

COMPARISON OF EFFECTS OF DIFFERENT DOSES OF DEXMEDETOMIDINE AS INTRATHECAL ADJUVANT TO HYPERBARIC ROPIVACAINE IN LOWER ABDOMINAL SURGERIES: A PROSPECTIVE RANDOMIZED CONTROLLED STUDY

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Received : 16/09/2026
Received in revised form : 10/10/2026
Accepted : 14/10/2026

Keywords:
Adjuvant, Dexmedetomidine,
Ropivacaine, VAS score.

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DOI: 10.47009/jamp.2026.8.5.131

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2026; 8 (5); 829-835



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ABSTRACT

Background: Lower abdominal surgeries done under SAB require efficient Anaesthesia and adequate post-operative analgesia for early mobilization and recovery of patients. Ropivacaine given intrathecally has shown to have lesser toxicity and making it hyperbaric by adding dextrose has shown to provide consistent and predictable block but associated with shorter duration of post-operative analgesia. Adding adjuvant like dexmedetomidine prolongs post-operative analgesia. This study is to compare the effects of different doses of dexmedetomidine as intrathecal adjuvant to hyperbaric Ropivacaine. **Materials and Methods:** A randomized controlled double blinded clinical trial includes 100 patients aged 18-60 years, either sex, belonging to ASA grade 1 and 2. They were randomly allocated into five groups (n=20). Group C received 0.5ml normal saline, Group D5 received 5mcg (0.05ml) Dexmedetomidine, Group D10 received 10mcg (0.1ml) Dexmedetomidine, Group D15 received 15mcg (0.15ml) Dexmedetomidine and Group D20 received 20mcg (0.2ml) Dexmedetomidine as adjuvant to 0.42% hyperbaric Ropivacaine. **Results:** The onset of sensory and motor block was early, duration of sensory and motor block was prolonged, and duration of post-operative analgesia was prolonged in Dexmedetomidine groups in dose dependent manner. But Group D15 and Group D20 had adverse effects like hypotension, bradycardia and prolonged post-operative immobilization. **Conclusion:** Considering optimal post-operative analgesia and minimal adverse effects, Dexmedetomidine 10mcg is the ideal dose as adjuvant to intrathecal 0.42% hyperbaric Ropivacaine for spinal Anaesthesia.

INTRODUCTION

Lower abdominal surgeries like appendectomy, hernioplasty, hemicolectomy, ileostomy reversal etc are very common surgical procedures. Efficient anaesthesia during these procedures and adequate post-operative pain management is of utmost importance to facilitate patients to return to their normal more quickly.

Spinal anesthesia is a popular regional anesthetic technique for lower abdominal surgeries where local anaesthetic is injected in to subarachnoid space, having a good efficacy profile because of its rapid onset of action, superior muscle relaxation, less bleeding, reduced respiratory complications, quick restoration of bowel function, cost effectiveness, less failure rates and reduced post operative stay.^[1]

Bupivacaine and Ropivacaine are two popular intrathecal local anesthetics used in spinal anesthesia. Bupivacaine has been used most widely as long-acting local anesthetic but has adverse effects such as hypotension, cardiotoxicity and central nervous system toxicity like restlessness, anxiety, dizziness, tinnitus and tremors.

Ropivacaine is a long-acting local anesthetic which is a pure S enantiomer of Bupivacaine preferred in recent times for spinal anesthesia due to its safety profile over Bupivacaine with less cardiotoxicity and neurotoxicity. It has lower lipid solubility than bupivacaine and blocks nerve fibers involved in pain transmission to greater degree than those involved in motor function. Hence, it has a greater degree of motor sensory differentiation and this could be useful when sensory block alone is sufficient.

