International Medicine
www.theinternationalmedicine.org

Research Article

Section: Anaesthesiology

# A Prospective Observational Study to Assess the Efficacy of Intrathecal Levobupivacaine versus Bupivacaine in Elderly Patients Undergoing Lower Abdominal Surgeries

**Dr. Shital Dalal**[1] **& Dr. Diksha Sao**[1]

[1]Department of Anaesthesiology, Indira Gandhi Government Medical College & Hospital, Nagpur, Maharashtra, India

ARTICLE INFO

*Article History:*

Received: 18-07-2025

Accepted: 28-07-2025

**Keywords**:

Levobupivacaine

Bupivacaine

Spinal Anaesthesia

Elderly Patients

Lower Abdominal Surgery

Haemodynamic Stability

***Corresponding author:**
**Dr. Shital Dalal**
Associate Professor, Department of Anaesthesiology, Indira Gandhi Government Medical College & Hospital, Nagpur, Maharashtra, India

ABSTRACT

**Introduction:**

With a growing elderly population, anaesthesia techniques must balance efficacy with safety. Spinal anaesthesia is preferred in geriatric patients due to reduced systemic effects compared to general anaesthesia. However, the choice of local anaesthetic—levobupivacaine or bupivacaine—remains a crucial determinant of perioperative outcomes. Levobupivacaine, the S(-) enantiomer of bupivacaine, is known for lower cardiotoxicity and neurotoxicity.

**Materials and Methods:**

This prospective observational study was conducted from September 2022 to September 2024 in the Department of Anaesthesiology at a tertiary care hospital. A total of 70 elderly patients (aged ≥ 65 years) scheduled for lower abdominal surgeries under spinal anaesthesia were enrolled. Patients were divided into two groups: Group L (intrathecal hyperbaric levobupivacaine) and Group B (intrathecal hyperbaric bupivacaine). Parameters recorded included onset of sensory and motor block, time to reach T10 level, maximum block height, haemodynamic changes, total duration of block, regression to L5 level, and complications. Statistical analysis was conducted using SPSS software, with $p < 0.05$ considered significant.

**Results:**

Both groups showed comparable onset of sensory and motor block ($p > 0.05$). The duration of motor block was significantly shorter in the levobupivacaine group (176.3 ± 14.2 minutes) than in the bupivacaine group (191.7 ± 16.1 minutes) ($p < 0.05$). Haemodynamic stability was better in the levobupivacaine group, with fewer incidences of hypotension and bradycardia. No major complications were observed in either group. Patient satisfaction and quality of anaesthesia were comparable.

**Conclusion:**

Levobupivacaine and bupivacaine provide similar quality of spinal anaesthesia in elderly patients undergoing lower abdominal surgeries. However, levobupivacaine offers better haemodynamic stability and faster motor recovery, making it a safer alternative in geriatric patients.

## INTRODUCTION

The global demographic landscape is undergoing a significant transformation, marked by a steady increase in the elderly population aged 65 years and above. As the average lifespan rises due to advances in medicine, the proportion of elderly individuals requiring surgical interventions has also grown. Lower abdominal surgeries, including procedures such as hernia repair and colorectal resections, are commonly performed in this age group for both elective and emergency cases. Managing elderly patients perioperatively presents unique challenges due to age-related physiological changes and comorbidities. In this context, regional anaesthesia techniques, particularly spinal anaesthesia, have gained popularity because of their

potential to reduce postoperative complications, maintain better haemodynamic stability, and offer improved pain control compared to general anaesthesia [1,2].

Spinal anaesthesia is especially advantageous in the elderly as it provides rapid onset of motor block, minimizes respiratory complications, enables early mobilization, and shortens hospitalization time. However, despite its benefits, spinal anaesthesia is not without drawbacks. The most notable risks include hypotension and bradycardia, which can be especially harmful in elderly patients with reduced cardiac reserves. The choice of local anaesthetic is crucial in mitigating such risks while ensuring effective anaesthesia and analgesia. Among available agents, bupivacaine and its S(-) enantiomer, levobupivacaine, are commonly used for spinal anaesthesia. Although both agents exhibit similar pharmacokinetics, levobupivacaine is known for its lower potential for cardiovascular and central nervous system toxicity [3-5].

