

## Original Research Article

# A comparative evaluation of hyperbaric levobupivacaine versus hyperbaric ropivacaine in parturients for elective caesarean section under spinal anaesthesia: a randomized clinical study

Sophia Koyu\*, Langpoklakpam Chaoba Singh, Mayanglambam Sushmita Devi,  
Abid K. Dodamani, Gracy Chanu Ningombam, Richardson Thongam

Department of Anaesthesiology, Regional Institute of Medical Sciences, Imphal, Manipur, India

**Received:** 31 October 2025

**Accepted:** 10 December 2025

### \*Correspondence:

Dr. Sophia Koyu,

E-mail: [Sophia.koyu@gmail.com](mailto:Sophia.koyu@gmail.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## ABSTRACT

**Background:** Spinal anaesthesia is the most preferred and widely used anaesthetic technique for elective lower-segment caesarean section, which offers less exposure to the potentially depressant drugs of general anaesthesia and allows early bonding between the mother and newborn as the mother is awake throughout the procedure. Levobupivacaine and Ropivacaine, are the two new long-acting amino amide local anesthetics available for clinical use. This study aimed to clinical efficacy, safety and haemodynamic changes of spinal anaesthesia with 0.5% hyperbaric Levobupivacaine versus 0.5% hyperbaric Ropivacaine.

**Methods:** The study groups were divided into two, named group L and group R. The total sample size was 132 (66 patients in each group). Patients in Group L received 2.4 ml of 0.5% hyperbaric Levobupivacaine and Patients in Group R received 2.4 ml of 0.5% hyperbaric Ropivacaine.

**Results:** Group R showed a quicker onset of sensory block and a faster 2-segment regression. On the other hand, Group L displayed a shorter duration of motor block. Both drugs showed promise for use in lower segment caesarean section with no significant side effects. The sensory and motor characteristics of both drugs are similar.

**Conclusions:** The intrathecal hyperbaric Ropivacaine showed a faster onset of sensory block, while hyperbaric Levobupivacaine led to earlier motor block regression in elective lower segment caesarean section.

**Keywords:** Hyperbaric Levobupivacaine, Hyperbaric Ropivacaine, Spinal anaesthesia

## INTRODUCTION

Spinal anaesthesia is the most preferred and widely used anaesthetic technique for elective lower-segment caesarean section.<sup>1</sup> Spinal anaesthesia offers less exposure to the potentially depressant drugs of general anaesthesia and allows early bonding between the mother and newborn as the mother is awake throughout the procedure. Hyperbaric Bupivacaine is a widely used local anaesthetic in spinal anaesthesia for caesarean section. A commercial preparation of hyperbaric bupivacaine contains a racemic combination (50:50) of two enantiomers: levobupivacaine,

the S (-) isomer, and dextro-bupivacaine, the R (+) isomer.<sup>2</sup> Although bupivacaine has a remarkable record of safety, their use is not totally without risk, its severe central nervous system (CNS) and cardiovascular adverse reactions following inadvertent intravascular injection has limited its use in recent clinical practice. This led to the quest for searching newer and safer anaesthetic agents for spinal anaesthesia.

Levobupivacaine and Ropivacaine, are the two new long-acting amino amide local anesthetics available for clinical use. The development of these new drugs is prompted by

the need for a wider safety margin while preserving the desirable pharmacodynamic properties of bupivacaine.<sup>3,4</sup>

Levobupivacaine presents an intriguing option as a substitute for bupivacaine in spinal anaesthesia.<sup>5</sup> After intrathecal injection, surgical sensory and motor block of similar characteristics and recovery over equal dose ranges of levobupivacaine and bupivacaine is demonstrated both in healthy volunteers and confirmed in surgical patients.<sup>6</sup> Sensory and motor block sets in more quickly when hyperbaric levobupivacaine is used as opposed to isobaric levobupivacaine.<sup>7</sup> Levobupivacaine and ropivacaine cause motor block regression earlier than bupivacaine.<sup>8</sup> Recent research has verified that levobupivacaine possesses a superior neurotoxic profile compared to racemic bupivacaine, suggesting a safer clinical profile for levobupivacaine.<sup>9</sup>

Ropivacaine, a novel long-acting amide local anaesthetic, shares structural and pharmacodynamic similarities with bupivacaine. Due to its reduced risk of central nervous system and cardiac toxicity, it is gaining popularity as it allows for early mobilization and discharge while providing effective postoperative pain management.<sup>10</sup> Ropivacaine is well-tolerated when used intrathecally, resulting in a shorter sensory block duration and milder motor block compared to bupivacaine. Additionally, intrathecal ropivacaine is associated with fewer hemodynamic side effects than intrathecal bupivacaine.<sup>11</sup>

Hyperbaric ropivacaine and levobupivacaine have been the subject of only a few comparative studies. Our study will utilize hyperbaric solutions due to their ability to produce consistent block characteristics and provide more dependable spinal anaesthesia compared to plain solutions.<sup>12</sup> So, our study will be comparing the efficacy of hyperbaric levobupivacaine and hyperbaric ropivacaine in parturients undergoing elective caesarean section.

