127.69+106.09)/1(17.72)}{87.4225}$$

$$n=\frac{(233.78)(17.72)}{87.4225}=\frac{4143.54}{87.4225}=45.39 \text{ (in each group)}\approx 45$$

n=Sample size

σ=Standard deviation

Δ=Difference of means

κ=Ratio

$Z_{1-\alpha/2}$=Two-sided Z value

$Z_{1-\beta}$=Power

Considering values from a study conducted by Dokania S et al., and assuming a mean duration of surgery of 43.5 and 34.15 in group A (received ephedrine) and group B (received mephentermine) with a bias of 10%, the total sample size was calculated to be 90 pregnant females [18].

Therefore, considering a 99% confidence interval and 90% power, the total sample size was 90 (45 in each group).

Inclusion criteria: All female patients between the ages of 18-35 years who met the American Society of Anaesthesiologists (ASA) classification [19] (patients with mild systemic disease including normal pregnancy) were included in the study.

Exclusion criteria: Patients with contraindications for spinal anaesthesia, underlying co-morbid conditions, BMI >30, Type 2 diabetes, gestational hypertension, or a history of antepartum haemorrhage were excluded from the study.

Premedication: After overnight fasting, all patients were given premedication consisting of 50 mg of intravenous ranitidine and 10 mg of metoclopramide one hour before surgery, according to institutional protocol, to prevent the risk of regurgitation and aspiration. Pregnancy is considered a "full stomach" regardless of the fasting period.

Under aseptic precautions, spinal anaesthesia was administered in the sitting position using a 25-gauge Quincke needle at the L3-L4 level. A total dose of 2.5 mL was given for spinal anaesthesia, consisting of a loading dose of 0.5 mL (25 micrograms) of fentanyl followed by 2 mL (10 mg) of bupivacaine. The level of anaesthesia was achieved up to T4-T6, which was confirmed using the Bromage scale and pinprick method. The study drug was administered only after confirming free flow of cerebrospinal fluid. A wedge was placed to prevent hypotension, and a warmer was attached to the patient.

Patients who developed hypotension after spinal anaesthesia were included in the study, while the rest were excluded. Hypotensive patients were randomly assigned to two groups using a chit/lottery method:

- Group A: Received a 6 mg intravenous bolus of ephedrine.
- Group B: Received a 6 mg intravenous bolus of mephentermine.

The dose of the drugs was determined through discussion in the department, and a dose of 6 mg was chosen based on a standard article [20]. To ensure double blinding, the drugs were prepared by an anaesthesiologist who did not perform the subarachnoid block and was not involved in data collection. All patients were preloaded with 10 mL/kg of Ringer lactate over 15 minutes. Baseline values for Heart Rate (HR), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), and Mean Arterial Pressure (MAP) were recorded after preloading and achieving the sensory block level. The same parameters were recorded every two minutes for the first ten minutes and then every five minutes until the end of anaesthesia fixation. Whenever hypotension (a decrease in SBP <20% from baseline or SBP <90 mm Hg) occurred, the study drug was administered as an intravenous bolus [7]. The study drug was administered every two minutes until the target SBP was achieved within 20% of the baseline value. A maximum of three bolus doses (18 mg) of the study drug were used in this study.

Intraoperatively, nausea and vomiting were managed with intravenous study drugs to restore blood pressure, along with

10 mg of intravenous metoclopramide. Additionally, 100% oxygen was given to reduce central hypoxia.

STATISTICAL ANALYSIS

The statistical analysis was performed using SPSS software version 21.0. Continuous variables were assessed using mean (standard deviation) or range values when necessary and compared using Student t-test (unpaired) with a 95% confidence interval. Dichotomous variables were presented as number/frequency and analysed using the Chi-square test. A p-value <0.05 was considered significant.

RESULTS

Consent was obtained from 120 female patients, out of which 90 patients who developed hypotension were included in this study. They were randomly assigned to two groups, with 45 patients in each group [Table/Fig-1].

Assessing the demographic profile, no significant difference in mean age was observed [Table/Fig-2].