Levobupivacaine has emerged as a safer alternative to racemic bupivacaine, particularly in patients who are more vulnerable to adverse effects. Its reduced affinity for cardiac sodium channels accounts for its better cardiovascular safety profile. While levobupivacaine is widely used in obstetric and non-obstetric epidural anaesthesia, there remains a lack of comprehensive clinical studies comparing its intrathecal use with bupivacaine, especially in elderly patients undergoing lower abdominal surgeries. This knowledge gap highlights the importance of evaluating the comparative effectiveness and safety of these agents in elderly populations to ensure optimal anaesthetic management [6].

Physiological changes associated with aging, such as the degeneration of peripheral and central nerves, anatomical alterations in the spine, and reduced cerebrospinal fluid volume, can lead to an enhanced sympathetic block during spinal anaesthesia in elderly patients. These factors increase the likelihood of high spinal block and consequently, hypotension. In such cases, minimizing cardiovascular risks becomes essential. While low-dose bupivacaine is sometimes used to mitigate these side effects, it may compromise the adequacy of surgical anaesthesia. In contrast, levobupivacaine provides a favorable balance by maintaining effective anaesthesia with reduced cardiovascular depression [7,8].

Despite the widespread use of both agents, data comparing intrathecal levobupivacaine and bupivacaine remain limited. Existing literature suggests that both drugs are effective, but levobupivacaine demonstrates a better haemodynamic profile and a lower incidence of systemic side effects. Thus, for elderly patients, especially those with compromised cardiac function, levobupivacaine may offer significant clinical advantages. The comparative evaluation of sensory and motor block characteristics, time to onset, duration of action, regression, haemodynamic stability, and complications is essential to guide anaesthetic choice [9,10].

Given the increasing demand for surgical care in the elderly and the need for safe and effective anaesthesia techniques, this study aims to fill the current gap by evaluating the perioperative outcomes of intrathecal levobupivacaine versus bupivacaine. By focusing on both efficacy and safety, particularly haemodynamic parameters, the study seeks to provide evidence-based guidance to anaesthesiologists in selecting the most suitable local anaesthetic agent. The findings are expected to contribute significantly to optimizing anaesthetic practices, enhancing patient safety, and improving recovery in the growing population of elderly surgical patients [11].

The aim of this study is to evaluate and compare the efficacy of intrathecal levobupivacaine and bupivacaine in elderly patients undergoing lower limb and lower abdominal surgeries. The primary objectives include comparing the onset of sensory and motor block, the time to reach T10 dermatome level, the time to achieve the highest level of block, and haemodynamic stability between the two drugs. Secondary objectives involve assessing the time to complete sensory and motor block, the total duration of both blocks, the time for regression to L5 level, and the occurrence of any complications.

## MATERIAL AND METHODS

This prospective observational study was conducted at the Department of Anaesthesiology, IGGMC Nagpur from September 2022– September 2024. Ethical approval has been obtained from the Ethical Approval Committee of IGGMC Nagpur.

### Study Population

A total of 70 patients aged over 60 years undergoing lower limb, inguinal hernia, or lower abdominal surgeries were prospectively studied after obtaining consent. Included were ASA grade I–IV patients, including those with cardiovascular conditions like ischemic heart disease, arrhythmias, or valvular disorders. Patients were excluded if they refused regional anaesthesia, were ASA grade V, had coagulation issues, local infections, hypersensitivity to anaesthetics, or significant COPD, liver, or renal disorders.

### Data Analysis

Data were analysed using SPSS version 13.0 with significance set at $p < 0.05$. A minimum of 21 patients per group was required to detect a 20 mmHg difference in MAP with 80% power. Independent sample t-tests and Mann–Whitney U-tests were used for intergroup comparisons, while repeated measures ANOVA followed by Bonferroni test assessed intra-group haemodynamic changes. Side effects were analysed using chi-squared tests, and results were reported as mean (SD) or number of patients.