## METHODS

A randomized clinical study was conducted in the Department of Anaesthesiology, Regional institute of medical sciences (RIMS), Imphal, Manipur from May 2022 to April 2024 consisting of 132 patients totally. The permission of the Research Ethics Board, RIMS, Imphal, Manipur was obtained before initiating the study. Informed written consent were taken from all patients.

### *Inclusion criteria*

Inclusion criteria includes age between 18 to 45 years, ASA (American Society of Anaesthesiology) category 1 and 2 and single term pregnancy.

### *Exclusion criteria*

Exclusion criteria includes history of allergic to the study drugs, pregnancy induced hypertension, cardiovascular co-morbidities, central nervous system disease, bleeding

tendency, local site infection, weight <50kg or >110kg, height <140cm or >180cm, respiratory diseases, kidney diseases, spinal deformities and uncooperative or unwilling patients.

Pre-operative assessment was done one day before the scheduled day of surgery and a good rapport was established with the patients. Eligible patients fulfilling the inclusion criteria were informed about the entire anaesthetic procedure including drugs used and a written informed consent was sought. The consenting patients were enrolled in the study. All the patients included in this study were kept fasting for 6 hours before caesarean section. At the start of each case, the gynaecologist was informed about the local anaesthetic going to be used. All the patients were assessed preoperatively for the vitals and a good peripheral line was secured and preloading of Ringer Lactate @ 5ml/kg over 30 mins was done along with the standard monitoring setup like ECG, Non-invasive blood pressure (NIBP) and pulse oximeter was connected. Baseline parameters such as heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure and oxygen saturation were recorded. patients were premedicated with injection Pantoprazole 40mg IV.

The study groups were divided into two, named Group L and Group R. The total sample size was 132 (66 patients in each group). Patients were allocated by using block randomization chart. Codes were assigned to each participant. Randomization was done and the study drug were prepared by another Anaesthesiologist not involved further in the study, in identical 5 ml syringes labelled as the "study drug" outside the operation theatre with codes. Patients in Group L received 2.4 ml of 0.5% hyperbaric Levobupivacaine and Patients in Group R received 2.4 ml of 0.5% hyperbaric Ropivacaine. Spinal anaesthesia was performed in the left lateral position with a 25-gauge Quincke needle using a midline approach at L2-3 or L3-4 interspace. With the spinal needle bevel facing cephalad, once free flow of clear cerebrospinal fluid is obtained, the study drug was injected over 10 seconds without barbotage or aspiration. After the injection of the spinal medication, the patients were turned supine with left uterine displacement. Oxygen was administered at 4L/min via a face mask. Maternal heart rate and blood pressure were measured with an automatic, non-invasive device. The table was kept horizontally at zero degrees without any position manipulation after the study drug is administered. The assessments of sensory block to pinprick were performed at 2, 4, 6, 8, 10, and 15 min after the intrathecal injection and then every 5 mins until 45 mins. Then, the sensory block was checked every 15 mins for the second hour and every 30 mins for the third hour. Results of the pinprick test was determined bilaterally at the midclavicular level by using a short bevelled 27-gauge needle. Blood pressure, heart rate, and the extent of motor block were recorded at the same measurement interval. Considering the time of intrathecal injection as time zero, the time to onset of sensory block, the time taken to reach maximum sensory block level, the time to regression of

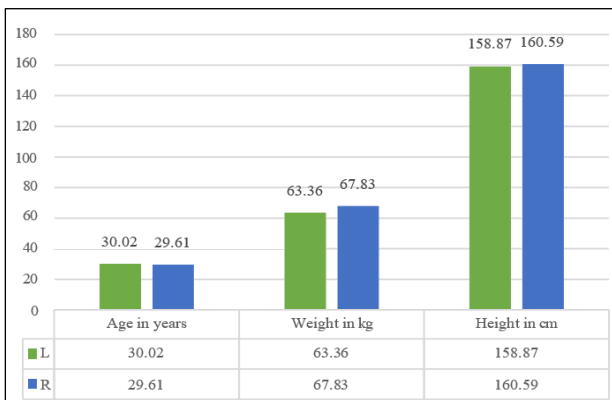
two dermatomes of the sensory block and the duration of the sensory block level were recorded. Motor block in the lower limbs was assessed by using a modified Bromage scale. The time of onset of motor block, the time to reach Bromage 3 and the duration of motor block was recorded.