Reduced lipophilicity is also associated decreased potential for central nervous system toxicity and cardiotoxicity in contrast to Bupivacaine. Isobaric solutions exhibits variable and less predictable effects causing either insufficient block level or excessively high level leading to adverse effects. Due to insufficient block, patients might require supplementation of analgesia and sedation. Also, it has shorter duration of action resulting in earlier onset of post-operative pain.^[2]

Hyperbaric solution made by adding dextrose to isobaric Ropivacaine increases its density that results in an equal distribution of drug and increases the height of block. It has more predictable and faster onset of action. It provides adequate intraoperative anesthesia and early mobilization. But it has shorter duration of action, hence patient complains of pain in early post-operative period necessitating the use of systemic drugs like NSAIDS and opioids which have side effects such as nausea, vomiting, pruritis, urinary retention and respiratory depression.^[3]

Many adjuvants have been added to intrathecal local anesthetic to improve the quality of intraoperative anesthesia and prolonged post-operative analgesia. Intrathecal Alpha 2 agonists are found to have an antinociceptive action for both somatic and visceral pain. Dexmedetomidine is an emerging choice of additive to spinal anesthesia in view of its property to provide analgesia and awake sedation without respiratory depression and with stable hemodynamics.

Dexmedetomidine is a highly selective Alpha 2 adrenoceptor agonist which has sympatholytic, analgesic, hypnotic, and sedative and anxiolytic properties. It was first licensed for the use of sedation in mechanically ventilated adult intensive care patients for up to 24 hours. It can be used as an adjuvant to intrathecal hyperbaric Ropivacaine in order to prolong anesthesia in post-operative period. It prolongs sensory block by depressing neurotransmitter release from C fibers of spinal cord leading to hyperpolarization of post synaptic dorsal horn neurons. Prolongation of motor block is by binding to motor neuron in dorsal horn of spinal cord.^[3]

Hence, the present study is to compare the effects of different doses of Dexmedetomidine as intrathecal adjuvant to hyperbaric Ropivacaine and to identify the lowest dose of dexmedetomidine that will provide optimum post-operative analgesia.

MATERIALS AND METHODS

This Comparative study was conducted on 100 patients of either sex, aged between 18 to 60 years, ASA grade 1 and 2 status undergoing elective lower abdominal surgeries under spinal anaesthesia at Krishna Rajendra Hospital attached to Mysore Medical College and Research Institute, Mysore.

Sample size –100 patients.

The Sample size was decided in consultation with the statistician.

Type of sampling: Simple Random Sampling

Inclusion Criteria:

- All ASA grade 1 and 2 patients
- Patients aged between 18 to 60 years of both sexes
- Patients scheduled for elective lower abdominal surgery under subarachnoid block.

Exclusion Criteria

- All ASA Grade 3 and 4 patients
- Patients with spinal deformity
- Pregnant patients
- Patients with height <140cm
- Patients with comorbidities like hypertension and diabetes
- Patients with known drug allergy
- Patients with pre-existing cardiovascular, respiratory and neurological disorders.
- Patients with local skin infections
- Patients with impaired liver or renal function tests
- Patients with coagulation disorders
- Patients with BMI >30kg/m²

Methods of Collection of Data

Data was collected in prescribed proforma meeting the objectives of the study. 100 patients in the age group of 18-60 years, of both sexes belonging to ASA class 1 and 2 scheduled for elective lower abdominal surgeries under spinal anesthesia, who met inclusion and exclusion criteria.

The patients recruited for the study were randomly divided in 5 groups with 20 subjects in each group (n=20) using shuffled closed opaque envelope technique.

- 1) **Group D5:** Subarachnoid block with 2.5ml of 0.42% hyperbaric Ropivacaine + 5mcg (0.05ml) Dexmedetomidine
- 2) **Group D10:** Subarachnoid block with 2.5ml of 0.42% hyperbaric Ropivacaine + 10mcg (0.1ml) Dexmedetomidine
- 3) **Group D15:** Subarachnoid block with 2.5ml of 0.42% hyperbaric Ropivacaine + 15mcg (0.15ml) Dexmedetomidine
- 4) **Group D20:** Subarachnoid block with 2.5ml of 0.42% hyperbaric Ropivacaine + 20mcg (0.2ml) Dexmedetomidine
- 5) **Group C:** Subarachnoid block with 2.5ml of 0.42% hyperbaric Ropivacaine + 0.5ml normal saline.

