

Comparison of Haemodynamic Behaviour, ECG Changes and Postoperative Outcomes in Normotensive and Hypertensive Patients Under Spinal Anaesthesia: A Prospective Comparative Observational Study.

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ABSTRACT

Background:

Spinal anaesthesia produces sympathetic blockade and can cause clinically important reductions in arterial pressure. Chronic hypertension alters vascular tone and autoregulation, potentially modifying haemodynamic and electrocardiographic responses.

Objectives:

To compare haemodynamic behaviour, perioperative ECG changes, and postoperative outcomes between normotensive and hypertensive patients undergoing spinal anaesthesia.

Methods:

This hospital-based prospective comparative observational study included 100 adults undergoing elective infraumbilical surgery at Government Medical College, Eluru, from November 2025 to April 2026. Fifty normotensive patients formed Group N and 50 controlled hypertensive patients formed Group H. Heart rate, systolic and diastolic blood pressure, mean arterial pressure, oxygen saturation, ECG changes, haemodynamic interventions, and postoperative outcomes were recorded. Continuous variables were compared using appropriate parametric or non-parametric tests; categorical variables were analysed using Pearson's chi-square or Fisher's exact test, as appropriate.

Results:

Group H was older than Group N (58.4 ± 8.7 vs. 45.8 ± 10.2 years), whereas male sex distribution was similar (60.0% vs. 56.0%). Body mass index was modestly higher in Group H (26.1 ± 3.5 vs. 24.7 ± 3.2 kg/m²). The maximum systolic blood-pressure reduction was greater in Group H than Group N ($24.6 \pm 10.8\%$ vs. $16.8 \pm 7.9\%$), as was the maximum mean arterial-pressure reduction ($22.1 \pm 9.5\%$ vs. $15.2 \pm 7.1\%$). Clinically significant hypotension occurred in 28.0% and 8.0%, respectively. Vasopressor use and new intraoperative ECG changes were more frequent in Group H. Recovery-room observation and hospital stay were longer among hypertensive patients. No myocardial infarction, stroke, heart failure, or death occurred.

Conclusion:

Controlled hypertensive patients had greater relative blood-pressure reductions, more hypotension, higher vasopressor requirements, and more transient ECG abnormalities under spinal anaesthesia.

Recommendations:

Enhanced early haemodynamic surveillance, readiness for vasopressor treatment, and perioperative ECG assessment are advisable in hypertensive patients.

Keywords: Hypertension; spinal anaesthesia; hypotension; haemodynamics; electrocardiography; postoperative outcome.

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INTRODUCTION

Spinal anaesthesia is widely used for infraumbilical, pelvic, perineal, urological, and lower-limb procedures because it provides reliable sensory and motor blockade, reduces airway manipulation, and supports early postoperative recovery. Its principal cardiovascular effect is interruption of sympathetic efferent activity, producing arterial vasodilatation, venous pooling, reduced systemic vascular resistance, and diminished venous return. The resulting fall in cardiac preload and arterial pressure ranges from a modest physiological response to clinically significant hypotension requiring fluid administration or vasopressor support. Bradycardia can accompany reduced preload or extensive sympathetic blockade and should be interpreted as a warning of haemodynamic compromise.^{1,2}

The incidence and severity of spinal anaesthesia-related hypotension vary with patient age, baseline blood pressure, intravascular volume, body mass index, urgency of surgery, block height, local anaesthetic dose, and concurrent medication. Large observational studies have reported hypotension as one of the most frequent adverse effects of spinal anaesthesia. Chronic hypertension deserves particular attention because sustained vascular remodelling, increased arterial stiffness, impaired baroreflex function, and altered organ autoregulation can reduce tolerance to rapid changes in perfusion pressure. Even when preoperative blood pressure is clinically controlled, the cardiovascular response to neuraxial sympathetic blockade can differ from that of normotensive patients.³

Previous comparative investigations have produced inconsistent findings. Some studies reported a higher frequency of hypotension and greater blood-pressure reduction among hypertensive patients, whereas others observed similar rates after standardised spinal anaesthesia.^{4,5,6,7} Differences in age distribution, antihypertensive treatment, hypotension definitions, fluid management, block characteristics, and measurement intervals probably contributed to these variations. The choice of antihypertensive therapy can also influence perioperative responses; beta-blockers can increase susceptibility to bradycardia, while calcium-channel blockers and renin-angiotensin system inhibitors can affect vasopressor requirements and vascular compensation.⁸

Haemodynamic instability can be accompanied by electrocardiographic abnormalities, including transient ST-segment depression, T-wave inversion, premature atrial or ventricular complexes, and conduction disturbances. These changes do not invariably represent myocardial infarction, but their occurrence during hypotension can indicate an imbalance between myocardial oxygen supply and demand. Baseline left ventricular hypertrophy and nonspecific ST-T abnormalities are also more prevalent in hypertensive

populations. Preoperative ECG abnormalities provide incremental cardiovascular prognostic information, while hypotension-related myocardial injury remains an important concern in patients with and without chronic hypertension.^{9,10} Simultaneous evaluation of serial blood pressure, heart rate, ECG behaviour, treatment requirements, and postoperative recovery therefore provides a broader assessment than haemodynamic monitoring alone.