Permission to perform operation was given once a T4-T6 level had been achieved. Bradycardia was defined as a pulse rate <50 beats per minute, and it was treated with 0.6 mg IV atropine. Hypotension was defined as a decrease in systolic blood pressure >30% from baseline, was initially treated with IV bolus of 5ml/kg ringer lactate and if needed inj. Mephentermine 3mg IV given. Fluids were administered to replace intraoperative losses. Intraoperative and post-operative nausea and vomiting, and other side-effects were also recorded.

Data was collected in predesigned proforma. Baseline information like age, weight, ASA grading, HR, BP, SpO<sub>2</sub> and block characteristics was recorded preoperatively. The findings and observations made during the entire study was entered in IBM SPSS version 26.0 for Windows software (Armonk, NY: IBM Corp; 2020). The two groups were analysed using student t-test. To compare qualitative data like side effects (nausea, vomiting) between the two groups, Chi-square test was used. A p value of <0.05 was considered statistically significant.

**RESULTS**

Figure 1 depicts the mean and standard deviation of the age, weight, and height of the participants in the two study groups. It is seen that there is no significant difference between the two groups. we can be conferred that there is no difference in terms of age, weight and height of the patients that can affect the two study drugs.

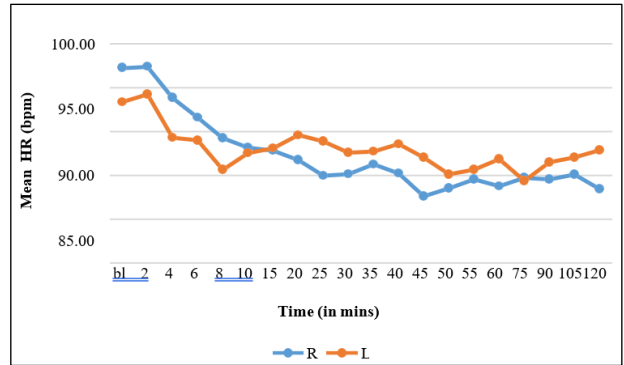


**Figure 1: Demographics of the study participants.**

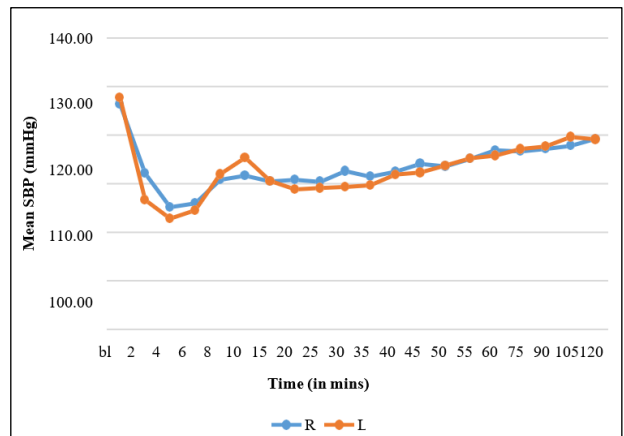
Figure 2 display significant decrease in heart rate with Group R compared to Group L based on independent t-test results. a significant difference in heart rates, with Group R showing a greater decrease than Group L (p<0.05).

Figure 3 display significant decrease in SBP in Group L compared to Group R, at 2 and 30 minutes (p<0.05). A

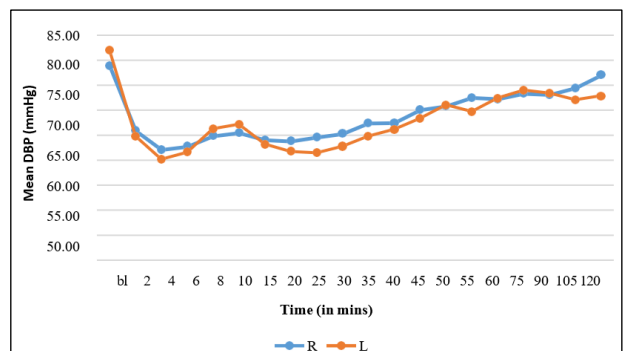
significant decrease in SBP in Group L compared to Group R, at 2 minutes and 30 minutes (p<0.05). Preoperative SBP values were similar in both groups.