Preparation of The Study Drug:^[4] Hyperbaric Ropivacaine 0.42% was prepared by Anaesthesia resident not aware of study patients by adding 0.5ml of 50% Dextrose to 2.5ml of 0.5% Isobaric Ropivacaine. After addition of Dextrose, total volume of 3ml of prepared drug will contain 12.5mg of Ropivacaine and 250mg of Dextrose. Thus, each milliliter of the study drug will contain 4.16mg Ropivacaine and 83.33mg Dextrose.^[4] 2.5ml of the above preparation was taken and Dexmedetomidine 5mcg (0.05ml) or 10mcg (0.1ml) or 15mcg (0.15ml)

or 20mcg (0.2ml) was added and was given intrathecally. Sterile autoclaved ampoules of 50% Dextrose were used. Samples of prepared drug were tested in laboratory for specific gravity and any possible bacterial contamination. The mean specific gravity of the sample drug was noted to be 1.0396 (specific gravity of CSF- 1.0004-1.00067). Culture sensitivity test was negative.

After obtaining hospital ethical committee and scientific committee approval, a thorough pre anaesthetic evaluation of patients with necessary basic investigations was done and their written informed consent was taken. All the patients were explained about the usage of Visual Analog scale scoring and Modified Ramsay sedation scoring to report pain and sedation in postoperative period. Premedication with Tab. Anxit 0.5mg + Tab. Ranitidine 150mg was done on the previous day of surgery.

On arrival to operating room, standard monitors (ECG, HR, SPO2, NIBP) were connected and baseline parameters were recorded. Intravenous line was secured with 18G cannula and patients were preloaded with Ringer lactate solution.

In lateral decubitus position under strict aseptic precautions, Lumbar puncture was performed by a junior Anaesthetist using a midline approach at L3-L4 or L4-L5 intervertebral space using 23 Gauge Quincke's spinal needle. After confirming free flow of cerebrospinal fluid through the spinal needle, the study drug solution was injected intrathecally over a period of 10-15 secs and patients was turned to supine position.

The following parameters were noted by the observer who was not aware of the composition of the drug-

- The time for onset of sensory level.
- The maximum height of sensory level achieved and time taken for it was assessed by pin prick method using sterile 25G hypodermic needle.
- The time taken for 2 segment sensory regression
- Complete sensory regression to S1 was assessed in post-operative period.
- The time of motor blockade onset
- The pain assessed using VAS scoring.^[4]
- Maximum motor level achieved was assessed using modified Bromage scale.^[5]
- The time of complete motor recovery was assessed in post-operative period.
- Sedation assessed using Ramsay sedation score.^[6]

- The time of first ambulation and first voiding of urine was assessed in post-operative period.

Statistical Analysis: Non parametric data VAS scores and Modified Ramsay Sedation Score were compared using the Kruskal Wallis test to analyze median and interquartile range between groups. A p value <0.05 and below was considered statistically significant.

All the data was presented as mean $\pm$ standard deviation and presented in a tabulated form.

RESULTS

All patients recruited for elective lower abdominal surgery were in age group of 18-60 years. The mean age in Group D5 was 34.3 ± 10.7 years, Group D10 was 32.3 ± 9.9 years, Group D15 was 36.3 ± 11 years, Group D20 was 34.3 ± 10.5 years and Group C was 39.3 ± 14.4 years. There was no statistically significant difference among the five groups with respect to mean age ($p=0.38$).

In the Group D5, female patients were 10 (50%) and male patients were 10 (50%). In the Group D10, female patients were 10 (50%) and male patients were 10 (50%). In the Group D15, female patients were 9 (45%) and male patients were 11 (55%). In the Group D20, female patients were 10 (50%) and male patients were 10 (50%). In the Group C, female patients were 10 (50%) and male patients were 10 (50%). All the five groups were comparable with respect to sex of the patients which was not significant ($p=0.93$).

