

## A COMPARATIVE STUDY OF DEXMEDETOMIDINE AND FENTANYL COMBINED WITH ROPIVACAINE FOR EPIDURAL ANAESTHESIA IN LOWER LIMB ORTHOPAEDIC SURGERIES

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### ABSTRACT

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#### BACKGROUND

Intrathecal anaesthesia and epidural anaesthesia are the most popular regional anaesthesia techniques used for lower limb surgeries. Intrathecal anaesthesia also called as subarachnoid block. It has few limitations like short duration of anaesthesia, extension of anaesthesia cannot be made for prolonged surgeries, rapid onset of sympathetic blockade, shorter duration of postoperative analgesia and troublesome complication of Post-Dural Puncture Headache (PDPH). Hence, epidural anaesthesia is the most preferred anaesthetic technique for lower limb surgeries these days.

#### METHODS

##### TIME FRAME

The study was conducted during period spanning December 2013 to November 2014.

#### STUDY POPULATION

Patients who met all inclusion criteria were randomly selected. No distinction is made between males and females.

#### STUDY DESIGN

A prospective, randomised, double blind, case control, observational, interventional comparative study is designed after getting the informed written consent was obtained from the patient.

#### RANDOMISATION

Randomisation was done using a computer generated random number table.

One hundred patients scheduled for various elective lower limb surgical procedures belonging to ASA class I and II were included in the study. 1. Group RD (n=50) 15 mL of 0.75% ropivacaine + 0.6 µg/kg of dexmedetomidine (Inj. DEXTOMID-1 mL=100 mcg, 1 mL ampoule); 2. Group RF (n=50) 15 mL of 0.75% ropivacaine (ropivacaine 0.75% preservative free-ROPIN 0.75%, 20 mL ampoules-Neon Laboratories, India), fentanyl 1 µg/kg Inj. FENTANYL-1 mL=50 mcg, 2 mL ampoule).

The patients were premedicated with tablet alprazolam 0.5 mg and tablet ranitidine 150 mg orally at bedtime on the previous night before surgery. They were kept nil orally 10 p.m. onwards on the previous night. On the day of surgery, patient's basal pulse rate and blood pressure were recorded. A peripheral intravenous line with 18 gauge cannula after local anaesthesia was secured in one of the upper limbs. All the patients were preloaded with 500 mL of Ringer lactate 30 minutes prior to the epidural procedure multi-parameter monitor was connected, which records heart rate, non-invasive measurement of Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP), continuous Electrocardiogram (ECG), monitoring and Oxygen Saturation (SPO<sub>2</sub>). With the patients in sitting position for epidural anaesthesia, painting the lumbar spine with 7.5% povidone-iodine solution waited for three minutes after that cleaned with the rectified spirit after that draped with the sterile clothes. Under aseptic precautions, after infiltrating skin with the 2% Xylocaine epidural space was identified by loss of resistance technique to air using 18G Tuohy needle via the midline approach at either L2-3 or L3-4 interspinous space (whichever space was felt better). An epidural catheter was threaded and fixed at 3 cms inside the epidural space. A test dose of 3 mL of 2% lignocaine with 1:2,00,000 adrenalin was injected through the catheter after aspiration. Study drug prepared by another colleague anaesthetist who was unaware of the study according to the randomised study number generated against the patient. 15 mL volume of drug, which was a mixture of the ropivacaine 0.75% and added study drugs dexmedetomidine or fentanyl. The dosages of these drugs were 0.6 µg/kg of dexmedetomidine and 1 µg/kg of fentanyl, respectively. After ruling out intrathecal and intravascular placement of the tip of the catheter, the study drug injected in increments of 5 mL. The patients were turned to supine position immediately after giving the study drug. Sensory and motor blockade were assessed at the end of each minute with the patient in supine position after completion of the injection of the study drug. The onset time for sensory and motor block, The maximum level of sensory block, Intensity of motor block and sedation scores were recorded (Tab 1). Sensory blockade was assessed using a short bevel 22 gauge needle and was tested in the midclavicular line on the chest, trunk and lower limbs on either side. Motor blockade in the lower limbs was assessed using modified Bromage scale.<sup>[4,5]</sup>

#### RESULTS

The minimum age in groups RD and RF was 20 and 18 years respectively. The maximum age in both groups RD and RF was 65 years respectively. There was no significant difference in the age of patients between the Group RD and Group RF.