**Figure 2: Trend of mean heart rate (bpm) among the study participants.**

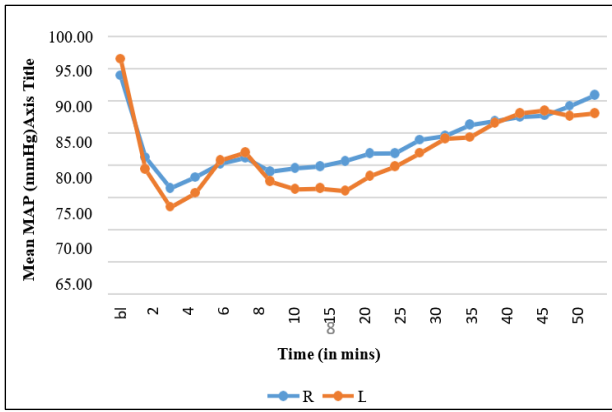


**Figure 3: Trend of mean SBP (mmHg) among the study participants.**



**Figure 4: Trend of mean DBP (mmHg) among the study participants.**

Figure 4 shows the result of independent t-test on mean change in DBP from baseline. There is significant fall in DBP in Group L than Group R (p<0.05). A notable reduction in DBP is observed in Group L compared to Group R at 20, 25, 30, 35, 40, 45, 55, 105, and 120 minutes.



**Figure 5: Trend of mean MAP (mmHg) among the study participants.**

Figure 5 shows the results of independent t-test for mean MAP changes from baseline. There is significant decrease in MAP on Group L than Group R,  $p < 0.05$ . Notably, there is a significant reduction in MAP in Group L compared to Group R, at 4, 6, 15, 20, 25, 30, 35, 40, 45, 105, and 120 minutes ( $p < 0.05$ ).

Table 1 illustrates the sensory and motor block traits of the study medications. Group R showed a quicker onset of sensory block and a faster 2-segment regression. On the other hand, Group L displayed a shorter duration of motor block. These findings were statistically significant ( $p < 0.05$ ).

Table 2 displays the various side effects linked to the study drugs and whether mephentermine (vasopressor) was used.

**Table 1: Sensory and motor block characteristics of Group L and Group R.**

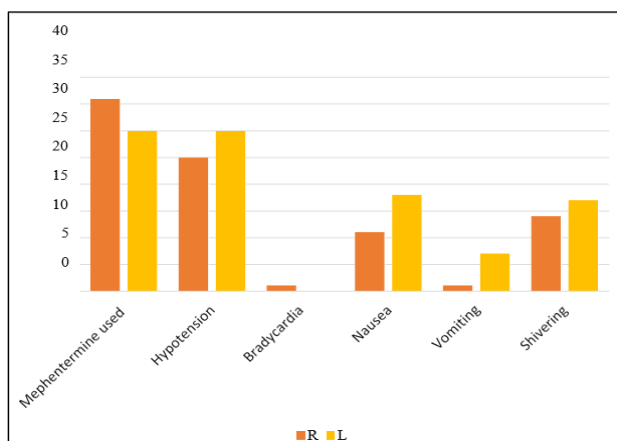
Block characteristics	Study group	Mean	SD	P value
Sensory onset time (seconds)	R	12.82	2.79	0.000
	L	20.18	6.22	
Time to block T6 (seconds)	R	201.33	56.07	0.105
	L	218.94	67.21	
Time to block T4 (seconds)	R	303.38	71.71	0.883
	L	300.22	63.07	
Time to peak sensory block level (seconds)	R	307.08	66.18	0.211
	L	292.03	71.22	
Time to 2 segment regression (minutes)	R	71.85	9.03	0.000
	L	78.35	11.46	
Motor block onset time (seconds)	R	55.02	18.36	0.061
	L	49.39	15.65	
Time to reach Bromage 3 (seconds)	R	115.09	32.99	0.126
	L	106.14	33.77	
Motor block duration (minutes)	R	107.74	11.74	0.003
	L	100.29	16.35	

\*An independent t-test was utilized for hypothesis testing, with a significance level set at p-value  $< 0.05$

**Table 2: Depicting the side effects associated with the study drugs and vasopressor use.**

Side effects		R		L		P value
		Mean	SD	Mean	SD	
Mephentermine used	Yes	36	48	30	52.6	0.598
	No	39	52	36	47.4	
Hypotension	Yes	25	45.5	30	54.5	0.377
	No	41	53.2	36	46.8	
Bradycardia	Yes	1	100	0	0	1
	No	65	49.6	66	50.4	
Nausea	Yes	11	37.9	18	62.1	0.141
	No	55	53.4	48	46.6	
Vomiting	Yes	1	12.5	7	87.5	0.062
	No	65	52.4	59	47.6	
Shivering	Yes	14	45.2	17	54.8	0.538
	No	52	51.5	49	48.5	

Figure 6 displays the distribution of adverse effects linked to the study drugs. The side effects observed in both groups are similar and not statistically significant ( $p < 0.05$ ) based on the chi-square test. Group L showed no bradycardia during the study.