The mean weight in Group D5 was 66.6 ± 7.1 kgs, Group D10 was 63.6 ± 4.5 kgs, Group D15 was 64.6 ± 3.8 , Group D20 was 65.6 ± 4.2 and Group C was 67.6 ± 8 kgs. There was no statistically significant difference among 5 groups with respect to weight ($p=0.40$).

The mean height in Group D5 166.1 ± 5.7 cms, Group D10 was 165.1 ± 5.4 cms, Group D15 was 163.1 ± 4.3 cms, Group D20 was 165.1 ± 5.1 cms and Group C was 167.1 ± 6.1 cms. There was no statistically significant difference among the 5 groups with respect to height ($p=0.29$).

The mean BMI in the Group D5 was 23.2 ± 1.5 kg/m², Group D10 was 23.2 ± 1.3 kg/m², Group D15 was 24.2 ± 1.4 kg/m², Group D20 was 23.2 ± 1.5 kg/m² and Group C was 23.2 ± 1.8 kg/m². There was no statistically significant difference among 5 groups with respect to BMI ($p=0.94$).

Table 1: ASA grade distribution

ASA	Group D5 No. of patients (%)	Group D10 No. of patients (%)	Group D15 No. of patients (%)	Group D20 No. of patients (%)	Group C No. of patients (%)	P value
I	14 (70)	16 (80)	15 (75)	14 (70)	14 (70)	0.301
II	6 (30)	4 (20)	5 (25)	6 (30)	6 (30)	
Total	20 (100)	20 (100)	20 (100)	20 (100)	20 (100)	

In Group D5, 14 (70%) patients belonged to ASA I and 6 (30%) patients belonged to ASA II. In Group

D10, 16 (80%) patients belonged to ASA I and 4(20%) belonged to ASA II. In Group D15,

15(75%) patients belonged to ASA I and 5 (25%) belonged to ASA II. In Group D20, 14 (70%) patients belonged to ASA I and 6 (30%) belonged to ASA II. In Group C, 14 (70%) patients belonged to

ASA I and 6 (30%) patients belonged to ASA II. There was no statistically significant difference among five groups with respect to ASA grade (P=0.301).

Table 2: Distribution of maximum level of sensory block achieved

Sensory level	Group D5 No. of patients (%)	Group D10 No. of patients (%)	Group D15 No. of patients (%)	Group D20 No. of patients (%)	Group C No. of patients (%)	P value
T6	18 (90)	15 (75)	17 (85)	18 (90)	18 (90)	0.477
T8	2 (10)	5 (25)	3 (15)	2 (10)	2 (10)	
Total	20 (100)	20 (100)	20 (100)	20 (100)	20 (100)	

Maximum sensory level attained was T6 in 18(90%) patients and T8 in 2(10%) patients in Group D5, T6 in 15(75%) patients and T8 in 5(25%) patients in Group D10, T6 in 17(85%) patients and T8 in 3 (15%) patients in Group D15, T6 in 18(90%)

patients and T8 in 2(10%) patients in Group D20, T6 in 18(90%) patients and T8 in 2(10%) patients in Group C. There was no statistically significant difference among five groups with respect to maximum sensory block achieved (p=0.477).

Table 3: Comparison of time of onset of sensory block and time for maximum level of sensory block in five groups

	Group D5 Mean $\pm$ SD	Group D10 Mean $\pm$ SD	Group D15 Mean $\pm$ SD	Group D20 Mean $\pm$ SD	Group C Mean $\pm$ SD	P value
Time of sensory block at T10	2.9 $\pm$ 0.2	1.6 $\pm$ 0.2	2.4 $\pm$ 0.0	2.0 $\pm$ 0.4	5.0 $\pm$ 0.5	<0.001
Time for maximum Sensory block	9.7 $\pm$ 1.4	5.1 $\pm$ 0.5	4.4 $\pm$ 0.3	3.1 $\pm$ 0.3	19.7 $\pm$ 0.7	<0.001

The mean time of onset of sensory block was early in Group D10 1.6 $\pm$ 0.2mins, compared to Group D20 (2 $\pm$ 0.4mins), Group D15 (2.4 $\pm$ 0 mins), Group D5 (2.9 $\pm$ 0.2mins) and Group C (5 $\pm$ 0.5mins). There was highly statistically significant difference among the five groups, p<0 01.