The present study was designed to compare normotensive and controlled hypertensive adults undergoing spinal anaesthesia at a government teaching hospital. The objectives were to compare serial heart rate and arterial-pressure changes; determine the incidence of hypotension, bradycardia, vasopressor use, and perioperative ECG abnormalities; and evaluate recovery-room duration, postoperative complications, intensive monitoring requirements, hospital stay, and major cardiovascular outcomes between the two groups.

METHODOLOGY

Study design and setting

This single-centre, hospital-based, prospective comparative observational study was conducted in the Department of Anaesthesiology at Dr YSR Government Medical College and its attached Government General Hospital, Eluru, Andhra Pradesh, India, from November 2025 to April 2026. The institution is a government teaching centre serving Eluru and surrounding districts. Its attached hospital provides emergency, outpatient, inpatient, operation-theatre, critical-care, diagnostic, laboratory, and blood-bank services. Major clinical specialties include general medicine, general surgery, anaesthesiology, emergency medicine, obstetrics and gynaecology, paediatrics, orthopaedics, ophthalmology, otorhinolaryngology, dermatology, psychiatry, and other allied disciplines. Adults scheduled for elective infraumbilical surgery under spinal anaesthesia were screened consecutively.

Participants

Patients aged 18–70 years with American Society of Anesthesiologists physical status I or II were eligible. Group N included patients without a history of hypertension and with normal preoperative blood-pressure measurements. Group H included patients with previously diagnosed hypertension receiving treatment and considered clinically controlled before surgery. Patients with uncontrolled severe hypertension, known coronary artery disease, significant valvular disease, heart failure, persistent arrhythmia, conduction block, autonomic neuropathy, major renal or hepatic dysfunction, contraindication to spinal anaesthesia,

failed spinal block, conversion to general anaesthesia, or incomplete records were excluded.

Sample size and sampling

A standardised effect size of 0.57 was derived from published comparative haemodynamic studies.⁴⁻⁷ With a two-sided alpha of 0.05, 80% power, and equal group allocation, at least 49 participants were required in each group. The target was rounded to 50 per group, producing a total sample of 100. Eligible patients were recruited consecutively until both groups were complete.

Bias

Consecutive screening and recruitment of eligible patients were used to reduce selection bias. The same eligibility criteria, pre-anaesthetic baseline assessment, monitoring approach, haemodynamic recording intervals, and prespecified outcome definitions were applied to both groups to limit measurement and ascertainment bias. Hypertension status was based on a documented diagnosis, ongoing antihypertensive treatment, and clinical control before surgery. Blinding of the anaesthesia team was not feasible because hypertension status and medication history were available in routine clinical records; however, perioperative management followed institutional practice and outcomes were recorded at identical prespecified time points in both groups. Potential confounding from age, body mass index, antihypertensive treatment, and heterogeneity of surgical procedures was considered during interpretation. Residual confounding remained possible because the study was observational and no multivariable adjustment was performed.

Anaesthetic procedure and monitoring

Antihypertensive treatment was managed according to institutional perioperative practice. After intravenous access, standard monitoring included non-invasive blood pressure, three- or five-lead ECG, heart rate, and peripheral oxygen saturation. Baseline values were obtained after five minutes of rest. Spinal anaesthesia was performed under aseptic precautions in the sitting or lateral position using 0.5% hyperbaric bupivacaine at a dose selected by the attending anaesthesiologist. Sensory level was assessed by loss of cold or pinprick sensation. Haemodynamic values were recorded at baseline and 5, 10, 15, 30, and 60 minutes after intrathecal injection.

Outcomes and definitions

The primary outcomes were serial systolic blood pressure, diastolic blood pressure, mean arterial pressure, heart rate, and maximum percentage reduction from baseline.

Clinically significant hypotension was defined as systolic blood pressure below 90 mmHg or a reduction greater than 20% from baseline. Bradycardia was defined as heart rate below 50 beats/min. ECG recordings were examined for new ST-segment deviation, T-wave inversion, premature complexes, or conduction abnormalities. Vasopressor and atropine use, intravenous fluid volume, recovery-room observation, postoperative haemodynamic events, intensive monitoring, hospital stay, myocardial infarction, stroke, heart failure, and mortality were documented.¹¹

Statistical analysis

Data were analysed using descriptive and inferential statistics. Normally distributed continuous variables were compared using the independent-samples t-test; non-normal variables were analysed using the Mann-Whitney U test. For categorical variables, Pearson's chi-square test was used for baseline comparisons with adequate expected cell frequencies, specifically sex distribution and sensory block level at or above T6. Two-sided Fisher's exact test was used for binary haemodynamic, ECG, and postoperative event outcomes because several contingency tables contained small or zero cell counts. All tests were two-sided, and a p-value below 0.05 was considered statistically significant.

