

**Original article:**

## Study of analgesic effect of dexmedetomidine at tertiary care hospital

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### Abstract

**Introduction:** Dexmedetomidine, imidazole compound the pharmacologically active dextroisomer of medetomidine has specific and selective alpha 2 –adrenoceptor agonism.

**Material and methods:** A hospital based double blind study was undertaken with 100 patients to evaluate the effect of dexmedetomidine infusion on post-operative blood sugar levels and insulin levels in patients undergoing lower limb surgeries under spinal anesthesia.

**Results:** The mean duration of analgesia was significantly higher in Group A compared to Group B (325.68±5.59 mins vs. 197.06±3.20 mins) as per Student t-test (p=0.0001).

**Conclusion:** The mean duration of analgesia was significantly higher in Group A compared to Group B (325.68±5.59 mins vs. 197.06±3.20 mins) as per Student t-test (p=0.0001).

**Keywords:** spinal anesthesia , Dexmedetomidine, imidazole

### Introduction:

Dexmedetomidine, imidazole compound the pharmacologically active dextroisomer of medetomidine has specific and selective alpha 2 –adrenoceptor agonism. Being a sedative and analgesic without respiratory depressant property provides intraoperative sedation, reduce the discomfort and also cover up the inadequate block height along with prolonging the postoperative analgesia.<sup>1</sup> Alpha2 agonist reduces vasomotor center mediated CNS activation causing sympatholysis, sedation, anxiolysis, and analgesic properties. The sub types of alpha 2 receptors are alpha 2 A, B and C.<sup>2</sup> Analgesic effect is mediated by alpha 2 C and alpha 2 A receptors present in the neurons of superficial dorsal horn in lamina II. On activation , it prevents the release of pronociceptive transmitters namely substance P and glutamate and hyperpolarize the spinal interneurons inhibiting the signal transmission.<sup>3</sup> The sedative action is by hyperpolarization in the locus coeruleus neurons on the pons and lower brainstem –alpha 2 A thereby inhibiting noradrenaline release and inhibiting activity in the descending medullospinal noradrenergic pathway.<sup>4</sup> Alpha 2 B agonism suppresses shivering centrally, causes analgesia, and vasoconstriction in the peripheral arteries. The alpha 2 C receptors are involved in sensory processing, modulation of cognition and locomotor activity. Decrease in the catecholamine release has significant action on glucose metabolism.

**Material and methods:**

A hospital based double blind study was undertaken with 100 patients to evaluate the effect of dexmedetomidine infusion on post-operative blood sugar levels and insulin levels in patients undergoing lower limb surgeries under spinal anesthesia. The patients were distributed by computer generated random number into following two groups:

- **Group A** – 50 patients were infused with Inj. Dexmedetomidine at a dose of 0.5 mcg/kg/hour
- **Group B** – 50 patients were infused with the same volume of 0.9 % normal saline.

**Study design:** A hospital based Double Blind study

**Study Duration:** 2 years

**Study population:** All patients of age between 18-65 years, diabetics with ASA grading II, undergoing lower limb surgeries under spinal anaesthesia who fulfilled the inclusion criteria.

**Sample size:** 100 patients

**Inclusion criteria:**

1. Age between 18-65 years
2. Diabetic patients controlled on Oral Hypoglycemic Agents and well-optimized before surgery.
3. ASA grading II
4. Either sex male or female
5. Patients undergoing lower limb surgeries under spinal anaesthesia

**Exclusion criteria:**

1. Age less than 18 years and more than 65 years
2. Myocardial Infarction
3. Cerebrovascular accident in last 3 months
4. Hypertensive disorders
5. Patients on beta blockers
6. Patients on insulin
7. Patients with endocrinological disorders apart from diabetes.
8. Severe Renal, pulmonary and hepatic disorders
9. Raised intracranial pressure
10. Pregnancy
11. Known allergy to dexmedetomidine

The study was done at our tertiary care center in the Department of Anesthesiology, after due permission from the Institutional Ethics Committee and Review Board and after taking Written Informed Consent from the patients.