## RESULTS

The study population was evenly distributed between the levobupivacaine and bupivacaine groups, with 35 patients in each. The age distribution showed that most patients in the

levobupivacaine group were older, with 48.57% between 61–70 years and 42.86% between 71–80 years, whereas in the bupivacaine group, 68.57% were between 61–70 years and only 14.29% were between 71–80 years. Although the mean age was higher in the levobupivacaine group (70.83 years) compared to the bupivacaine group (65.54 years), the difference was not statistically significant (p = 0.13), indicating both groups were comparable in age. In terms of gender, the levobupivacaine group included 12 females and 23 males, while the bupivacaine group had 6 females and 29 males. Despite the variation, the p-value (0.10) revealed no significant difference in sex distribution. Anthropometric measurements such as weight, height, and BMI also showed no statistically significant differences between the groups, with p-values of 0.15, 0.85, and 0.39 respectively, confirming the groups were comparable in terms of physical characteristics.

ASA grading distribution further supported the similarity between the groups, as both had a majority of patients classified under ASA grades II and III, and the overall p-value of 0.08 indicated no significant difference. A notable distinction was found in the onset times of sensory and motor blocks. The levobupivacaine group had a significantly longer mean onset time for sensory block at 115.09 seconds compared to 62.54 seconds in the bupivacaine group (p = 0.001). Similarly, motor block onset was slower in the levobupivacaine group, with a mean of 184.00 seconds versus 100.37 seconds in the bupivacaine group, which was also statistically significant (p = 0.001). These results indicate that while both anaesthetic agents were used in clinically similar patient populations, bupivacaine demonstrated a significantly faster onset of both sensory and motor blockade.

**Table 1: Showing distribution of study subjects based on time to reach t 10 level**

| Time to reach T10 level (in seconds ) | Levobupivacaine (n=35) | Bupivacaine (n= 35 ) | p-value |
|---|---|---|---|
| Mean | 307.00 | 257.34 | |
| Standard Deviation | 85.97 | 91.57 | |

The mean time to reach the T10 sensory level was longer with Levobupivacaine (307.00 ± 85.97 sec) compared to Bupivacaine (257.34 ± 91.57 sec), with a statistically significant difference (p = 0.02). Levobupivacaine took approximately 50 seconds longer than Bupivacaine to achieve the same level.

**Table 2: Showing distribution of study population based on time to achieve highest level of block (T 6 level)**

| Time to achieve the highest level of block (T6 le vel )(in seconds ) | Levobupivacaine n = 35 | Bupivacaine n =35 | p-value |
|---|---|---|---|
| Mean | 411.14 | 372.29 | |
| Standard Deviation | 90.25 | 126.76 | |

The mean time to achieve the highest level of block (T6) was slightly longer with Levobupivacaine (411.14 ± 90.25 sec) than with Bupivacaine (372.29 ± 126.76 sec), but this difference was not statistically significant (p = 0.14). Thus, both drugs showed comparable onset times to reach T6 level.