Ethical considerations

The study was approved by the Institutional Ethics Committee of Government Medical College, Eluru [IEC-GMC-ELR 005-2025, dated 29 September 2025]. Written informed consent was secured from every participant. Confidentiality was maintained through coded study records and restricted access to identifiable information.

RESULTS

Participant characteristics

Of the 106 patients assessed for eligibility, six were excluded because they did not meet the eligibility criteria or had incomplete perioperative records. The final analysis included 100 patients: 50 normotensive participants (Group N) and 50 patients with hypertension (Group H). Complete intraoperative haemodynamic, electrocardiographic, and postoperative outcome data were available for all included patients.

Patients in Group H were older than those in Group N (58.4 ± 8.7 vs. 45.8 ± 10.2 years, $p < .001$) and had a modestly higher body mass index (26.1 ± 3.5 vs. 24.7 ± 3.2 kg/m², $p = .039$). As expected, baseline systolic blood pressure, diastolic blood pressure, and mean arterial pressure were higher in the hypertensive group (all $p < .001$). Sex distribution, baseline heart rate, peripheral oxygen saturation, duration of surgery, intrathecal bupivacaine dose,

and the proportion attaining a sensory block at or above T6 did not differ significantly between groups (Table 1).

Categorical test output: Pearson's chi-square test showed no significant between-group difference in sex distribution ($\chi^2 = 0.164$, $df = 1$, $p = .686$) or in the proportion attaining a

sensory block at or above T6 ($\chi^2 = 0.219$, $df = 1$, $p = .640$). Fisher's exact test was used for the categorical haemodynamic, ECG, and postoperative event outcomes presented in Tables 3 and 4; the corresponding exact p -values are reported with each comparison.

Table 1 *Baseline Demographic, Clinical, and Perioperative Characteristics*

Characteristic	Group (n = 50)	N	Group (n = 50)	H	p
Age, years	45.8 ± 10.2		58.4 ± 8.7		< .001
Male sex, n (%)	28 (56.0)		30 (60.0)		.686
Female sex, n (%)	22 (44.0)		20 (40.0)		—
Body mass index, kg/m ²	24.7 ± 3.2		26.1 ± 3.5		.039
Baseline heart rate, beats/min	78.6 ± 9.4		80.2 ± 10.1		.414
Baseline systolic BP, mmHg	124.8 ± 8.6		151.6 ± 13.8		< .001
Baseline diastolic BP, mmHg	77.2 ± 6.9		89.4 ± 8.2		< .001
Baseline MAP, mmHg	93.1 ± 7.1		110.1 ± 9.3		< .001
Baseline SpO ₂ , %	98.3 ± 0.8		98.1 ± 0.9		.241
Duration of surgery, min	74.6 ± 21.3		78.9 ± 23.6		.341
Sensory block level ≥ T6, n (%)	11 (22.0)		13 (26.0)		.640
Intrathecal bupivacaine dose, mg	13.2 ± 1.1		13.3 ± 1.0		.635

Note. Continuous variables are presented as mean ± standard deviation; categorical variables are presented as frequency (percentage). BP = blood pressure; MAP = mean arterial pressure; SpO₂ = peripheral oxygen saturation. Pearson's chi-square test was used for sex distribution and sensory block level at or above T6.

Intraoperative haemodynamic changes

After spinal anaesthesia, both groups demonstrated an early reduction in blood pressure, with the lowest mean values occurring approximately 10 minutes after the block. Although absolute blood-pressure values remained higher in Group H at every assessment, the relative fall from baseline was greater in patients with hypertension. Heart rate declined moderately in both groups, and no between-group

difference was observed at any recorded time point (Table 2).

The maximum percentage reduction in systolic blood pressure was greater in Group H than in Group N ($24.6 \pm 10.8\%$ vs. $16.8 \pm 7.9\%$, $p < .001$). A similar pattern was observed for mean arterial pressure ($22.1 \pm 9.5\%$ vs. $15.2 \pm 7.1\%$, $p < .001$). Serial systolic blood pressure and mean arterial pressure profiles are shown in Figures 1 and 2.