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Both groups were similar with respect to age distribution ( $p > 0.05$ ). The mean body weight in group RD was  $56.10 \pm 6.11$  kg and group RF is  $58.64 \pm 5.17$  kg. There was no significant difference in the body weight of patients between the groups ( $p = 0.27$ ). The mean duration of surgery was  $90.83 \pm 23.12$  min in group RD and  $96.83 \pm 27.49$  min in group RF. There was no statistically significant difference between the groups. The meantime of onset of sensory blockade in group RD was  $5.26 \pm 1.49$  min and in RF  $10.04 \pm 2.5$  min. Statistically, significant difference was observed between the groups ( $p = 0.000$ ). The mean time taken for the onset of motor blockade was  $11.22 \pm 2.61$  min in group RD and  $15.36 \pm 3.28$  mins in group RF. There was statistically significant difference between the groups ( $p = 0.000$ ). Group RD had the highest level of T5 and highest level in RF group was T6. There was no significant difference between the two groups ( $p > 0.05$ ). Regarding motor blockade in both the groups, the number of patients with Bromage 1 were 15 in group RF and 0 in group RD whereas patients with Bromage 3 were 0 in group RF and 16 in group RD. More intense motor blockade of Bromage 3 was found in patients in group RD compared to patients in group RF. The p value being 0.001, which was highly significant (Tab-4). On comparing sedation scores in both groups, group RD had the highest score of 4 and highest score in group RF was 2. Dexmedetomidine had greater scores compared to fentanyl. There was statistically significant difference between the groups ( $p = 0.001$ ) (Tab-5). The mean duration of sensory block was  $359.30 \pm 61.94$  min in group RD and  $198.0 \pm 24.05$  mins. in group RF. There was statistically significant difference between the groups ( $p = 0.001$ ). The mean duration of motor blockade was  $233.70 \pm 15.26$  mins. in group RD,  $149.00 \pm 14.21$  mins. in group RF. There was statistically significant difference between the group ( $p = 0.001$ ) (Tab-6). There was no statistically significant difference in the mean heart rate between groups at various intervals. 4 patients in RD group developed bradycardia, which was treated with Inj. Atropine 0.6 mg. There was no statistically significant difference in systolic blood pressure between both the groups. 7 patients in group RD and 4 patients in group RF developed hypotension, which was treated with intravenous fluids and Inj. Mephentermine.

### SIDE EFFECTS

Bradycardia and dry mouth seen only in the RD group, none was in RF group. Hypotension, nausea and vomiting, tremors observed in both groups, which were statistically insignificant.

### POSTOPERATIVE ANALGESIA

Initial four hours of the postoperative period requirement of epidural top up was not required in the RD group. 50% of patients in RD group required epidural top ups in next 4-8 hrs. Whereas after next 8 hrs., all the patients in the two groups required epidural top ups. Another finding was that the intensity of the pain was less in the RD group compared to the RF group.