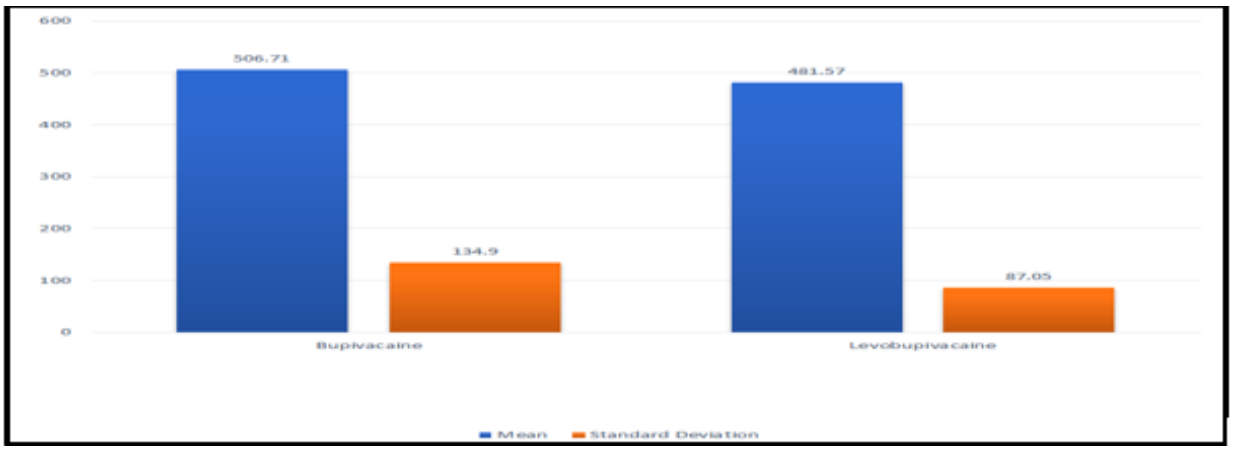


**Figure 1: Showing distribution of study subjects based on time to achieve total sensory and motor block**

The mean time to achieve total sensory and motor block was 481.57 ± 87.05 seconds with Levobupivacaine and 506.71 ± 134.90 seconds with Bupivacaine, showing no statistically significant difference (p = 0.36). Both drugs produced a similar onset of complete block.

**Table 3: Showing distribution of study subjects based on total duration of sensory and motor block**

| Total duration of sensory and motor block (in minutes ) | Levobupivacaine n=35 | Bupivaca ine n=35 | p-value |
|---|---|---|---|
| Mean | 124.57 | 145.00 | |
| Standard Deviation | 22.80 | 28.72 | |

The total duration of sensory and motor block was significantly shorter with Levobupivacaine (124.57 ± 22.80 min) compared to Bupivacaine (145.00 ± 28.72 min), with a statistically significant difference (p = 0.001). Thus, Bupivacaine provided a longer-lasting block than Levobupivacaine.

**Table 4: Showing distribution of study subjects based on time of block to regress till L5**

| Time to regress till L5 (in minutes) | Levobupivacaine n=35 | Bupivacaine n=35 | p-value |
|---|---|---|---|
| Mean | 153.71 | 185.03 | 0.001 (Statistically Significant) |
| Standard Deviation | 19.87 | 34.25 | |

The mean time for block regression to the L5 level was significantly shorter with Levobupivacaine (153.71 ± 19.87 min) compared to Bupivacaine (185. 03 ± 34.25 min), with a statistically significant p-value of 0.001. Hence, Bupivacaine exhibited a longer duration of sensory block regression.

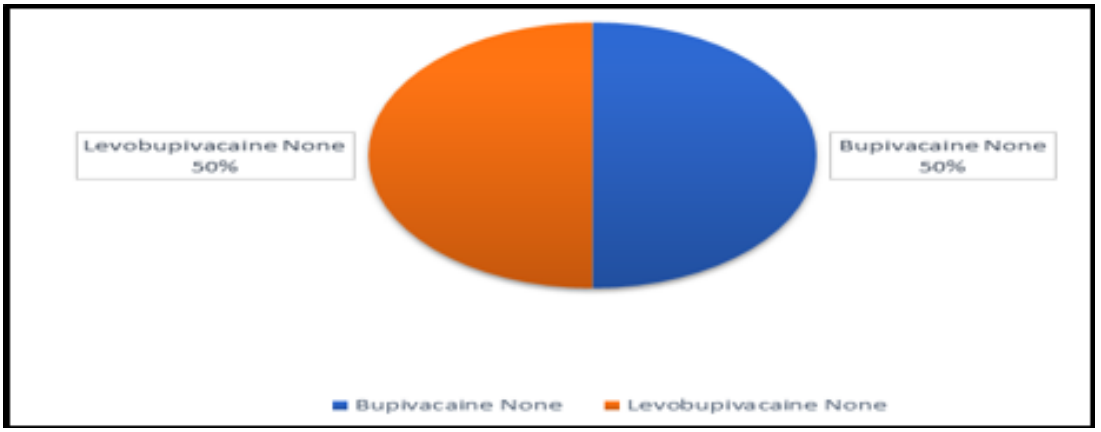


**Figure 2: Showing distribution of study subjects based on requirement of supplementation**

The Pearson correlation coefficient between cancer stage and death is 0.671, indicating a strong positive correlation. As the stage of cancer advances, the likelihood of death significantly increases. The correlation is statistically significant (p = 0.000), confirming a reliable association. This highlights cancer stage as a strong predictor of mortality in the studied cohort.

