

# Assessment of Prophylactic Effect of Atropine with Ephedrine in Prevention of Hypotension Induced by Spinal Anaesthesia in Elderly Patients: A Comparative Study

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## ABSTRACT

**Background:** Hypotension is one of the major adverse effects seen in patients undergoing spinal anaesthesia and is reported to be seen in more than 30 percent of the cases of patients receiving spinal anaesthesia. It has been highlighted in various studies that the use of atropine and ephedrine in the improvement of hemodynamic parameter when used preoperatively in spinal anaesthesia. Hence; we carried this study to evaluate and compare the heart rate and mean arterial pressure after spinal anaesthesia with prophylactic use of atropine, ephedrine and placebo in elderly patients.

**Materials & Methods:** The present study was conducted among 120 patients who underwent surgical procedures under spinal anaesthesia. Patients were randomly divided into three study groups; Group 1 (40 patients): who received normal saline, Group 2 (40 patients) who received 0.6 mg of atropine and Group 3 (40 patients) who received 12 mg of ephedrine. Study drugs were administered to the patients one minute after the spinal anaesthesia. Recording of the various parameters such as amount of vasopressor needed (phenylephrine), after 15 minutes of spinal anaesthesia, sensory level reached presence of intra-operative angina and intra/postoperative confusion and other side effects till six hours post-surgically was done. All the results were analyzed by SPSS software.

**Results:** MAP at the baseline time in the three study groups was found to be 98.5, 91.5 and 93.7 respectively. 14 patients in

the group 3 were observed to have bradycardia while none of the patients in group 1 and group 2 suffered from bradycardia at baseline. Significant results were obtained while comparing the mephenmine used and amount of patients affected by bradycardia when compared in between the various study groups.

**Conclusion:** It can be concluded that profile of atropine is better as compared to ephedrine in the maintenance of hemodynamic in elderly patients.

**Key Words:** Anaesthesia, Hypotension, Spinal.

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## INTRODUCTION

Spinal anaesthesia is being used as a routine procedure for carrying out various surgical procedures since long time. After the insertion of the needle in the plane of neuraxis, sympathetic block, sensory analgesia and motor block, depending on dose, concentration, or volumes of local anaesthetics are produced by this procedure. One of the major disadvantages of the spinal block is the precipitous hypotension. Hypotension is reported to be seen in more than 30 percent of the cases of patients receiving spinal anaesthesia.<sup>1,2</sup> Hypotension occurring after spinal blockage is further precipitated by the absence of significant amount of reflex tachycardia. Blockade of cardio accelerator sympathetic fibers at T1 to T4, and possibly the "reverse" of the Bainbridge reflex are further responsible for occurrence of these phenomena. One of the prominent mechanisms producing hypotension is the

sympathetic blockage leading to the systemic vasodilation after the administration of spinal anaesthesia. One of the current topics of research is the search such of a technique or combinations to prevent spinal anaesthesia induced hypotension and bradycardia.<sup>3,4</sup> Various studies have highlighted the use of atropine and ephedrine in the improvement of hemodynamic parameter when used preoperatively in spinal anaesthesia.<sup>5,6</sup> Hence; we carried this study to evaluate and compare the heart rate and mean arterial pressure after spinal anaesthesia with prophylactic use of atropine, ephedrine and placebo in elderly patients.

## MATERIALS & METHODS

The present study was conducted in the department of medicine and anaesthesiology of the institution and included prospective

assessment of 120 patients who underwent surgical procedures under spinal anaesthesia. Ethical approval was taken from the institutional ethical committee in written and consent was obtained from all the patients after explaining them the entire research protocol.

Elderly patients of equal to or more than 60 years of age, who were scheduled to undergo urological surgeries under spinal anaesthesia and patients with physical status (ASA PS) I-II according to American Society of Anaesthesiologist were included in the study. Exclusion criteria for the present study included uncooperative patients, patients in which spinal anaesthesia was contraindicated, patients having history of cardiac arrhythmia such as atrial fibrillation, patients with history of first degree heart blocks, hypertensive patients having systolic or diastolic blood pressure more than 140 mm or 100 mm of Hg, patients having unstable angina, patients suffering from cardiomyopathy, patients on  $\beta$ -adrenergic blockers and patients taking any drug which is known to alter the effect of study drugs.