The mean time for maximum sensory block was faster in Group D20 3.1 $\pm$ 0.3mins, compared to Group D15 (4.4 $\pm$ 0.3mins), Group D10 (5.1 $\pm$ 0.5mins), Group D5 (9.7 $\pm$ 1.4mins) and Group C (19.7 $\pm$ 0.7mins). There was highly statistically significant difference among the five groups, p<0 01.

Table 4: Comparison of time for 2 segment sensory regression and total duration of sensory block among five groups

	Group D5 Mean $\pm$ SD	Group D10 Mean $\pm$ SD	Group D15 Mean $\pm$ SD	Group D20 Mean $\pm$ SD	Group C Mean $\pm$ SD	P value
2 sensory segment regression	90.8 $\pm$ 3.8	120.2 $\pm$ 5.0	150.2 $\pm$ 4.8	269.8 $\pm$ 4.8	90.1 $\pm$ 0.9	<0.001
Total duration of sensory block	298.8 $\pm$ 10.0	417.4 $\pm$ 7.5	541.5 $\pm$ 5.4	718.7 $\pm$ 8.9	202.2 $\pm$ 5.3	<0.001

The mean time for 2 segment sensory regression was longer in Group D20 269.8 $\pm$ 4.8mins, compared to Group D15 (150.2 $\pm$ 4.8mins), Group D10 (120.2 $\pm$ 5 mins), Group D5 (90.8 $\pm$ 3.8mins) and Group C (90.1 $\pm$ 0.9mins). There was highly statistically significant difference among the five groups, p<0 01. The total duration of sensory block

was prolonged in Group D20 718.7 $\pm$ 8.9mins, compared to Group D15 (541.5 $\pm$ 5.4mins), Group D10 (417.4 $\pm$ 7.5mins), Group D5 (298.8 $\pm$ 10 mins) and Group C (202.2 $\pm$ 5.3mins). There was highly statistically significant difference among the five groups, p<0 01.

Table 5: Maximum motor block achieved – Modified Bromage scale

Modified Bromage scale	Group D5 No. of patients (%)	Group D10 No. of patients (%)	Group D15 No. of patients (%)	Group D20 No. of patients (%)	Group C No. of patients (%)	P value
2	7 (35)	4 (20)	4 (20)	7 (35)	7 (35)	0.62
3	13 (65)	16 (80)	16 (80)	13 (65)	13 (65)	
Total	20 (100)	20 (100)	20 (100)	20 (100)	20 (100)	

Maximum motor block attained was 2 in 7(35%) patients and 3 in 13(65%) patients in Group D5, 2 in 4(20%) patients and 3 in 16(80%) patients in Group D10, 2 in 4(20%) patients and 3 in 16(80%) patients in Group D15, 2 in 7(35%) patients and 3 in 13(65%) patients in Group D20, 2 in 7(35%)

patients and 3 in 13(65%) patients in Group C. There was no statistically significant difference among 5 five groups with respect to maximum motor block achieved according to Modified Bromage scale.

Table 6: Comparison of time of onset of motor block and time for maximum motor block among five groups

	Group D5 Mean±SD	Group D10 Mean ±SD	Group D15 Mean ±SD	Group D20 Mean ±SD	Group C Mean±SD	P value
Time of onset of motor block	2.0±0.3	1.5±0.3	2.9±0.3	1.5±0.1	10.4±0.6	<0.001
Time for maximum motor block	6.9±0.4	5.3±0.3	5.7±1.3	5.1±0.3	13.0±0.7	<0.001

The mean time for onset of motor block was faster and similar in Group D20 (1.5±0.1mins) and D10 (1.5±0.3mins), compared to Group D15 (2.9±0.3mins), Group D5 (2 ±0.3mins) and Group C (10.4±0.6mins), which was highly statistically significant ($p<0.01$). The mean time for maximum motor block was faster in Group D20 (5.1±0.3mins), compared to Group D15 (5.7±1.3mins), Group D10 (5.3±0.3mins), Group D5 (6.9±0.4mins) and Group C (13 ±0.7mins), which was highly statistically significant ($p<0.01$).