**Table 5: Showing distribution of study population according to variation in pulse rate at different time intervals**

| Pulse Rate | Levobupi vacaine n= 35 | | Bupivacaine n=35 | | p-value |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Baseline | **74.4** | **7.91** | **74.71** | **9.59** | **0.88** |
| At 0 min | 83.11 | 10.99 | 82.84 | 11.39 | **0.87** |
| At 5th min | 83.91 | 13.64 | 81.99 | 9.62 | **0.10** |
| At 10th min | 82.69 | 13.86 | 79.77 | 8.87 | **< 0.001** |
| At 15th min | 83.66 | 10.77 | 80.84 | 5.65 | **< 0.001** |
| At 20th min | 82.92 | 10.23 | 80.51 | 16.31 | **0.02** |
| At 25th min | 81.69 | 9.31 | 78.03 | 11.23 | **0.01** |
| At 30th min | 80.86 | 9.51 | 76.29 | 11.45 | **< 0.001** |
| p value for change in heart rate ( beats /min ) over time within each group | 0.001 | | 0.001 | | |

Baseline and early pulse rates were comparable between Levobupivacaine and Bupivacaine groups, but from the 10th minute onward, the Bupivacaine group showed significantly lower mean pulse rates ($p < 0.001$ to 0.02), though no patient in either group developed bradycardia (<60 bpm). Overall, Bupivacaine had a greater effect on reducing pulse rate over time, but changes remained clinically stable in both groups.

In this study, systolic, diastolic, and mean arterial pressure (MAP) were compared between patients receiving intrathecal levobupivacaine and those receiving bupivacaine. At baseline and 0 minutes, systolic blood pressure (SBP), diastolic blood pressure (DBP), and MAP were comparable between the two groups with no statistically significant differences. However, from the 5th to the 20th minute, the bupivacaine group consistently demonstrated a statistically significant decrease in all three parameters compared to the levobupivacaine group. Specifically, SBP was significantly lower in the bupivacaine group at 5, 10, 15, and 20 minutes, with the most pronounced drop observed at 5 minutes ($p < 0.001$). DBP followed a similar pattern, with significant reductions at 5, 10, 15, and 20 minutes (p-values ranging from <0.003 to 0.05). MAP also decreased more substantially in the bupivacaine group during the same intervals, with significant differences observed at 5 ($p < 0.001$), 10 ($p = 0.01$), 15 ($p < 0.001$), and 20 minutes ($p = 0.01$). After 25 minutes, blood pressure values in both groups stabilized, and no significant differences were found. Despite the statistically significant drops, these haemodynamic changes were not clinically significant and did not require any medical intervention. In the levobupivacaine group, decreases in SBP, DBP, and MAP were smaller and more gradual, with only a few patients showing minimal falls, whereas the bupivacaine group had more pronounced early drops, especially between 5–20 minutes post-injection. These findings suggest that levobupivacaine offers greater haemodynamic stability than bupivacaine in elderly patients undergoing spinal anaesthesia.

**Table 6: Showing distribution of study population according to varaiation in $SPO_2$ at different time intervals**

| $SpO_2$ | Levobupivacaine n=35 | | Bupivacaine n=35 | | p-value |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| **Baseline** | **98.2** | **1.81** | **98.4** | **1.11** | **0.58** |
| **At 0 min** | 98.97 | 1.07 | 98.74 | 1.09 | **0.91** |
| **At 5th min** | 99.60 | 0.69 | 99.31 | 0.93 | **0.96** |
| **At 10th min** | 99.97 | 0.17 | 99.62 | 0.60 | **0.98** |
| **At 15th min** | 99.86 | 0.36 | 99.94 | 0.34 | **0.99** |
| **At 20th min** | 99.97 | 0.17 | 99.94 | 0.34 | **0.99** |
| **At 25th min** | 100.00 | 0.00 | 100.00 | 0.00 | **1.00** |
| **At 30th min** | 100.00 | 0.00 | 100.00 | 0.00 | **1.00** |

Oxygen saturation remained stable and comparable between the Levobupivacaine and Bupivacaine groups throughout the 30-minute observation period, with no statistically significant differences at any time point ($p > 0.05$). Both drugs maintained adequate and consistent $SpO_2$ levels, indicating similar respiratory safety profiles.