Pre-anaesthetic evaluations were carried out in all the patients and after evaluation, were randomly divided into three study groups; Group 1: who received normal saline, Group 2: who received 0.6 mg of atropine and Group 3: who received 12 mg of ephedrine. Final volume concentration of all the drugs in the study groups was achieved to 2.5 ml. One minute after the induction of the spinal anaesthesia in the patients of all the three study groups, their allotted drugs were administered. Before the commencement of the surgery, all the patients were given pre-medication in the form of tab midazolam orally. Preloading of all the patients with normal saline (NS) was done in the preanesthetic preparation room, before the induction of spinal anaesthesia. Monitoring of all the patients in operating room was done or recording the values of baseline heart rate, non-invasive blood pressure, oxygen saturation and electrocardiogram till completion of surgery. Spinal anaesthesia was given at the L3-L4 space with hyperbaric bupivacaine in sitting position and was immediately made to lie in supine position. Study drugs were administered to the study patients one minute after the spinal anaesthesia. Recording of the

MAP and HR was done at baseline and in the successive time following the administration of drugs. Systolic blood pressure of more than 60 mm of Hg was categorized under the definition of significant hypotension and if it occurred, the treatment was done with mephentermine. In cases in which more than 30 mg of inj. Mephentermine was required, inj. Phenylephrine was administered in the form a rescue drug. Presence of HR of less than 50 beats per minute was categorized as bradycardia and was treated by atropine. In case of patients affected by tachycardia (HR of more than 140 beats per minute), bolus IV esmolol was given as the line of treatment. Recording of the various parameters such as amount of vasopressor needed (phenylephrine), after 15 minutes of spinal anaesthesia, sensory level reached presence of intra-operative angina and intra/postoperative confusion and other side effects till six hours post-surgically was done.

All the results were analyzed by SPSS software. Chi-square test, Mann Whitney U test and one way ANOVA was used for the assessment of level of significance. P-value of less than 0.05 was considered to be significant.

## RESULTS

Graph 1 highlights the demographic details of the patients. Mean age of the patients in the group 1, 2 and 3 were 69.5, 67.2 and 68.7 years respectively. Mean weight of the patients in the three study groups were 61.5, 60.8 and 58.9 kg respectively. Mean HR of the patients was 74.8, 72.5 and 71.4 beats per minute in the three study groups respectively. MAP at the baseline time in the three study groups was found to be 98.5, 91.5 and 93.7 respectively. Graph 2 and Graph 3 shows the Mean HR and MAP at baseline and various time intervals. 14 patients in the group 3 were observed to have bradycardia while none of the patients in group 1 and 1 patient in group 2 suffered from bradycardia at baseline. Significant results were obtained while comparing the mephentermine used and amount of patients affected by bradycardia when compared in between the various study groups (p-value < 0.05, Table 2).