The mean time of total duration of motor block was prolonged in Group D20 (423 ±4.1mins), compared to Group D15 (419.2±6 mins), Group D10 (298.6±7.9mins), Group D5 (264.3±10.2mins) and Group C (148.5±2.7mins), which was highly statistically significant ($p<0.01$).

The mean duration of analgesia in Group D20 (663.6±6.8 mins) was longer compared to Group C (172.1±5.4 mins), Group D5 (293.2±12.3 mins), Group D10 (359.2±8 mins) and Group D15 (486.4±6.4 mins), which was statistically highly significant ($p<0.01$).

The mean time for first ambulation in Group D20 (481.4±7.3 mins) was longer compared to Group C (252.2±5.4 mins), Group D5 (326.3±9.9 mins), Group D10 (376.3±11 mins) and Group D15 (479.4±7.7 mins), which was highly statistically significant ($p<0.01$). The mean time for first voiding of urine in Group D20 (495.4±7.6 mins) was longer compared to Group C (272.2±3.7 mins), Group D5 (362.3±8 mins), Group D10 (478.4±6.6 mins) and Group D15 (489.4±6.3 mins), which was highly statistically significant ($p<0.01$). There was a highly statistically significant difference in the VAS score among five groups throughout the post-operative period, $P<0.01$. There was no statistically significant difference found in sedation score among five groups at 7hr, 8hr, 9hr, 10hr, 11hr and 12hr, $p>0.05$. Bradycardia was noted in 2(10%) patients in Group C and Group D5, 3(15%) patients in Group D10, 4(20%) patients in Group D15 and Group D20, which was statistically significant $p<0.01$. Hypotension was noticed in 3(15%) patients in Group D15 and Group D20, 1(5%) patient in Group D10 and 0(0%) patient in Group D5 and Group C, which is statistically significant $p<0.01$.

DISCUSSION

In the present study adult patients between 18-60 years undergoing lower abdominal surgeries were recruited. Patients were comparable with respect to

sex distribution and other demographic parameters like height, weight and BMI.

Time of onset of sensory block at T10

In our study, onset of sensory block at T10 was faster with Group D20 (1.6±0.2mins), compared to Group D15 (2.0±0.4mins), Group D10 (2.4±0 mins), Group D5 (2.9±0.2mins) and Group C (5 ±0.5mins), which was statistically significant ($p<0.01$). Similar to our study findings, Shashikala et al,^[1] observed that onset of sensory block at T10 was 1.673±0.567 mins in 0.5% hyperbaric ropivacaine + dexmedetomidine 10mcg group, which was early in comparison to 0.5% hyperbaric ropivacaine + fentanyl group.

In contrast to the findings of present study, Shagufta Naaz et al,^[7] found that onset of sensory block at T10 was faster in Hyperbaric bupivacaine + Dexmedetomidine 20mcg group (1.65±0.32mins) compared to Hyperbaric bupivacaine given with Dexmedetomidine 5mcg, 10mcg, 15mcg and control group. This may be because 0.5% hyperbaric Bupivacaine was used as intrathecal local anaesthetic in their study whereas we used 0.42% hyperbaric ropivacaine.

Time for maximum sensory block

The mean time for maximum sensory block was faster in Group D20 (3.1±0.3mins) compared to Group D15 (4.4±0.3mins), Group D10 (5.1±0.5mins), Group D5 (9.7±1.4mins) and Group C (19.7±0.7mins), which was statistically significant ($p<0.01$). This is similar to the study conducted by Shagufta Naaz et al,^[7] where time for maximum sensory level was faster in group Hyperbaric bupivacaine + Dexmedetomidine 20mcg compared to Hyperbaric bupivacaine given with 5mcg, 10mcg, 15mcg and control group.