Age (in years)	Group A	Group B	p-value
Mean±SD	24.35±2.97	24.72±3.86	t=0.7229 p=0.4717
Age distribution (in years)			
18-25	35	30	χ^2=1.410 p=0.4940
>25-30	5	8	
>30-35	5	7	

[Table/Fig-2]: Tabular distribution/mean age of enrolled patients by groups.
Chi-square test, Student t-test

Further assessment of the parameters showed a decrease in SBP, DBP, and MAP in both groups following spinal anaesthesia.

The maximum level of sensory block was achieved at the T4 level by 40 patients in group A and 36 patients in group B. Four patients in both groups achieved the sensory block level at T5, while five patients in group B and one patient in group A achieved the sensory block level at T6 [Table/Fig-3].

The time to develop hypotension after spinal anaesthesia was mostly two minutes in both groups [Table/Fig-4].

Sensory block	Group A	Group B	p-value
T4	40	36	χ^2=2.877 p=0.2373
T5	4	4	
T6	1	5	

[Table/Fig-3]: Tabular distribution of sensory block among patients.
Chi-square test

Time	Group A (n=45)	Group B (n=45)	p-value
1 min	0	6	χ^2=59.20 **p<0.0001***
2 min	39	34	
4 min	5	5	
6 min	1	0	
8 min	0	0	

[Table/Fig-4]: Distribution of time to develop hypotension after spinal anaesthesia.
*Following the institutional protocol the blood pressure was recorded every two minutes.
Chi-square test

At baseline, all vital parameters were comparable. The MAP was 90.46 mmHg in group A and 92.47 mmHg in group B (p-value=0.1801). The HR varied between group A (90/min) and group B (84/min) (p-value=0.574). There was no significant difference in SBP between the two groups, with both groups having a mean SBP of 119 mmHg (p-value=0.8667) [Table/Fig-5].

The requirement for bolus doses of vasopressor showed a statistically significant result (p-value=0.0265). The total dose of vasopressor used in group A was 348 mg, while group B used 458 mg of bolus dose [Table/Fig-6].

At baseline	Group A	Group B	p-value
Heart rate (beats per minute)	90.32±13.76	84.98±12.52	t=1.926 p=0.574
Systolic BP (mmHg)	119.67±8.57	119.44±8.58	t=0.1683 p=0.8667
Diastolic BP (mmHg)	76.92±7.57	78.94±7.66	t=1.327 p=0.1879
Mean arterial pressure (mmHg)	90.46±6.99	92.47±7.23	t=1.351 p=0.1801

[Table/Fig-5]: Mean vital parameters of patients at baseline.
Student t-test; BP: Blood pressure

Bolus dose	Group A	Group B	p-value
Mean bolus	1.28	1.68	χ^2=7.257 **p=0.0265**
Standard deviation	0.54	0.81	
One	34	24	
Two	9	11	
Three	2	10	

[Table/Fig-6]: Administration of bolus doses among the groups.
Student t-test; Chi-square test; Bolus one is equivalent to 6 mg

After administering the vasopressor, the mean HR values were mostly higher in group B than in group A at all follow-ups, except at baseline and HP. However, there was no statistically significant difference in HR between the groups at any follow-up. Both groups experienced an increase in HR at the onset of hypotension [Table/Fig-7].

Heart rate	Group A Mean±SD	Group B Mean±SD	p-value
Baseline	90.26±13.84	84.98±12.52	t=1.926 p=0.0574
Hypotension (vasopressor given)	119.64±8.61	119.43±8.59	t=0.1683 p=0.8667
2 min after vasopressor	76.81±7.52	78.94±7.63	t=1.327 p=0.1879
4 min	90.47±6.99	92.44±7.2	t=1.351 p=0.1801
6 min	94.68±13.17	99.12±18.24	t=1.318 p=0.1909
8 min	94.11±12.81	98.69±15.42	t=1.548 p=0.1251
10 min	92.76±13.15	97.28±15.57	t=1.488 p=0.1402
15 min	92.19±12.61	96.18±15.52	t=1.350 p=0.1803
20 min	93.98±12.28	96.75±15.92	t=1.439 p=0.1536
25 min	93.14±11.99	95.89±14.52	t=0.9665 p=0.3364
30 min	91.97±11.99	96.16±14.72	t=1.490 p=0.1399

[Table/Fig-7]: Mean Heart Rate (HR) of the patients at different follow-ups.