### CONCLUSIONS

A statistically significant difference in the onset of sensory and motor blockade observed between ropivacaine with dexmedetomidine and ropivacaine with fentanyl group. Ropivacaine and dexmedetomidine group produced more intense motor blockade than ropivacaine with fentanyl group. Duration of sensory block is prolonged with ropivacaine with dexmedetomidine group compared to ropivacaine with fentanyl group. Duration of motor block is also prolonged with ropivacaine with dexmedetomidine group compared to ropivacaine with fentanyl group. Ropivacaine with dexmedetomidine group had greater sedation scores compared to ropivacaine with fentanyl group. Side effects like significant hypotension and bradycardia were not observed in any of these groups. Hence, it can be concluded that dexmedetomidine given epidurally with ropivacaine produces synergistic effects of profound prolonged motor blockade and also prolonged duration of sensory blockade. Ropivacaine with dexmedetomidine can be a safe and effective agent for epidural blockade in lower limb surgeries. Dexmedetomidine given epidurally with ropivacaine produces synergistic effect of profound and prolonged motor blockade and also a prolonged duration of sensory blockade. There is relatively less incidence of complications and side effects when dexmedetomidine used as an adjunct in the epidural anaesthesia. Hence, it was concluded that dexmedetomidine can be used as a more potent and safer alternative to fentanyl in epidural anaesthesia as an adjuvant to ropivacaine.

### KEYWORDS

Anaesthesia, Spinal E03.155.086.331, Anaesthesia, Epidural E03.155.086.131, Conscious Sedation E03.250.

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**INTRODUCTION:** Different local anaesthetics are used for epidural anaesthesia, most popular in India being Lidocaine and Bupivacaine.<sup>[1]</sup> The drawback of lidocaine is its intermediate duration of action and the drawback of bupivacaine though long-acting is increased incidence of fatal cardiac toxicity after accidental intravascular injection because of low dosage for cardiovascular collapse and central nervous system toxicity (cc/cns).<sup>[2]</sup>

For this reason, there has been a search for alternative drugs with desirable blocking properties of bupivacaine, but with a greater margin of safety. Ropivacaine and levobupivacaine are the newer long-acting amide local anaesthetics, which have a wide margin of safety compared to bupivacaine with all its advantages.<sup>[2]</sup> Dexmedetomidine is a highly selective  $\alpha_2$  adrenergic agonist with an affinity of eight times greater than clonidine. Various studies have shown that the dose of clonidine is 1.5-2 times higher dexmedetomidine when used in epidural route. The anaesthetic and the analgesic requirement get reduced to a huge extent by the use of dexmedetomidine because of its analgesic properties and augmentation of local anaesthetic effects as they cause hyperpolarisation of nerve tissues by altering transmembrane potential and ion conductance at locus coeruleus in the brainstem.<sup>[3]</sup>

**AIMS AND OBJECTIVES:** To study the synergistic effect of adding dexmedetomidine to ropivacaine 0.75% and fentanyl to ropivacaine 0.75% in epidural anaesthesia for lower limb surgeries, regarding.

1. Onset and duration of sensory blockade.
2. Onset and duration of motor blockade.
3. Haemodynamic changes.
4. Maximum dermatomal level of analgesia.
5. Intensity of motor blockade.
6. Sedation.
7. Any adverse effects.

## MATERIALS AND METHODS

**Time Frame:** The study was conducted during period between December 2013 to November 2014. The study was undertaken after obtaining institutional ethical committee clearance as well as informed consent from all patients.

**Study Population:** Patients who met all inclusion criteria were randomly selected. No distinction is made between males and females.

**Study Design:** A prospective, randomised, double blind, case control, observational, interventional comparative study is designed after getting the informed written consent was obtained from the patient.

**Randomisation:** Randomisation was done using a computer generated random number table. One hundred patients scheduled for various elective lower limb surgical procedures belonging to ASA class I and II were included in the study. Group RD (n=50)-15 mL of 0.75% ropivacaine + 0.6  $\mu$ g/kg of dexmedetomidine (Inj. DEXTOMID-1 mL=100 mcg, 1 mL ampoule). Group RF (n=50) 15 mL of 0.75% ropivacaine (ropivacaine 0.75% preservative free-ROPIN 0.75% 20 mL ampoules-Neon Laboratories, India) fentanyl 1  $\mu$ g/kg Inj. FENTANYL-1 mL=50 mcg, 2 mL ampoule).