Singh et al,^[8] found that time for maximum sensory block was faster in Group with 0.75% isobaric Ropivacaine with Dexmedetomidine 10mcg (5.47±1.53mins) in comparison to group with Dexmedetomidine 5mcg (7.90±2.26mins) which is similar to the findings in our study, where Group D10 (5.1±0.5mins) was faster than Group D5 (9.7±1.4mins).

Maximum sensory block achieved

The highest level of sensory block T6 was seen in group D5 (90%), group D10 (75%), group D15 (85%), group D20 (90%) and group C (90%). This was similar with findings in study by Shagufta Naaz et al,^[7] where maximum sensory level achieved was T6 in groups with dexmedetomidine 10mcg, 15mcg and 20mcg given as adjuvant to hyperbaric bupivacaine.

Total duration of sensory block

Group D20 increased the total duration of sensory block (718.7 ± 8.9 mins) compared to Group D15 (541.5 ± 5.4 mins), Group D10 (417.4 ± 7.5 mins), Group D5 (298.8 ± 10 mins) and Group C (202.2 ± 5.3 mins), which was statistically significant, $p < 0.01$. This was similar to the study conducted by Shagufta Naaz et al,^[7] who found that total duration of sensory block was increased to 759.8 ± 62.4 mins in group with Dexmedetomidine 20mcg, compared to group Dexmedetomidine 15mcg (598.4 ± 59.6 mins), group Dexmedetomidine 10mcg (382.8 ± 48.1 mins), group Dexmedetomidine 5mcg (289.1 ± 15.2 mins), when used as adjuvant to hyperbaric bupivacaine and Control group (228.3 ± 50.4 mins), which was statistically significant. Similarly, in a study conducted by Singh et al,^[8] total duration of sensory block was prolonged in Dexmedetomidine 10mcg group (433.72 ± 69.39 mins), compared to Dexmedetomidine 5mcg group (339.66 ± 46.71 mins) when given as adjuvant to 0.75% isobaric Ropivacaine.

Time taken for 2 segment sensory regression

Time taken for 2 segment sensory regression was prolonged in group D20 (269.8 ± 4.8 mins), compared to group D15 (150.2 ± 4.8 mins), group D10 (120.2 ± 5 mins), group D5 (90.8 ± 3.8 mins) and group C (90.1 ± 0.9 mins), which was statistically significant $p < 0.01$. This was similar to the study conducted by Shagufta Naaz et al,^[7] where time taken for 2 segment sensory regression in SAB given with hyperbaric bupivacaine was increased in Group Dexmedetomidine 20mcg (297.2 ± 30.9 mins) compared to group Dexmedetomidine 15mcg (218.6 ± 26.8 mins), group Dexmedetomidine 10mcg (157.9 ± 28.7 mins), group Dexmedetomidine 5mcg ($1213. \pm 10.2$ mins) and group Control group (94.1 ± 12.2 mins). Duration is more prolonged in this study may be because of use of hyperbaric bupivacaine.

Similar to our study where time for 2 segment sensory regression in Dexmedetomidine 10mcg group was 120.5 ± 5 mins, Sucheta Hans et al,^[9] also found that the time for 2 segment sensory regression was 120 ± 15.7 mins in Dexmedetomidine 10mcg group, which was prolonged compared to Fentanyl group (114 ± 14.5 mins) when given as adjuvants to 0.75% hyperbaric Ropivacaine.

Time of onset of motor block

In our study, the time of onset of motor block was early in group D10 (1.5 ± 0.3 mins) and Group D20 (1.5 ± 0.1 mins) compared to group D15 (2.9 ± 0.3 mins), group D5 (2 ± 0.3 mins) and group C (10.4 ± 0.6 mins), which was statistically significant, $p < 0.01$. This is comparable to study conducted by Shagufta Naaz et al,^[7] where they found the time of onset of motor block was earliest in group Dexmedetomidine 20mcg (1.66 ± 0.11 mins) compared to group Dexmedetomidine 15mcg (2.23 ± 0.39 mins), group Dexmedetomidine 10mcg (2.33 ± 0.57 mins), group Dexmedetomidine 5mcg

(2.27 ± 0.46 mins) and Control group (3.61 ± 0.67 mins), when given with hyperbaric bupivacaine. The difference in time for other groups could be because of use of hyperbaric bupivacaine in their study, where as we have used hyperbaric ropivacaine.