Table 2 *Serial Haemodynamic Measurements After Spinal Anaesthesia*

Variable and time point	Group (n = 50)	N	Group (n = 50)	H	p
Heart rate, beats/min					
Baseline	78.6 ± 9.4		80.2 ± 10.1		.414
5 min	76.2 ± 9.1		77.4 ± 10.6		.548
10 min	73.8 ± 8.7		74.1 ± 10.2		.874
15 min	72.9 ± 8.4		72.6 ± 9.8		.870
30 min	74.8 ± 8.2		74.2 ± 9.5		.736
60 min	76.7 ± 8.6		76.1 ± 9.1		.736
Systolic BP, mmHg					
Baseline	124.8 ± 8.6		151.6 ± 13.8		< .001
5 min	113.2 ± 10.7		132.4 ± 16.8		< .001
10 min	107.6 ± 11.3		122.7 ± 17.4		< .001
15 min	109.8 ± 10.8		124.9 ± 16.5		< .001
30 min	115.6 ± 9.7		133.1 ± 15.2		< .001
60 min	120.2 ± 8.9		141.2 ± 14.6		< .001
Diastolic BP, mmHg					
Baseline	77.2 ± 6.9		89.4 ± 8.2		< .001
5 min	69.8 ± 7.8		77.6 ± 9.8		< .001
10 min	65.4 ± 8.1		71.8 ± 10.2		.001
15 min	66.7 ± 7.9		72.6 ± 9.6		.001
30 min	70.5 ± 7.2		77.1 ± 8.9		< .001
60 min	73.6 ± 6.8		82.8 ± 8.6		< .001
MAP, mmHg					
Baseline	93.1 ± 7.1		110.1 ± 9.3		< .001
5 min	84.3 ± 8.1		95.8 ± 11.2		< .001
10 min	79.5 ± 8.5		88.8 ± 11.7		< .001
15 min	81.1 ± 8.2		90.0 ± 10.8		< .001
30 min	85.5 ± 7.6		95.8 ± 10.1		< .001
60 min	89.1 ± 7.1		102.3 ± 9.6		< .001

Note. Values are presented as mean ± standard deviation. BP = blood pressure; MAP = mean arterial pressure.

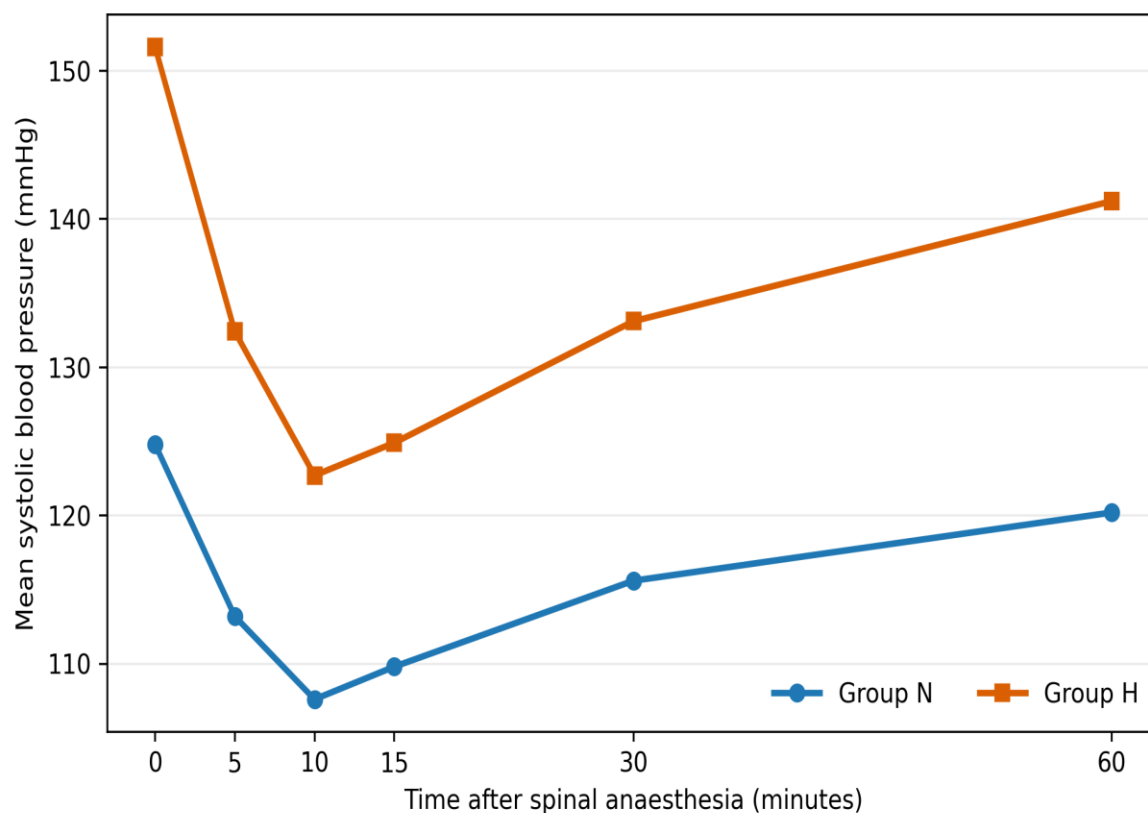


Figure 1. Serial systolic blood-pressure changes after spinal anaesthesia. Values represent group means.