**Table 7: Showing distribution of study subjects according to complications**

| Complications | Levobupivacaine (n = 35) | | Bupivacaine (n = 35) | | p-value |
|---|---|---|---|---|---|
| | NUMBER | PERCENTAGE | NUMBER | PERCENTAGE | |
| Hypotension | 2 | (5.71%) | 22 | (62.86%) | **< 0.001** |
| Nausea | 0 | (0.00%) | 4 | (11.43%) | **0.04** |
| Vomiting | 0 | (0.00%) | 1 | (2.86%) | **0.58** |
| Headache | 0 | (0.00%) | 0 | (0.00%) | **1.00** |
| Shivering | 0 | (0.00%) | 10 | (28.57%) | **<0.001** |
| Pruritis | 0 | (0.00%) | 0 | (0.00%) | **1.00** |
| Bradycardia | 1 | (2.86%) | 2 | (5.71%) | **0.54** |

Complications such as hypotension (62.86%) and shivering (28.57%) were significantly more frequent in the Bupivacaine group compared to the Levobupivacaine group ($p < 0.001$), which showed minimal adverse effects. Nausea was also more common with Bupivacaine ($p = 0.04$), while other complications showed no significant difference.

## DISCUSSION

In the present study, the haemodynamic effects and clinical efficacy of intrathecal levobupivacaine were compared with bupivacaine in elderly patients undergoing lower abdominal and lower limb surgeries. The findings indicate that both drugs are effective in providing spinal anaesthesia, but there are important distinctions in onset times, block characteristics, duration, and cardiovascular effects that merit attention in clinical decision-making for geriatric patients [12].

The onset of sensory block was faster with hyperbaric bupivacaine as compared to hyperbaric levobupivacaine. This observation aligns with the pharmacological properties of the drugs; bupivacaine, particularly in hyperbaric form, spreads more predictably in cerebrospinal fluid, contributing to a quicker sensory blockade. In contrast, levobupivacaine, being isobaric in this study, tends to have a slower onset, although it ultimately achieves comparable sensory levels. The mean time to onset of sensory block was shorter in the bupivacaine group, supporting its quicker action. However, a longer time to achieve peak sensory level was observed with levobupivacaine, suggesting a more gradual ascent of anaesthesia, which may translate into more haemodynamic stability [13,14].

Regarding motor block, the onset was also faster in the bupivacaine group. However, the duration of motor block was significantly longer in patients who received bupivacaine than in those who received levobupivacaine. This extended motor blockade can be a limitation in elderly patients, as it may delay postoperative mobilization and increase the risk of complications such as deep vein thrombosis or pressure sores. The shorter duration of motor block observed with levobupivacaine suggests an advantage in terms of postoperative recovery, especially in geriatric patients who benefit from early ambulation [15].

Haemodynamic changes during spinal anaesthesia are of particular concern in elderly patients due to age-related decline in cardiovascular reserve. In the current study, hypotension and bradycardia were more commonly noted in the bupivacaine group. **Luca E, et. al; 2023,** underscored the need for cautious monitoring when using bupivacaine in elderly individuals, as significant drops in blood pressure can lead to adverse outcomes, particularly in patients with comorbid cardiac conditions. Levobupivacaine demonstrated a more stable haemodynamic profile throughout the intraoperative and early postoperative periods. This can be attributed to its lower lipid solubility and reduced affinity for cardiac sodium channels, which contribute to fewer cardiovascular depressive effects [16,17].

Additionally, levobupivacaine was associated with a reduced incidence of side effects, including nausea, vomiting, and shivering. Although these adverse effects are typically minor, they can considerably affect the comfort and satisfaction of elderly patients, who are more vulnerable to disturbances in homeostasis. The better safety profile of levobupivacaine makes it a more suitable option in older patients, especially those with borderline cardiac or renal function [18].