In terms of SBP, the mean values were generally higher in group A than in group B at all follow-ups. However, there was no statistically significant difference in mean SBP between the groups at any follow-up. Two minutes after the vasopressor bolus, the rise in SBP was 108 mmHg in group A and 105 mmHg in group B. At four minutes, it was 112 mmHg in group A and 108 mmHg in group B. At six minutes, the results were almost equivalent, with SBP measuring 113 mmHg in group A and 112 mmHg in group B [Table/Fig-8].

The mean DBP was higher in group B than in group A at all follow-ups, except at 2, 4, 20, and 30 minutes. However, there was no statistically significant difference in mean DBP between the groups at any follow-up [Table/Fig-9].

Systolic BP	Group A Mean±SD	Group B Mean±SD	p-value
Baseline	119.57±8.51	119.27±8.53	t=0.1729 p=0.8631
Hypotension (vasopressor given)	83.13±5.28	82.78±6.16	t=0.2894 p=0.7730
2 min after VP	108.58±12.72	105.59±12.24	t=1.136 p=0.2589
4 min	112.76±13.32	108.77±10.71	t=1.576 p=0.1186
6 min	113.95±9.21	112.27±11.16	t=0.7920 p=0.4305
8 min	114.34±11.8	112.64±10.59	t=0.7218 p=0.4723
10 min	114.66±11.07	113.58±10.43	t=0.4877 p=0.6270
15 min	114.78±_9.99	111.55±10.71	t=1.473 p=0.1444
20 min	114.77±9.98	112.71±9.92	t=0.9587 p=0.3403
25 min	114.75±10.62	110.14±21.86	t=1.273 p=0.2065
30 min	116.45±9.57	115.25±11.5	t=0.3604 p=0.7194

[Table/Fig-8]: Mean Systolic blood pressure at various intervals.
Student t-test

Diastolic BP	Group A Mean±SD	Group B Mean±SD	p-value
Baseline	76.77±7.49	78.84±7.62	t=1.327 p=0.1879
Hypotension P (vasopressor given)	49.39±9.91	51.86±9.28	t=1.245 p=0.2164
2 min after vasopressor	69.09±12.12	66.05±11.88	t=1.193 p=0.2362
4 min	68.03±14.36	66.46±8.68	t=0.6429 p=0.5219
6 min	66.27±13.69	68.68±10.18	t=0.9495 p=0.3450
8 min	66.56±13.79	70.32±8.08	t=1.560 p=0.1222
10 min	69.07±11.24	70.58±9.64	t=0.6803 p=0.4981
15 min	68.52±9.98	69.89±9.57	t=0.6342 p=0.5276
20 min	66.76±9.72	64.95±8.18	t=0.9558 p=0.3418
25 min	68.54±9.29	72.26±10.45	t=1.787 p=0.0774
30 min	71.98±8.99	71.82±9.96	t=0.05013 p=0.9601

[Table/Fig-9]: Mean Diastolic BP (DBP) of the patients at different follow-ups.
Student t-test

Comparing the mean MAP values between the groups at all follow-ups, there was no statistically significant difference observed, except at four minutes where the MAP was higher in group A (82.89) than in group B (81.85) [Table/Fig-10].