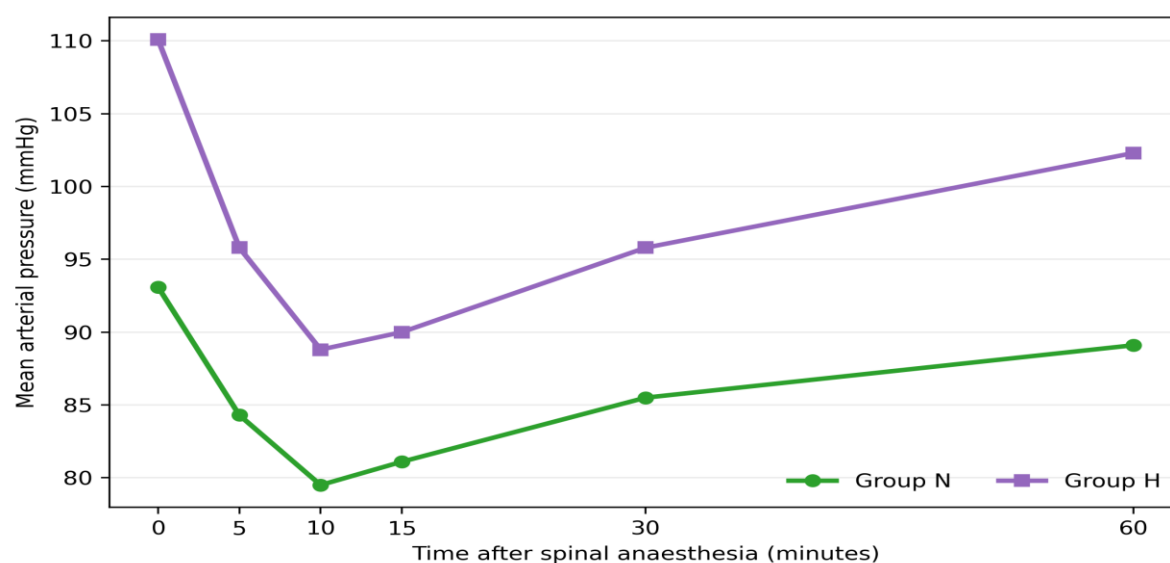


Figure 2. Serial mean arterial pressure changes after spinal anaesthesia. Values represent group means.

Haemodynamic events and electrocardiographic changes

Clinically significant hypotension was more frequent in Group H than in Group N (28.0% vs. 8.0%, $p = .017$). Correspondingly, vasopressor treatment was required more often in hypertensive patients (26.0% vs. 8.0%, $p = .031$). Group H also received a larger volume of intravenous fluid ($1,118 \pm 284$ vs. 985 ± 246 mL, $p = .014$), and among patients who received mephentermine, the mean dose was higher in Group H (9.2 ± 4.1 vs. 6.0 ± 2.8 mg, $p = .038$). Bradycardia occurred in 16.0% of hypertensive patients and 4.0% of normotensive patients, but the difference did not reach statistical significance ($p = .092$).

Preoperative left ventricular hypertrophy was more common in Group H (20.0% vs. 2.0%, $p = .008$), as were new intraoperative electrocardiographic abnormalities (24.0% vs. 6.0%, $p = .023$). The observed abnormalities included transient T-wave inversion, premature atrial or ventricular complexes, and ST-segment depression. Four hypertensive patients developed transient ST-segment depression; three events occurred during hypotension and resolved after correction of the haemodynamic disturbance. No patient developed a persistent postoperative ECG abnormality, perioperative myocardial infarction, refractory arrhythmia, or cardiac arrest (Table 3; Figure 3).

Table 3 Intraoperative Haemodynamic Events and Electrocardiographic Findings

Finding	Group (n = 50)	N Group (n = 50)	H p
Maximum systolic BP reduction, %	16.8 ± 7.9	24.6 ± 10.8	< .001
Maximum MAP reduction, %	15.2 ± 7.1	22.1 ± 9.5	< .001
Clinically significant hypotension, n (%)	4 (8.0)	14 (28.0)	.017
Vasopressor requirement, n (%)	4 (8.0)	13 (26.0)	.031
Mephentermine dose among recipients, mg	6.0 ± 2.8	9.2 ± 4.1	.038
Intravenous fluid requirement, mL	985 ± 246	$1,118 \pm 284$	.014
Bradycardia, n (%)	2 (4.0)	8 (16.0)	.092
Atropine administration, n (%)	2 (4.0)	5 (10.0)	.436
Preoperative left ventricular hypertrophy, n (%)	1 (2.0)	10 (20.0)	.008
Preoperative nonspecific ST–T changes, n (%)	2 (4.0)	8 (16.0)	.092
Any new intraoperative ECG change, n (%)	3 (6.0)	12 (24.0)	.023
Transient ST-segment depression, n (%)	0 (0.0)	4 (8.0)	.117
Transient T-wave inversion, n (%)	2 (4.0)	6 (12.0)	.269
Premature atrial or ventricular complexes, n (%)	1 (2.0)	4 (8.0)	.362
Persistent postoperative ECG change, n (%)	0 (0.0)	0 (0.0)	—
Perioperative myocardial infarction, n (%)	0 (0.0)	0 (0.0)	—

Note. Continuous variables are presented as mean $\pm$ standard deviation; categorical variables are presented as frequency (percentage). BP = blood pressure; MAP = mean arterial pressure; ECG = electrocardiogram. Two-sided Fisher's exact test was used for categorical event comparisons.