**Figure 6: Displays the distribution of adverse effects linked to the study drugs.**

## DISCUSSION

The choice of anaesthetic technique for a caesarean section depends on several factors, including urgency, the patient's existing health conditions, their preferences, as well as the skills and preferences of the anaesthesiologists and surgeon. Typically, regional anaesthesia is the preferred option due to the unique conditions of pregnancy, unless there are specific contraindications. Regional anaesthesia offers benefits such as quicker recovery of gastrointestinal functions post-surgery, improved postoperative pain relief, early patient mobilization after surgery, enhanced bonding between the mother and baby, and reduced risk of drug toxicity for both mother and child.<sup>13</sup>

Bupivacaine introduced in 1963, an amino-amide compound, quickly became a highly effective long-acting local anaesthetic. However, in 1979, Albright highlighted the risks associated with bupivacaine and etidocaine, as accidental intravascular access could lead to dangerous cardiac rhythm abnormalities and cardiac depression, potentially resulting in cardiac arrest. These drawbacks of the original anaesthetic led to the creation of a newer agent called Ropivacaine.<sup>14</sup> The motivation behind creating the newer stereo-selective, single enantiomer amide local anaesthetic agents, Ropivacaine and Levobupivacaine, stemmed from cases of fatal cardiac toxicity in pregnant women who received epidural bupivacaine and etidocaine during caesarean sections.<sup>15</sup>

Commercial bupivacaine consists of a racemic mixture of (R)- and (S)- stereoisomers. To address the risk of cardiotoxicity due to accidental intravenous bupivacaine injection, single enantiomers were developed for safety. Ropivacaine and levobupivacaine were created to utilize

this stereoselectivity. Ropivacaine, a single (S)-stereoisomer, differs from levobupivacaine by substituting a propyl group for the butyl group on the piperidine ring. These structural changes aimed to reduce cardiotoxicity.<sup>16</sup> Ropivacaine, a long-acting amide local anaesthetic, shares structural and pharmacodynamic characteristics with bupivacaine. Ropivacaine exhibits a lower negative inotropic effect on isolated cardiac tissue compared to bupivacaine. These variances in electrical and mechanical effects might stem from bupivacaine's selective inhibition of  $Ca^{2+}$  currents.

A clinical study comparing lumbar epidural 0.5% Bupivacaine with 0.75% Ropivacaine showed no significant differences in motor or sensory impact at these concentrations. Overall, Ropivacaine seems slightly less potent than Bupivacaine (1:1.3 to 1:1.5) for regional anaesthesia. Some studies indicate that Ropivacaine produces shorter-lasting blocks than Bupivacaine in certain laboratory and human trials.<sup>16</sup> Research findings, along with information from a preliminary study, concluded that 18 mg of 0.5% hyperbaric Ropivacaine had similar effects to 12 mg of 0.5% hyperbaric bupivacaine for spinal anaesthesia during caesarean delivery.<sup>17</sup> The effectiveness and appropriate dosage of spinal ropivacaine for caesarean section remains uncertain.

In our present study, 132 patients aged between 18-45 years were recruited and allocated into two groups by block randomization. Group L received 2.4ml of 0.5% Hyperbaric Levobupivacaine and Group R received 2.4ml of 0.75% Hyperbaric Ropivacaine. No patients were excluded from the study; all participants were included as per sample size calculation. There was no difference in terms of age, weight and height of the patients that can affect the two study drugs. The clinical efficacy and safety of spinal anaesthesia with 0.5% hyperbaric ropivacaine compared with 0.5% hyperbaric bupivacaine for elective caesarean delivery was studied by Chung et al.<sup>17</sup> Ropivacaine produced a shorter duration of motor blockade than bupivacaine and Onset time of sensory block to T10 or to peak level was later in the Ropivacaine group in their study. While in our study, 0.75% hyperbaric Ropivacaine had a faster sensory onset with motor regression later than 0.5% hyperbaric levobupivacaine, which was statistically significant ( $p < 0.05$ ).