Once the patients were enrolled for the study, a thorough history and physical examination was done as per proforma. An informed consent was taken in written from patients or patient's attendant.

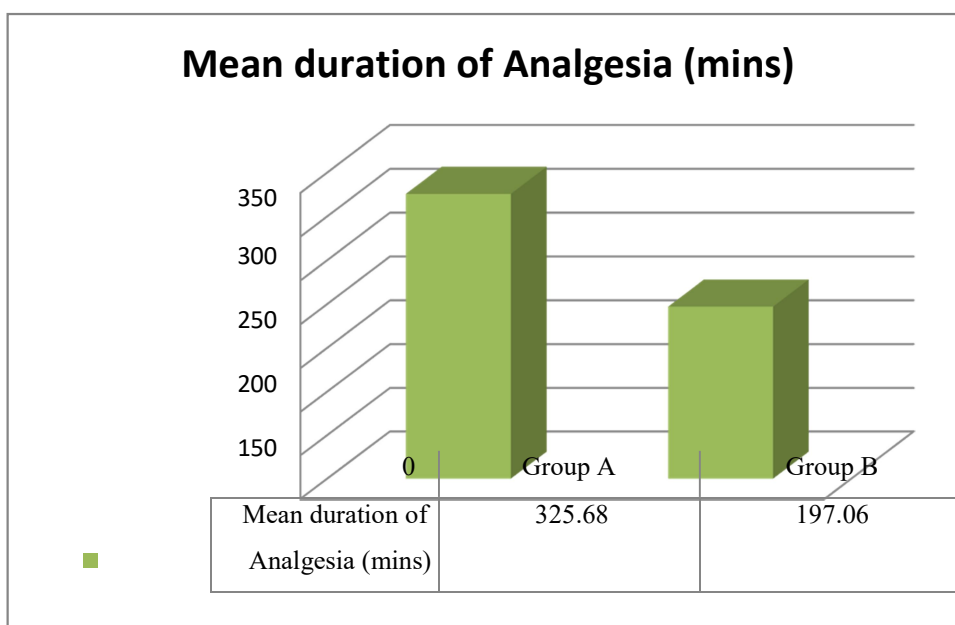
**Results:**

**Comparison of Duration of Analgesia between groups**

The mean duration of analgesia was significantly higher in Group A compared to Group B (325.68±5.59 mins vs. 197.06±3.20 mins) as per Student t-test (p=0.0001).

**Table 1: Comparison of Duration of Analgesia between groups**

	Group A		Group B		p Value
	Mean	SD	Mean	SD	
Mean duration of Analgesia (mins)	325.68	5.59	197.06	3.20	0.0001