Graph 1: Demographic details of the patients

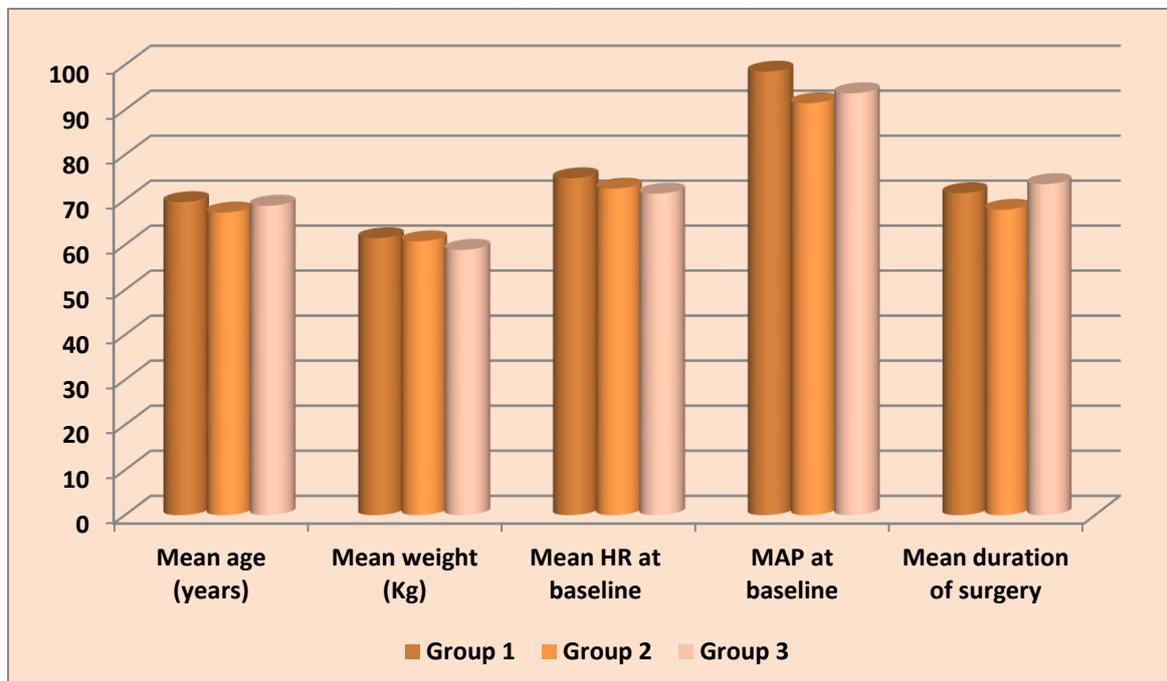
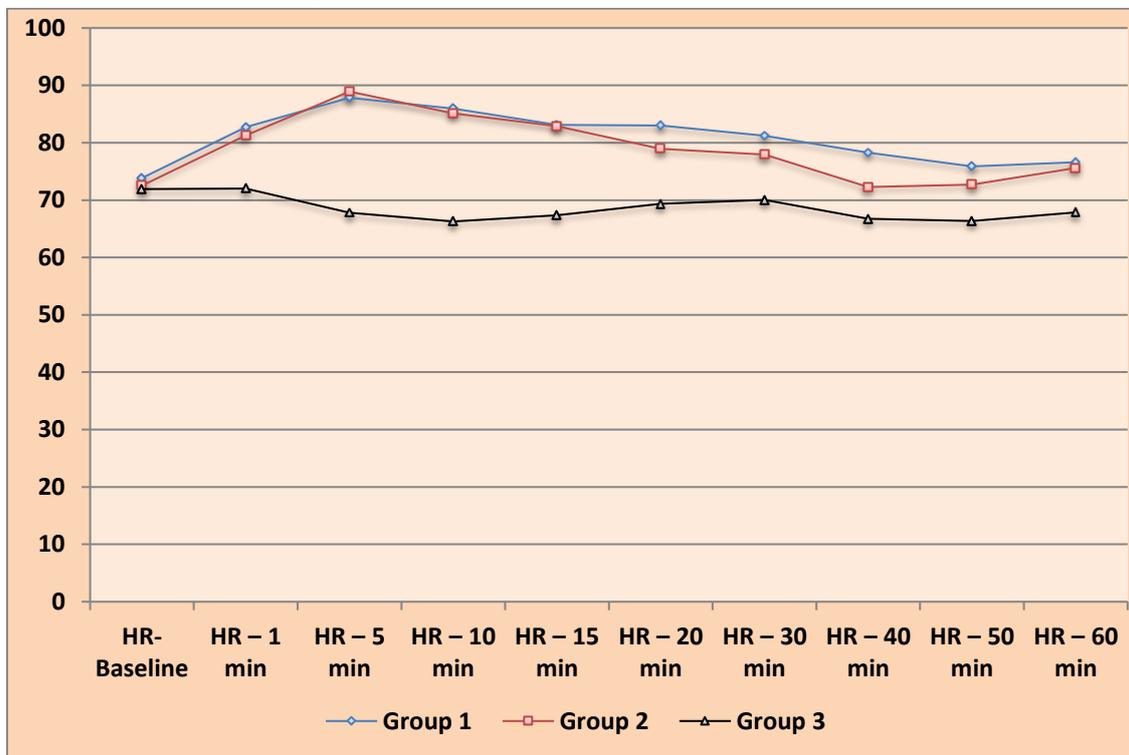