Total duration of motor block

Total duration of motor block was prolonged in our study in Group D20 (423 ± 4.1 mins), compared to Group D15 (419.2 ± 6 mins), Group D10 (298.6 ± 7.9 mins), Group D5 (264.3 ± 10.2 mins) and Control group (148.5 ± 2.7 mins), which was statistically significant, $p < 0.01$. Similar to this is the study by Shagufta Naaz et al,^[7] where total duration of motor block was prolonged in group Dexmedetomidine 20mcg (460.7 ± 52.1 mins) compared to group Dexmedetomidine 15mcg (411.7 ± 48.7 mins), group Dexmedetomidine 10mcg (386.3 ± 30.7 mins), group Dexmedetomidine 5mcg (251.4 ± 46.5 mins) and Control group (150.6 ± 23.8 mins), when given with hyperbaric bupivacaine. More prolongation compared to our study may be because of use of hyperbaric bupivacaine, where as we have used Hyperbaric Ropivacaine.

Total duration of post-operative analgesia

In our study, time for first rescue analgesia was prolonged in Group D20 (663.6 ± 6.8 mins) compared to Group D15 (486.4 ± 6.4 mins), Group D10 (359.3 ± 8 mins), Group D5 (293.2 ± 12.3 mins) and Control group (172.1 ± 5.4 mins), which was statistically significant, $p < 0.01$. Similar was the findings in study conducted by Shagufta Naaz et al,^[7] where time for first rescue analgesia was prolonged in group Dexmedetomidine 20mcg (702.4 ± 52 mins) compared to group Dexmedetomidine 15mcg (540.3 ± 51.6 mins), group Dexmedetomidine 10mcg (310.7 ± 48.1 mins), group Dexmedetomidine 5mcg (259.1 ± 15.2 mins) and Control group (201.5 ± 29.1 mins). Manohar et al¹⁰, observed in their study that time for first rescue analgesia was prolonged in Group D, 0.75% hyperbaric Ropivacaine + Dexmedetomidine 5mcg (303.20 ± 48.65 mins) compared to Group C, 0.75% hyperbaric Ropivacaine + Clonidine 50mcg (260.20 ± 51.61 mins). More prolongation in Dexmedetomidine 5mcg group compared to Group D5 in our study may be because of use of 0.75% hyperbaric Ropivacaine in their study. In a study conducted by Bhure AR et al,^[11] it was observed that similar to our study Dexmedetomidine 15mcg group (401.5 ± 19.7 mins) prolonged post-operative analgesia compared to Dexmedetomidine 10mcg group (362.5 ± 18.93 mins) given as adjuvant to 0.5% hyperbaric bupivacaine. Post-operative analgesia with Dexmedetomidine 15mcg is more prolonged compared to that in study conducted by Bhure AR et al,^[11] this may be because they have used 0.5% hyperbaric Bupivacaine where as we have used 0.42% hyperbaric Ropivacaine. Adverse effects overall were seen significantly more in Group D20 (45% of patients), compared to Group D15 (35% of

patients), Group D10 (20% of patients), Group D5 and C (10% of patients). This correlates with the study by Shagufta et al,^[7] where bradycardia and hypotension were observed significantly more in Group Dexmedetomidine 20mcg and 15mcg.

CONCLUSION

Dexmedetomidine 20mcg provided adequate intra operative Anaesthesia and though its duration of post-operative analgesia was twice that of Dexmedetomidine 10mcg, these beneficial effects were offset by the incidence of adverse effects and prolonged immobilization after surgery. Hence, we conclude that Dexmedetomidine 10mcg which provides similar intra operative Anaesthesia and optimal duration of post-operative analgesia facilitating early ambulation, is the ideal dose of intrathecal adjuvant to 0.42% hyperbaric Ropivacaine in lower abdominal surgeries under SAB.

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