Al-Abdulhadi et al conducted a comparative study on hyperbaric spinal Ropivacaine (15 mg) and hyperbaric spinal Bupivacaine (11.25 mg) with 0.1 mg of preservative-free morphine and 0.01 mg of fentanyl for elective caesarean delivery.<sup>18</sup> Their findings showed similarities in achieving T10 or T6 block levels and maximal sensory block levels between the two groups. The study concluded that using 15 mg of hyperbaric Ropivacaine for spinal anaesthesia in caesarean sections resulted in higher patient satisfaction levels due to the shorter duration of sensory and motor blocks compared to using 11.25 mg of hyperbaric Bupivacaine. Additionally, the onset of sensory block was quicker in the Ropivacaine

group than previously reported. The Ropivacaine group also experienced later regression of motor block. Peak sensory block level, time to reach peak sensory level, and onset of motor block did not show statistically significant differences between the two groups.

Bremerich et al conducted a study to compare fixed doses of intrathecal hypertonic Levobupivacaine 0.5% (10mg) and Bupivacaine 0.5% (10mg) combined with either intrathecal Fentanyl (10 and 20 microgram), or Sufentanil (5 microgram) in elective caesarean delivery.<sup>19</sup> Levobupivacaine produced significantly shorter and less pronounced motor blockade than racemic bupivacaine regardless of the kind and dose of opioids added. Duration of motor block Bromage 3 shorter than bupivacaine group. Adding Sufentanil 5 µg to either local anaesthetic significantly prolonged duration of effective analgesia compared to supplemental Fentanyl 10 or 20 µg.

The study conducted by Kulkarni et al compared hyperbaric 0.5% Ropivacaine and 0.5% hyperbaric Bupivacaine for spinal anesthesia in patients undergoing elective infraumbilical surgeries.<sup>20</sup> The findings revealed that compared to Bupivacaine, the Ropivacaine had a slower onset and a shorter duration of sensory block. Patients who received Ropivacaine had a faster recovery from motor blockade and an earlier return of urinary function. Guler et al conducted a comparative study between plain Levobupivacaine and hyperbaric Bupivacaine for spinal anaesthesia during caesarean sections.<sup>21</sup> The findings indicated that hyperbaric Bupivacaine resulted in prolonged sensory block durations but quicker onset of motor block. Moreover, hyperbaric Levobupivacaine demonstrated a lower incidence of adverse effects such as hypotension and nausea.

Cappelleri et al conducted a study comparing small doses of hyperbaric Ropivacaine and hyperbaric Levobupivacaine in the context of unilateral spinal anaesthesia for knee arthroscopy.<sup>22</sup> Their research revealed that hyperbaric Ropivacaine induced a predominantly unilateral sensory blockade in 73% of participants, leading to faster recovery and home discharge times compared to hyperbaric Levobupivacaine. Specifically, doses of 7.5 mg hyperbaric ropivacaine and 5 mg hyperbaric levobupivacaine were associated with expedited recovery and discharge, surpassing the effects of a 7.5 mg dose of hyperbaric levobupivacaine. In a study by Dar et al, the effectiveness and safety of intrathecal hyperbaric Ropivacaine were compared with hyperbaric Bupivacaine in patients undergoing limb and hip surgeries.<sup>23</sup> The study revealed that the mean onset of sensory block was significantly slower in the Ropivacaine group compared to the Bupivacaine group. Furthermore, the duration of the sensory block was notably shorter in the Ropivacaine group compared to the Bupivacaine group. Consequently, the study concluded that intrathecal use of hyperbaric Bupivacaine leads to a faster onset of sensory block and longer-lasting analgesic effects compared to hyperbaric Ropivacaine.

Luck et al conducted a comparative study examining the clinical effects of hyperbaric Bupivacaine for spinal anesthesia in comparison to hyperbaric Levobupivacaine and hyperbaric Ropivacaine.<sup>16</sup> In this study, 60 ASA grade I-II patients undergoing elective surgery under spinal anesthesia were randomly assigned to receive 3 ml of Bupivacaine, Levobupivacaine, or Ropivacaine, each at a concentration of 5 mg/ml. The study concluded that hyperbaric Ropivacaine offers dependable spinal anaesthesia of a shorter duration compared to hyperbaric Bupivacaine or hyperbaric Levobupivacaine, with both latter exhibiting similar clinical effects. Notably, the recovery profile of ropivacaine may be particularly advantageous in scenarios necessitating prompt mobilization.