The time required for complete regression of sensory block

to the L5 dermatome was significantly longer in the bupivacaine group, indicating a prolonged sensory blockade. While prolonged analgesia may seem beneficial, it may delay the return of protective sensations, which is not ideal for elderly patients who are at higher risk of falls and require functional mobility as soon as possible after surgery. Levobupivacaine, on the other hand, allowed for a quicker recovery of both sensory and motor functions, supporting its role in enhanced recovery protocols [19].

Although both levobupivacaine and bupivacaine are effective for spinal anaesthesia in elderly patients, levobupivacaine offers certain advantages that make it more appropriate for this age group. These include a more stable haemodynamic profile, fewer adverse effects, shorter duration of motor blockade, and quicker recovery, all of which contribute to better postoperative outcomes and patient safety. **Lee YY, et. al; 2009,** supported the use of intrathecal levobupivacaine as a safer and effective alternative to bupivacaine in elderly patients undergoing lower abdominal and lower limb surgeries. Further large-scale studies are encouraged to validate these findings and establish standardized guidelines for optimal spinal anaesthetic practices in geriatric surgical care [20,21].

## CONCLUSION

Our study concludes that while bupivacaine induces a quicker onset of sensory and motor block, levobupivacaine ensures greater haemodynamic stability with fewer drops in blood pressure and heart rate, making it more suitable for elderly patients where cardiovascular stability is essential. Levobupivacaine also showed a lower incidence of side effects, indicating better safety. It provides a high-quality anaesthetic effect with the added benefit of shorter motor block duration, allowing faster postoperative recovery. Therefore, levobupivacaine is recommended as the preferable choice for intrathecal anaesthesia in elderly patients undergoing lower abdominal surgeries.

## REFERENCES:


1. Jane Osareme O, Muonde M, Maduka CP, Olorunsogo TO, Omotayo O. Demographic shifts and healthcare: A review of aging populations and systemic challenges. Int. J. Sci. Res. Arch. 2024;11:383-95.
2. Nordquist D, Halaszynski TM. Perioperative multimodal anesthesia using regional techniques in the aging surgical patient. Pain research and treatment. 2014;2014(1):902174.
3. Hansen J, Rasmussen LS, Steinmetz J. Management of ambulatory anesthesia in older adults. Drugs & Aging. 2020 Dec;37(12):863-74.
4. Das S, Forrest K, Howell S. General anaesthesia in elderly patients with cardiovascular disorders: choice of anaesthetic agent. Drugs & aging. 2010 Apr;27(4):265-82.
5. Glaser C, Marhofer P, Zimpfer G, Heinz MT, Sitzwohl C, Kapral S, Schindler I. Levobupivacaine versus racemic bupivacaine for spinal anesthesia. Anesthesia & Analgesia. 2002 Jan 1;94(1):194-8.
6. Gristwood RW. Cardiac and CNS toxicity of levobupivacaine: strength of evidence for advantage over bupivacaine. Drug Safety. 2002 Mar;25(3):153-63.
7. Takla M, Mele M, Takla T. Anatomical and Physiological Changes in Aging. InGeriatric Anesthesia: A Practical Guide 2024 Apr 27 (pp. 10-22). Bentham Science Publishers.
8. NAMRATA N. A Comparative Study Of 0.5% Levobupivacaine And 0.5% Bupivacaine In Spinal Anaesthesia In Geriatric Patients Undergoing Lower Limb Surgeries (Doctoral dissertation, BLDE (Deemed to be University)).
9. Ture P, Ramaswamy AH, Shaikh SI, Alur JB, Ture AV. Comparative evaluation of anaesthetic efficacy and haemodynamic effects of a combination of isobaric bupivacaine with buprenorphine vs. isobaric levobupivacaine with buprenorphine for spinal anaesthesia–A double blinded randomised clinical trial. Indian journal of anaesthesia. 2019 Jan 1;63(1):49-54.
10. Chandana MH. A Study for Comparing the Clinical Effects and Block Characteristics of Intrathecal Hyperbaric Bupivacaine and Isobaric Levobupivacaine for Spinal Anaesthesia in Lower Abdominal Surgeries (Doctoral dissertation, Rajiv Gandhi University of Health Sciences (India)).
11. Manojavam V. A Comparative Study of Isobaric Levobupivacaine 0.5% and Isobaric Levobupivacaine 0.5% with Fentanyl 25mcg in Infraumbilical Surgeries Under Spinal Anaesthesia (Doctoral dissertation, Rajiv Gandhi University of Health Sciences (India)).
12. Herrera R, De Andrés J, Estañ L, Olivas FJ, Martínez-Mir I, Steinfeldt T. Hemodynamic impact of isobaric levobupivacaine versus hyperbaric bupivacaine for subarachnoid anesthesia in patients aged 65 and older undergoing hip surgery. BMC anesthesiology. 2014 Oct 24;14(1):97.
13. Manjunath A. A Comparative, Randomized, Double-Blind, Prospective Study of 0.5% Isobaric Levobupivacaine Versus 0.5% Hyperbaric Bupivacaine for Infra-Umbilical Surgeries (Doctoral dissertation, Rajiv Gandhi University of Health Sciences (India)).
14. Mashar GP. Prospective Randomized Comparison of Paravertebral Somatic Nerve Block with Bupivacaine & Fentanyl or Levobupivacaine & Fentanyl for Unilateral Inguinal Herniorrhaphy (Doctoral dissertation, Rajiv Gandhi University of Health Sciences (India)).
15. Urbanek B, Duma A, Kimberger O, Huber G, Marhofer P, Zimpfer M, Kapral S. Onset time, quality of blockade, and duration of three-in-one blocks with levobupivacaine and bupivacaine. Anesthesia & Analgesia. 2003 Sep 1;97(3):888-92.
16. Luca E, Schipa C, Cambise C, Sollazzi L, Aceto P. Implication of age-related changes on anesthesia management.