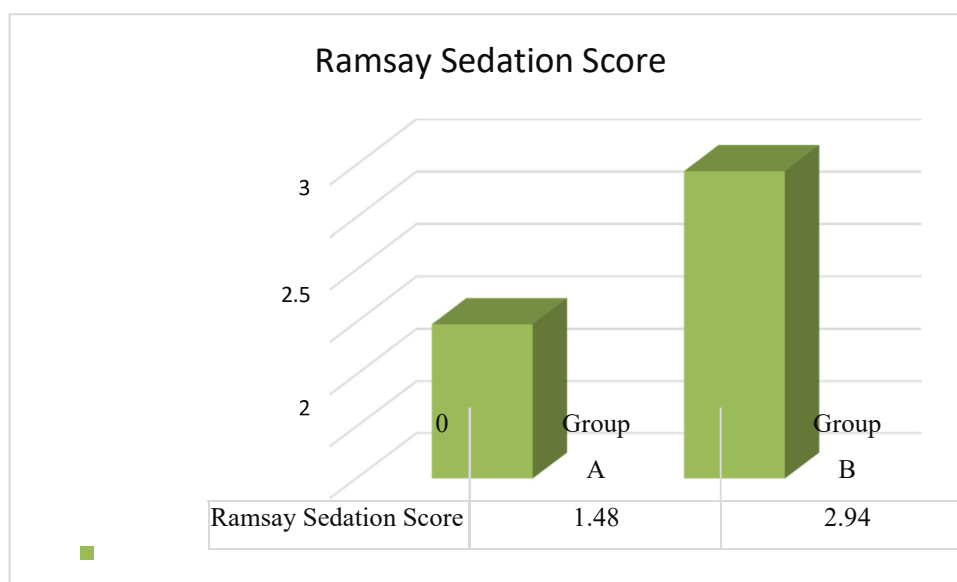


**Graph 1: Comparison of Duration of Analgesia between groups**

It was observed that the Ramsay Sedation Score was significantly higher in Group A compared to Group B (1.48±0.50 vs. 2.94±0.77) as per Student t-test (p=0.02).

**Table 2: Comparison of RSS between groups**

	Group A		Group B		p Value
	Mean	SD	Mean	SD	
<b>Ramsay Sedation Score</b>	1.48	0.50	2.94	0.77	<b>0.02</b>



**Graph 2: Comparison of RSS between groups**

**Discussion:**

It was observed in our study that the mean duration of analgesia was significantly higher in Group A compared to Group B (325.68±5.59 mins vs. 197.06±3.20 mins) as per Student t-test (p=0.0001).

Hui Yun S et al<sup>5</sup> study investigating the ability of an intraoperative dexmedetomidine infusion to reduce hyperglycaemia, observed use of additional analgesics was higher in the control group.

Harsoor SS et al<sup>6</sup> randomized, prospective, double blind, controlled, clinical study observed statistically significant 28% reduction in the Sevoflurane requirement in the 1st hr of anesthesia, 11.10 ± 2.17 mL in Dexmedetomidine group compared to 15.45 ± 3.97 mL in placebo group (P< 0.001). While it was 10.58 ± 3.4 mL in 2nd hr and 7.00 ± 2.33 mL in 3rd hr in placebo group compared to 8.13 ± 2.75 mL and 8.14 ± 1.35 mL dexmedetomidine (P = 0.02 for 2nd hr, P = 0.06 for 3rd hr), respectively.

Vasanthi B et al<sup>7</sup> prospective double blind, randomized controlled study noted that all patients in dexmedetomidine

group had adequate intraoperative and post-operative analgesia. The time required for the first dose of rescue analgesia was significantly prolonged in dexmedetomidine group ( $p < 0.001$ )

In the present study, the Ramsay Sedation Score was significantly higher in Group A compared to Group B ( $1.48 \pm 0.50$  vs.  $2.94 \pm 0.77$ ) as per Student t-test ( $p = 0.02$ ). This is in concordance to the studies of Harsoor SS et al<sup>5</sup> and Vasanthi B et al<sup>7</sup>.

Harsoor SS et al<sup>5</sup> randomized, prospective, double blind, controlled, clinical study observed Ramsay sedation score was significantly higher at  $2.6 \pm 0.75$  in patients treated with Dexmedetomidine, while it was  $1.25 \pm 0.44$  in placebo group ( $P < 0.001$ ) indicating arousable sedation.

Vasanthi B et al<sup>7</sup> prospective double blind, randomized controlled study observed most of the patients in Dexmedetomidine group were sedated intraoperatively with a sedation score from 2 to 4. Only 3 of the patients in placebo group showed the score of 2 and all others showed a score of 1.

### Conclusion

The mean duration of analgesia was significantly higher in Group A compared to Group B ( $325.68 \pm 5.59$  mins vs.  $197.06 \pm 3.20$  mins) as per Student t-test ( $p = 0.0001$ ).

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For any images presented appropriate consent has been obtained from the subjects: YES

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