Sanansilp et al conducted a double-blinded prospective study involving 20 patients who underwent gynaecologic surgery with a lower abdominal incision.<sup>7</sup> The study aimed to compare the effects of intrathecal hyperbaric Levobupivacaine versus isobaric Levobupivacaine. Patients were randomly assigned to receive 3 ml of either isobaric or hyperbaric 0.42% Levobupivacaine intrathecally. In conclusion, hyperbaric Levobupivacaine demonstrated more consistent sensory block levels and exhibited greater efficacy for surgeries involving a lower abdominal incision.

In our study, we conducted a comparative analysis of equipotent doses of hyperbaric Levobupivacaine and hyperbaric Ropivacaine, focusing on their clinical efficacy, safety profiles, hemodynamic impacts, as well as sensory and motor block attributes. Notably, hyperbaric Ropivacaine exhibited a swifter onset of sensory block, whereas hyperbaric levobupivacaine resulted in earlier regression of motor block. These observations yielded statistically significant results ( $p < 0.05$ ). Peak sensory block level, time to peak sensory level attainment, and motor block onset were comparable across both groups and lacked statistical significance. The occurrence of adverse effects like hypotension, bradycardia, nausea, vomiting, and shivering displayed similarity between the two groups, without statistical significance. Limited studies exist that juxtapose the effectiveness of intrathecal hyperbaric Levobupivacaine and hyperbaric Ropivacaine specifically for elective caesarean sections. Most investigations concerning these anaesthetic agents are confined to lower abdominal surgeries excluding pregnant individuals. Hence, further research is imperative to establish the efficacy and safety profiles of hyperbaric Ropivacaine and hyperbaric Levobupivacaine in pregnant individuals.

## CONCLUSION

The present results show that intrathecal anaesthesia provides optimal environment during elective caesarean section. My study drugs, hyperbaric levobupivacaine and hyperbaric ropivacaine were considerably safe with no significant side effects like hemodynamic instability, bradycardia, nausea, vomiting and shivering. The

intrathecal hyperbaric ropivacaine showed a faster onset of sensory block, while hyperbaric levobupivacaine led to earlier motor block regression in elective lower segment caesarean section. Both drugs show promise for use in lower segment caesarean section with no significant side effects. The sensory and motor characteristics of both drugs are similar.

### Recommendations

Doppler parameters and clubbed it with all adverse outcomes including perinatal deaths and nursery admissions. Martinez et al studied small-for-gestational-age group and concluded that middle cerebral artery vasodilation was associated with the highest risk of cesarean delivery ( $p < 0.001$ ) and cesarean delivery for nonreassuring fetal status ( $p < 0.001$ ) and also increased risk of neonatal acidosis (odds ratio, 9.0).

### ACKNOWLEDGEMENTS

Authors would like to thank the Department of Anaesthesiology, Regional institute of medical sciences, Imphal, Manipur, India for their support during study. Authors would like to thank the Junior Residents for helping in data collection, and to the HOD and other Senior Residents for helping in data compiling. Authors are also thankful to the patients who had participated in this study

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Research Ethics Board, RIMS, Imphal, Manipur (ethical clearance No. A/206/REB-Comm (SP)/RIMS/2015/829/170 /2022)*