Saudi Journal of Anaesthesia. 2023 Oct 1;17(4):474-81.

17. Bagatin D, Bagatin T, Nemrava J, Šakić K, Šakić L, Deutsch J, Isomura E, Malić M, Ivelj MŠ, Kljajić Z. Levobupivacaine features and linking in infiltrating analgesia. InFeatures and Assessments of Pain, Anaesthesia, and Analgesia 2022 Jan 1 (pp. 433-442). Academic Press.
18. Hima Y. A Comparision of Ropivacaine (0.5%) and Levobupivacaine (0.5%) for Epidural Anaesthesia in Patients Undergoing Elective Lower Abdominal and Lower Limb Surgery (Doctoral dissertation, Rajiv Gandhi University of Health Sciences (India)).
19. Kanai A, Niki Y, Hayashi N, Maeda S, Horie K, Okamoto H. The Initial Subjective Sensory Change in the Dermatome During Intrathecal Injection of Plain Bupivacaine Predicts the Spread of Sensory Blockade: A Prospective Multi-Level Modeling Study. Anesthesiology and Pain Medicine. 2019 Sep 18;9(5):e91216.
20. Vives R, Fernandez-Galinski D, Gordo F, Izquierdo A, Oliva JC, Colilles C, Pontes C. Effects of bupivacaine or levobupivacaine on cerebral oxygenation during spinal anesthesia in elderly patients undergoing orthopedic surgery for hip fracture: a randomized controlled trial. BMC anesthesiology. 2019 Jan 31;19(1):17.
21. Lee YY, Kee WD, Fong SY, Liu JT, Gin T. The median effective dose of bupivacaine, levobupivacaine, and ropivacaine after intrathecal injection in lower limb surgery. Anesthesia & Analgesia. 2009 Oct 1;109(4):1331-4.

**How to Cite:** Dr.Shital Dalal & Dr.Diksha Sao. A Prospective Observational Study To Assess The Efficacy Of Intrathecal Levobupivacaine Versus Bupivacaine In Elderly Patients Undergoing Lower Abdominal Surgeries. International Medicine, 2025;11(1):1-9