MAP	Group A (n=45) Mean±SD	Group B (n=45) Mean±SD	p-value
Baseline	90.38±6.98	92.34±7.16	t=1.351 p=0.1801
Hypotesnion (Vasopressor given)	61.46±7.36	62.16±7.52	t=0.44487 p=0.6548
2 min after vasopressor	83.37±11.77	83.77±7.65	t=0.1923 p=0.8479
4 min	82.89±13.35	81.85±5.99	t=5.061 p<0.0001*
6 min	82.14±10.78	80.99±8.53	t=0.5885 p=0.5577
8 min	82.51±12.56	83.1±6.84	t=0.2829 p=0.7779
10 min	84.23±10.17	84.42±9.51	t=0.09690 p=0.9230
15 min	83.92±9.08	84.21±9.15	t=0.1573 p=0.8753
20 min	84.95±9.12	84.83±8.17	t=0.05507 p=0.9562
25 min	83.94±8.71	85.34±9.69	t=0.7243 p=0.4708
30 min	86.6±8.48	85.46±9.21	t=0.6477 p=0.5189

[Table/Fig-10]: Mean arterial pressure of the enrolled patients at different follow-ups.
Student t-test, Significant*

There were no complications identified, except for bradycardia, tachycardia, nausea and vomiting, and hypertension, which were more frequently seen in group B. Complications occurred less frequently in group A [Table/Fig-11].

Complications	Group A n (%)	Group B n (%)	p-value
Bradycardia	8 (17.7)	11 (24.4)	χ^2=0.6004 p=0.4384
Tachycardia	2 (4.44)	13 (28.88)	χ^2=42.54 **p<0.0001***
Hypertension	4 (8.88)	3 (6.66)	χ^2=0.1549 p=0.6939
Nausea and Vomiting	13 (28.88)	16 (35.5)	χ^2=11.43 **p=0.0007***

[Table/Fig-11]: Assessing complications within the groups.
Chi-square test, Significant*

DISCUSSION

The current study included a total of 45 patients in each group. Various demographic factors, such as age, height, and weight, were comparable. Hypotension was defined as a decrease in blood pressure (SBP) of more than 20% from the baseline value or less than 90 mmHg.

The present study suggests that ephedrine can be used safely and effectively as mephentermine for the prevention and treatment of hypotension during spinal anaesthesia. However, the results showed that ephedrine was more effective than mephentermine when comparing the statistical data with group B. The incidence of side effects, such as nausea, vomiting, and tachycardia, was lower in the ephedrine group compared to the mephentermine group. These findings are similar to the study conducted by Kol IO et al., which also demonstrated a lower incidence of hypotension, nausea, and vomiting in the ephedrine group compared to the control group [21].

In 1978, Lauckner W et al., administered 30 mg of intravenous mephentermine to treat hypotension in pregnant females. The drug facts provided by Wyeth (an American pharmaceutical company) recommend intramuscular doses of 30 to 45 mg for prevention and intravenous doses of 30 to 45 mg for the treatment of post-spinal hypotension. In the study institution, the standard bolus dose used for treating post-spinal hypotension is 6 mg, repeated as needed [22].

There are a few clinical trials comparing these two vasopressors. Sahu D et al., conducted a study using 6 mg bolus doses of ephedrine and mephentermine following the onset of hypotension and found similar requirements for both drugs in maintaining blood pressure during caesarean section [17]. The maximum dose of ephedrine used in their study was 18.34±2.53 mg in two patients, while 10 patients required 18 mg of mephentermine to maintain their SBP. Simon L et al., concluded that a single bolus of intravenous ephedrine at a dosage of either 15 or 20 mg significantly reduced the incidence of maternal hypotension compared to a single 10 mg bolus of ephedrine [23].