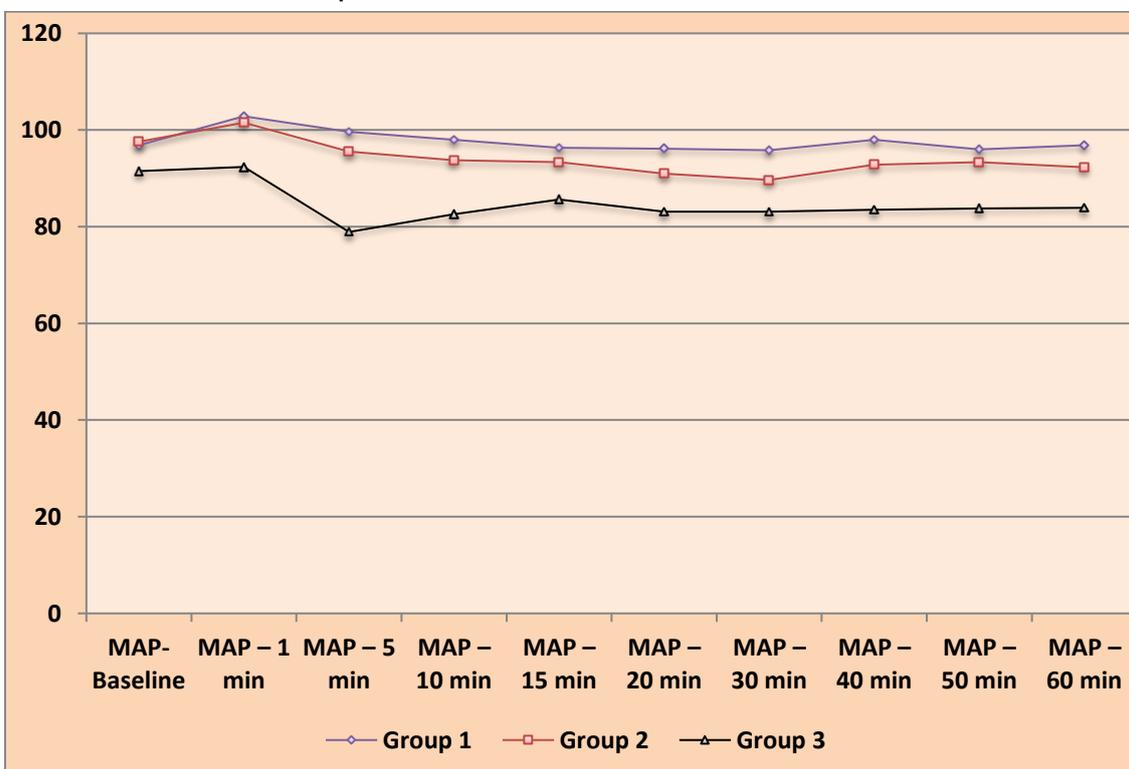
Table 1: P-value for the comparison of demographic details

Parameter	Group 1	Group 2	Group 3	p-value
Mean age (years)	69.5	67.2	68.7	0.52
Mean weight (Kg)	61.5	60.8	58.9	0.42
Mean HR at baseline	74.8	72.5	71.4	0.58
MAP at baseline	98.5	91.5	93.7	0.35
Mean duration of surgery	71.5	67.8	73.5	0.41