### REFERENCES

1. Akamatsu TJ. Advances in obstetric anesthesiology during the period 1960-1970. *Clin Anesth.* 1969;3:221-51.
2. Bajwa SS, Kaur J. Clinical profile of levobupivacaine in regional anesthesia: A systematic review. *J Anaesthesiol Clin Pharmacol.* 2013;29(4):530-9.
3. Foster RH, Markham A. Levobupivacaine: a review of its pharmacology and use as a local anaesthetic. *Drugs.* 2000;59(3):551-79.
4. Markham A, Faulds D. Ropivacaine: a review of its pharmacology and therapeutic use in regional anaesthesia. *Drugs.* 1996;52(3):429-49.
5. Vanna O, Chumsang L, Thongmee S. Levobupivacaine and bupivacaine in spinal anesthesia for transurethral endoscopic surgery. *J Med Assoc Thai.* 2006;89(8):1133-9.
6. Alley EA, Kopacz DJ, McDonald SB, Liu SS. Hyperbaric spinal levobupivacaine: A comparison to racemic bupivacaine in volunteers. *Anesth Analg* 2002;94(1):188-93.
7. Sanansilp V, Trivate T, Chompubai P, Visalyaputra S, Suksoppee P, Permpolprasert L, et al. Clinical characteristics of spinal levobupivacaine: Hyperbaric compared with isobaric solution. *Sci World J.* 2012;2012(1):169076.
8. Casati A, Moizo E, Marchetti C, Vinciguerra F. A prospective, randomized, double-blind comparison of unilateral spinal anesthesia with hyperbaric bupivacaine, ropivacaine, or levobupivacaine for inguinal herniorrhaphy. *Anesth Analg* 2004;99(5):1387-92.
9. Margenella C, Bruno V, Matrisciano F, Reale C, Nicoletti F, Melchiorri D. Comparative effects of levobupivacaine and racemic bupivacaine on excitotoxic neuronal death in culture and N-methyl-D-aspartate-induced seizures in mice. *Eur J Pharmacol.* 2005;518(2-3):111-5.
10. Sultan MA, Ali Shams TM, Mageed NA, El-ebidy MG. Intrathecal hyperbaric ropivacaine versus hyperbaric bupivacaine in geriatric hypertensive patients. *Benha M. J.* 2005;22(3):479.
11. Mohta M. Ropivacaine: Is it a good choice for spinal anesthesia?. *J Anaesthesiol Clin Pharmacol* 2015;31(4):457-8.
12. Fettes PD, Hocking G, Peterson MK, Luck JF, Wildsmith JA. Comparison of plain and hyperbaric solutions of ropivacaine for spinal anaesthesia. *Br J Anaesth.* 2005;94(1):107-11.
13. Banerjee A, Sarkar D, Bandra B. Evaluation of anaesthetic techniques for caesarean. *Int J Res Med Sci.* 2018;6(5):1742-46.
14. Dar FA, Mushtaq MB, Khan UM. Hyperbaric spinal ropivacaine in lower limb and hip surgery: A comparison with hyperbaric bupivacaine. *J Anaesthesiol Clin Pharmacol.* 2015;31(4):466-70.
15. Luck JF, Fettes PDW, Wildsmith JAW. Spinal anaesthesia for elective surgery: a comparison of hyperbaric solutions of racemic bupivacaine, levobupivacaine, and ropivacaine. *Br J Anaesth.* 2008;101(5):705-10.
16. Gropper MA, Eriksson LI, Fleisher LA, Wiener-Kronish JP, Cohen NH, Leslie K, editors. *Miller's Anesthesia, 2-volume set E-book.* Chapter 29. Elsevier Health Sciences; 2019:885-6.
17. Chung CJ, Choi SR, Yeo KH, Park HS, Lee SI, Chin YJ. Hyperbaric spinal ropivacaine for cesarean delivery: a comparison to hyperbaric bupivacaine. *Anesthesia Analgesia.* 2001;93(1):157-61.
18. Al-Abdulhadi O, Biehl D, Ong B, Boker A. Hyperbaric spinal for elective Cesarean section-ropivacaine vs bupivacaine. *Middle East J Anaesthesiol.* 2007;19(2):385-96.
19. Bremerich DH, Fetsch N, Zwissler BC, Meininger D, Gogarten W, Byhahn C. Comparison of intrathecal bupivacaine and levobupivacaine combined with opioids for Caesarean section. *Curr Med Res Opin.* 2007;23(12):3047-54.
20. Kulkarni KR, Deshpande S, Namazi I, Singh SK, Kondilya K. A comparative evaluation of hyperbaric ropivacaine versus hyperbaric bupivacaine for elective surgery under spinal anesthesia. *J Anaesthesiol Clin Pharmacol.* 2014;30(2):238-42.

21. Guler G, Cakir G, Ulgey A, Ugur F, Bicer C, Gunes I, Boyaci A. A comparison of spinal anesthesia with levobupivacaine and hyperbaric bupivacaine for cesarean sections: A randomized trial. 2012;2(3):84-9.
22. Cappelleri G, Aldegheri G, Danelli G, Marchetti C, Nuzzi M, Iannandrea G, et al. Spinal anesthesia with hyperbaric levobupivacaine and ropivacaine for outpatient knee arthroscopy: a prospective, randomized, double-blind study. *Anesth Analg.* 2005;101(1):77-82.
23. Dar FA, Mushtaq MB, Khan UM. Hyperbaric spinal ropivacaine in lower limb and hip surgery: A

comparison with hyperbaric bupivacaine. *J Anaesthesiol Clin Pharmacol.* 2015;31(4):466-70.

**Cite this article as:** Koyu S, Singh LC, Devi MS, Dodamani AK, Ningombam GC, Thongam R. A comparative evaluation of hyperbaric levobupivacaine versus hyperbaric ropivacaine in parturients for elective caesarean section under spinal anaesthesia: a randomized clinical study. *Int J Res Med Sci* 2026;14:118-25.