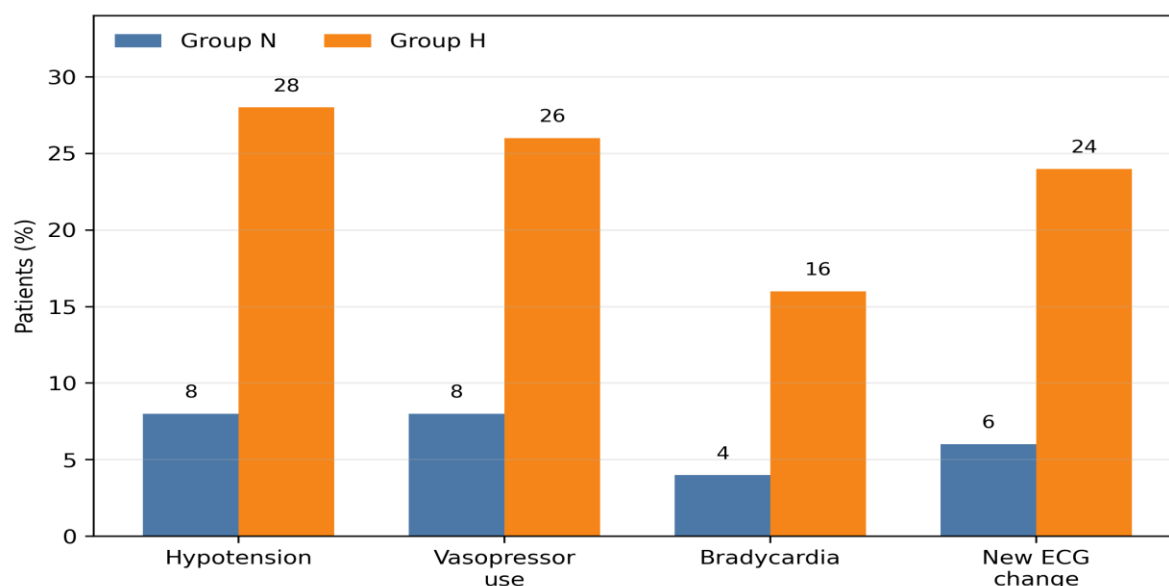


Figure 3. Selected intraoperative haemodynamic and electrocardiographic events. Values are percentages within each group.

Postoperative outcomes

The recovery-room observation period was longer in Group H than in Group N (86.4 ± 24.8 vs. 72.6 ± 20.3 minutes, $p = .003$). Postoperative nausea or vomiting, shivering, hypotension, hypertension, and delayed recovery-room discharge were numerically more frequent among hypertensive patients; however, none of these individual categorical outcomes differed significantly between groups.

Three patients in Group H required high-dependency or intensive monitoring because of recurrent hypotension, transient ECG abnormalities, or inadequately controlled postoperative blood pressure. The mean duration of hospitalisation was also longer in Group H (2.6 ± 1.0 vs. 2.1 ± 0.7 days, $p = .005$). No myocardial infarction, stroke, acute heart failure, or in-hospital death occurred in either group (Table 4; Figure 4).

Table 4 Postoperative Outcomes in Normotensive and Hypertensive Patients

Outcome	Group N (n = 50)	Group H (n = 50)	p
Recovery-room observation, min	72.6 ± 20.3	86.4 ± 24.8	.003
Delayed recovery-room discharge, n (%)	2 (4.0)	7 (14.0)	.160
Postoperative nausea or vomiting, n (%)	4 (8.0)	9 (18.0)	.234
Postoperative shivering, n (%)	6 (12.0)	11 (22.0)	.287
Postoperative hypotension, n (%)	1 (2.0)	5 (10.0)	.204
Postoperative hypertension, n (%)	1 (2.0)	7 (14.0)	.059
High-dependency/intensive monitoring, n (%)	0 (0.0)	3 (6.0)	.242
Hospital stay, days	2.1 ± 0.7	2.6 ± 1.0	.005
Myocardial infarction, n (%)	0 (0.0)	0 (0.0)	—

Outcome	Group (n = 50)	N	Group (n = 50)	H	p
Stroke or acute heart failure, n (%)	0 (0.0)		0 (0.0)	—	
In-hospital mortality, n (%)	0 (0.0)		0 (0.0)	—	

Note. Continuous variables are presented as mean $\pm$ standard deviation; categorical variables are presented as frequency (percentage). Two-sided Fisher's exact test was used for categorical event comparisons.