Graph 2: Mean HR at baseline and various time intervals



Graph 3: MAP at baseline and various time intervals



**Table 2: p-value for comparison of MAP at baseline**

Parameter	No. of patients			p-value
	Group 1	Group 2	Group 3	
Mephentemine used	3	2	21	0.02*
Bradycardia	0	1	14	0.03*
Tachycardia	2	0	0	0.52
Other adverse effects	0	0	0	-

\*Significant

**DISCUSSION**

Hypotension and bradycardia are the common adverse effects associated spinal anaesthesia. Hypotension is risk factor at age of 40 years or older and its subarachnoid puncture level above the L3-L4, its sympathetic block height T5 or higher, and baseline systolic blood pressure less than 120 mmHg. By use of  $\beta$ -adrenergic blockers, prolonged PR interval on electrocardiogram, ASAPS I and block height T5 or higher, these factor reduce the risk factor for development of bradycardia include heart rate less than 60 beats per minute. Now days various techniques are advocated for the prevention of hypotension and bradycardia which include pre or co-loading of IV fluid, vasopressors, and physical methods such as table tilt, leg binders, and compression devices.<sup>7,8</sup> Hence, we carried this study to evaluate and compare the heart rate and mean arterial pressure after spinal anaesthesia with prophylactic use of atropine, ephedrine and placebo in elderly patients.

In the present study, the incidence of bradycardia was significantly higher at different time intervals in the placebo group in comparison with the other study groups. Also, treatment was required to treat this bradycardia in the placebo group (p-value < 0.05). Persistence of lower heart rate was observed in the placebo group in the present study even at the middle of the surgery. For the treatment of hypotension, mephentemine was required in more than 50 percent, 5 percent and 5 percent of the patients of the placebo group, ephedrine group and the atropine group respectively. When compared to ephedrine or atropine group, in patients of placebo group, mephentemine was significantly used (p-value < 0.05). However, non-significant results were obtained while comparing the ephedrine with atropine group in regard to mephentemine use. When compared to the other study groups, lower values of MAP were observed in placebo group at most of the time intervals. However, in comparison with the atropine group, significantly lower values of MAP at baseline were observed in the ephedrine group. Attenuation of spinal induced spinal hypotension can occur due to administration of ondansetron. Marashi SM et al<sup>9</sup> evaluated the impact of administration of ondansetron through intravenous route and concluded that spinal induced hypotension, bradycardia and shivering are significantly attenuated by administration of two different doses of intravenous ondansetron in comparison to the control saline group. However, the hemodynamic profiles and shivering in experimental groups were not statistically different. Owczuk R et al<sup>10</sup> verified the hypothesis that blockade of type 3 serotonin receptors by intravenous ondansetron administration might reduce hypotension and bradycardia induced by spinal anaesthesia. Patients of the first group received 8 mg i.v. ondansetron while the patients of the other group received

isotonic NaCl solution and they concluded that fall of systolic and mean blood pressure is attenuated by ondansetron when given intravenously, but does not have an influence on diastolic blood pressure or heart rate. Brooker RF et al<sup>11</sup> conducted a randomized clinical trial to compare phenylephrine and epinephrine and revealed that an increase in heart rate and cardiac output occurs by the epinephrine management of tetracaine spinal-induced hypotension. Phenylephrine management of tetracaine spinal-induced hypotension decreases heart rate and cardiac output while restoring systolic, mean, and diastolic blood pressure. Sahoo T et al<sup>12</sup> evaluated the effect of ondansetron, as a 5-HT<sub>3</sub> receptor antagonist, on the haemodynamic response following subarachnoid block in parturients undergoing elective caesarean section and observed a reduction in the hypotension occurs when Ondansetron is given intravenously 5 min before subarachnoid block. Kelsaka et al<sup>13</sup> evaluated and compared the efficacy of ondansetron and meperidine in the prevention of shivering during and after spinal anaesthesia and found that ondansetron and meperidine have similar anti-shivering effects.

**CONCLUSION**

From the above results, the present study concludes that in elderly patients, profile of atropine is better than ephedrine in the maintenance of hemodynamic in elderly patient. However; future studies are recommended.

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