S. No.	Author's name and year of study	Place of study	Sample size	Name of study drugs compared	Parameters assessed	Conclusion
1	Chandak AV et al., [16] 2020	Maharashtra	120	Phenylephrine (100 mcg), Ephedrine (10 mg), Mephentermine (6 mg)	Arterial blood pressure, heart rate, maternal complication	All three vasopressors are effective in maintaining maternal arterial pressure, though phenylepherine has quicker action.
2	Kaur D et al., [20] 2018	Uttar Pradesh	90	Phenylephrine (100 mcg), Ephedrine (6 mg), Mephentermine (6 mg)	Heart rate, blood pressure (systolic and diastolic), Mean arterial pressure, respiratory rate, hypotension	Mephentermine as well as ephedrine were similar in performance, whereas phenylephrine has fast acting action but has short lived normotensive effect.
3	Kol IO et al., [21] 2009	Turkey	42	Ephedrine (0.5 ml/kg) Control group	Hypotension, maternal nausea and vomiting	There was significantly low incidence of hypotension, nausea and vomiting in ephedrine group in contrast to control group. It can be concluded that prophylactic 0.5 mg/kg bolus intravenous ephedrine can reduce the occurence of hypotension.
4	Simon L et al., [23] 2001	France	108	Ephedrine 5 mg bolus	Prophylactic dose of ephedrine (10 mg, 15 mg, 20 mg) effective in reducing maternal hypotension	Incidence of hypotension remained higher among women receiving 10 mg prophylactic dose of ephedrine than in those receiving 15 mg or 20 mg, intravenously.
5.	Present study 2023	Uttar Pradesh	90	Ephedrine 6 mg bolus Mephentermine (6 mg)	Heart rate, mean arterial pressure, systolic and diastolic blood pressure, hypotension, maternal complications	Ephedrine is more effective than mephentermine in terms of requirement of bolus doses and occurrence of intraoperative side-effects. (as mentioned in results).

[Table/Fig-12]: Comparison of the current study with similar existing studies.

According to the literature, the peak effect of ephedrine is seen within 2-5 minutes, while mephentermine typically takes around 5 minutes to reach its peak effect [17]. Similar findings were observed in this study, where the SBP became equivalent between the two groups at 6 minutes after the bolus dose. The recorded SBP at 6 minutes was 113 mmHg in group A and 112 mmHg in group B.

Kol IO et al., mentioned that a prophylactic bolus dose of 0.5 mg/kg intravenous ephedrine, given at the time of intrathecal block after a crystalloid fluid preload, along with rescue bolus doses, reduces the occurrence of hypotension [21]. This may be due to the specific protocol of drug administration followed in their study, which involved continuous infusion rather than bolus doses. Kaur D et al., conducted a study comparing phenylephrine, ephedrine, and mephentermine bolus doses for maintaining blood pressure during spinal anaesthesia in lower abdominal surgeries [20].

Their findings indicated that ephedrine and mephentermine had a relatively gradual and stable normotensive effect with no bradycardia effect. They also observed that there was only one episode of hypotension following ephedrine bolus compared to other vasopressors [20].

A study conducted by Chandak AV et al., compared the bolus of phenylephrine (group P), ephedrine (group E), and mephentermine (group M) for maintaining blood pressure during elective caesarean section in 120 patients divided into 40 in each group. The study concluded that there was no difference in managing hypotension between the three groups, and all three vasopressors were effective in maintaining maternal arterial pressure. The bolus doses used were 100 mcg intravenous phenylepherine, 10 mg intravenous ephedrine, and 6 mg of mephentermine in groups P, E, and M, respectively [16]. The table below [Table/Fig-12] displays past research studies conducted by various authors comparing ephedrine versus mephentermine as a potent vasopressors.

Limitation(s)

The results are from a single tertiary care centre and may not be generalisable to other contexts. Therefore, they cannot be extrapolated to a wider population.

CONCLUSION(S)

In patients undergoing Lower Segment Caesarean Section (LSCS), spinal anaesthesia provides a rapid, deep, and symmetrical sensory and motor blockade of superior quality. However, hypotension is the most frequently observed side effect of spinal anaesthesia during LSCS. In daily practice, sympathomimetic agents are commonly used drugs that exert their effects via adrenergic receptors, either directly or indirectly by inducing the release of norepinephrine, which further acts on these receptors. This study concluded that administering an ephedrine bolus immediately following spinal anaesthesia is a safe and effective technique for preventing hypotension in females scheduled for LSCS. The incidence of undesirable side effects such as nausea, vomiting, or hypertension is also low with ephedrine.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Nov 24, 2022
- Manual Googling: Jun 10, 2023
- iThenticate Software: Jul 03, 2023 (14%)

ETYMOLOGY: Author Origin

EMENDATIONS: 9

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Nov 19, 2022**
Date of Peer Review: **Jan 05, 2023**
Date of Acceptance: **Jul 06, 2023**
Date of Publishing: **Aug 01, 2023**