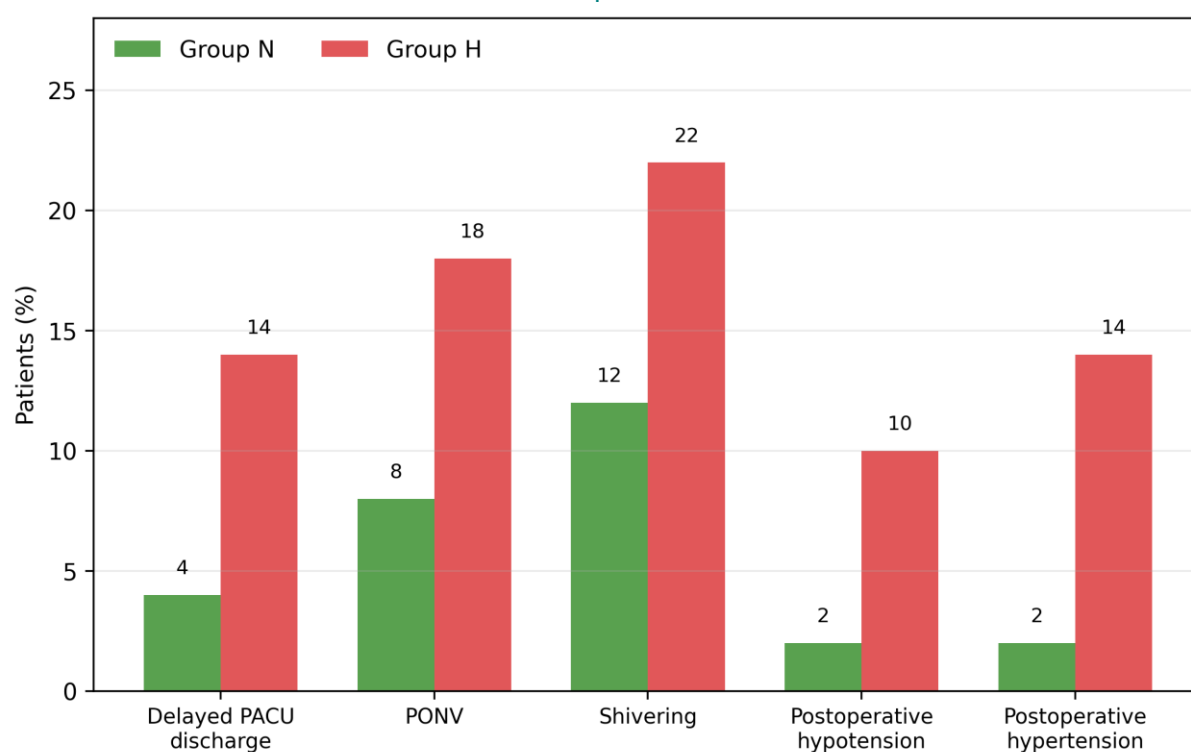


Figure 4. Selected postoperative events. Values are percentages within each group. PACU = post-anaesthesia care unit; PONV = postoperative nausea or vomiting.

DISCUSSION

This prospective comparison demonstrated that patients with controlled hypertension experienced a greater proportional fall in systolic blood pressure and mean arterial pressure after spinal anaesthesia than normotensive patients. Clinically significant hypotension and vasopressor administration were also more frequent in the hypertensive group. The largest decline occurred during the first 5–15 minutes, corresponding to the period when neuraxial sympathetic blockade develops rapidly and venous capacitance increases. Although absolute arterial pressures remained higher in hypertensive patients, the relative

reduction from their own baseline was clinically more pronounced.

These findings agree closely with Gebrags et al., who reported hypotension in 23.6% of controlled hypertensive patients and 7.3% of normotensive patients undergoing spinal anaesthesia.⁴ Racle et al. likewise observed larger blood-pressure decreases and more hypotensive episodes among elderly hypertensive patients.⁶ Chronic hypertension produces arterial stiffness, vascular hypertrophy, and altered baroreceptor responsiveness, limiting rapid compensation after sympathetic blockade. However, Acar et al. and Kil et al. found no statistically significant difference in hypotension rates between groups.^{5,7} Such discrepancies can

arise from variation in age, local anaesthetic dose, fluid loading, antihypertensive medication, block height, and the threshold used to define hypotension.

Bradycardia was numerically more frequent among hypertensive participants but did not reach statistical significance. This pattern resembles previous comparative evidence in which hypotension differed between groups while bradycardia did not.⁴ Medication effects remain relevant: beta-blockade restricts compensatory tachycardia, whereas vasodilating drugs can increase the need for pressor treatment.⁸ The higher fluid and mephentermine requirements in Group H support reduced vascular adaptability rather than a major difference in heart-rate response.

New intraoperative ECG abnormalities occurred in 24.0% of hypertensive and 6.0% of normotensive patients. Most consisted of transient T-wave inversion, premature complexes, or ST-segment depression. The association of three ST-depression episodes with hypotension suggests a temporary myocardial oxygen supply–demand imbalance. Hypertensive patients also had more baseline left ventricular hypertrophy and nonspecific ST–T abnormalities, which can increase ECG vulnerability during perioperative stress. Nevertheless, all changes resolved after haemodynamic correction, and no myocardial infarction occurred. This reinforces the value of interpreting monitor changes together with symptoms, blood pressure, serial ECG findings, and cardiac biomarkers when indicated.^{9,10}

Recovery-room observation and hospital stay were longer in the hypertensive group. These differences probably reflected recurrent blood-pressure abnormalities, additional monitoring, and transient ECG changes rather than major organ injury. Contemporary perioperative evidence links the severity and duration of hypotension with myocardial, renal, and mortality outcomes.^{12,13} Current international consensus recommends prompt, cause-directed treatment and preservation of an adequate mean arterial pressure in at-risk surgical patients.¹⁴ The absence of major cardiovascular events in this cohort is reassuring but should not reduce vigilance because the sample was modest and patients with severe cardiovascular disease were excluded.

Generalizability

The findings are most applicable to adults with treated, clinically controlled hypertension undergoing elective infraumbilical procedures under single-shot spinal anaesthesia in a government teaching-hospital setting. They can inform monitoring protocols in comparable secondary and tertiary hospitals with similar patient profiles and perioperative resources. Extrapolation to patients with

uncontrolled hypertension, advanced cardiac disease, emergency surgery, obstetric procedures, very elderly populations, or alternative intrathecal drug regimens requires caution because these groups were not adequately represented.

CONCLUSION

Controlled hypertensive patients undergoing spinal anaesthesia demonstrated greater relative reductions in systolic blood pressure and mean arterial pressure than normotensive patients. They also experienced more clinically significant hypotension, greater vasopressor and fluid requirements, and a higher frequency of transient intraoperative ECG abnormalities. Bradycardia did not differ significantly between the groups. Hypertensive patients required longer recovery-room observation and had a modestly prolonged hospital stay, although no myocardial infarction, stroke, acute heart failure, cardiac arrest, or death occurred. These findings indicate that apparently controlled hypertension remains an important marker of perioperative haemodynamic vulnerability. Careful baseline assessment, close early monitoring, and rapid correction of hypotension are essential during spinal anaesthesia in this population.

LIMITATIONS

This study had a single-centre observational design and a modest sample size. The hypertensive group was older, creating residual confounding despite clinical comparability. Antihypertensive drug classes and surgical procedures were heterogeneous. Continuous twelve-lead ECG monitoring and routine postoperative troponin estimation were unavailable. Short in-hospital follow-up prevented assessment of delayed cardiovascular events. The findings therefore require confirmation in larger multicentre cohorts with adjusted analyses.

RECOMMENDATIONS

Hypertensive patients should undergo careful verification of preoperative blood-pressure control, medication history, baseline ECG findings, and cardiovascular symptoms. Blood pressure should be measured frequently during the first 20 minutes after spinal injection, when the steepest decline is expected. Intravenous access, appropriate fluid therapy, and vasopressors should be immediately available. Clinicians should assess percentage change from baseline in addition to absolute pressure thresholds. New ST–T changes or arrhythmias should prompt correction of haemodynamic disturbances and further cardiac evaluation when persistent. Future multicentre studies should stratify participants by antihypertensive drug class, hypertension duration,

ambulatory pressure control, block height, and procedure type consistently.

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Informed consent

Written informed consent was obtained from all participants.

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Conflict of interest

The authors declare that they have no conflicts of interest.

Data availability

De-identified data can be made available by the corresponding author after institutional approval and a reasonable request.

Abbreviations

ASA, American Society of Anesthesiologists; BP, blood pressure; DBP, diastolic blood pressure; ECG, electrocardiogram; HR, heart rate; MAP, mean arterial pressure; PACU, post-anaesthesia care unit; SBP, systolic blood pressure; SD, standard deviation; SpO₂, peripheral oxygen saturation.

Author contributions

Dr. Konduru Sindhura: Conceptualization, methodology, investigation, data collection, literature review, and preparation of the original manuscript draft.

Dr. Bala Muralikrishna Muppala: Methodology, data interpretation, literature review, critical revision of the manuscript, and intellectual input.

Dr. Kusuma Kishore Kumar: Conceptualization, supervision, validation, data interpretation, critical review and editing, correspondence with the journal, and final approval of the manuscript.

All authors reviewed the final manuscript, approved its submission, and agreed to be accountable for the accuracy and integrity of the work.

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