**PROCEDURE:** The patients were premedicated with tablet alprazolam 0.5 mg and tablet ranitidine 150 mg orally at bedtime on the previous night before surgery.

They were kept nil orally 10 p.m. onwards on the previous night. On the day of surgery, patient's basal pulse rate and blood pressure were recorded. A peripheral intravenous line with 18 gauge cannula after local anaesthesia was secured in one of the upper limbs. All the patients were preloaded with 500 mL of Ringer lactate 30 minutes prior to the epidural procedure. Multi-parameter monitor was connected, which records heart rate, non-invasive measurement of Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP), continuous Electrocardiogram (ECG) monitoring and Oxygen Saturation (SPO<sub>2</sub>). With the patients in sitting position for epidural anaesthesia, painting the lumbar spine with 7.5% povidone-iodine solution waited for three minutes after that cleaned with the rectified spirit after that draped with the sterile drapes. Under aseptic precautions, after infiltrating the skin with 2% Xylocaine epidural space was identified by loss of resistance to air technique using 18G Tuohy needle via the midline approach at either L2-3 or L3-4 interspinous space (whichever space was felt well).

An epidural catheter was threaded and fixed at 3 cm inside the epidural space. A test dose of 3 mL of 2% lignocaine with 1:2,00,000 adrenalin was injected through the catheter after aspiration. Study drug prepared by another colleague anaesthetist who was unaware of the study according to the randomised study number generated against the patient. 15 mL volume of drug, which was a mixture of the ropivacaine 0.75% and added study drugs dexmedetomidine or fentanyl. The dosages of these drugs were 0.6  $\mu$ g/kg of dexmedetomidine and 1  $\mu$ g/kg of fentanyl, respectively. After ruling out intrathecal and intravascular placement of the tip of the catheter, the study drug injected in increments of 5 mL. The patients were turned to supine position immediately after giving the study drug. Assessment of sensory and motor blockade was done at the end of each minute with the patient in supine position after completion of the injection of the study drug. The onset time for sensory and motor block, The maximum level of sensory block, Intensity of motor block and Sedation scores were recorded (Tab 1). Sensory blockade was assessed using a short bevel 22 gauge needle and was tested in the midclavicular line on the chest, trunk and lower limbs on either side. Motor blockade in the lower limbs was assessed using modified Bromage scale<sup>[4,5]</sup> (Tab-2). Measurements of blood pressure, heart rate and oxygen saturation will be recorded every 5 minutes till the end of 1 hour and then every 15 minutes till the end of surgery.

Hypotension was defined as reduction of systolic blood pressure more than 30% from basal systolic blood pressure or SBP less than 90 mmHg and was treated with increased rate of intravenous fluids and if needed injection mephentermine 3 mg (I.V.) given in increments. Bradycardia (<60 beats/min.) was treated with injection atropine 0.6 mg (I.V.). After the surgery, patients referred

to the recovery room (PACU) postanesthesia care unit where they remained until there was complete recovery of sensory and motor blockade. Epidural top up was given with 8 mL of 0.2% Inj. Ropivacaine once the patient complains of pain.

Postoperatively, vital parameters was recorded every 15 minutes, and also duration of sensory and motor blockade, any adverse events like nausea, vomiting, pruritus, dry mouth, urinary retention, shivering, etc. was noted. Onset of sensory blockade was taken as the time from the completion of the injection of the study drug till loss of sensation at T10 level. Onset of motor blockade was taken from the completion of the injection of study drug till the patient develops modified Bromage scale grade 1 motor blockade. Duration of motor block was taken from the time of injection till the patient attains complete motor recovery (Bromage 0). Duration of sensory block was taken from the time of injection till the patient complains of pain at the T10 dermatome. The results of the study were statistically analysed between the two groups.

**SAMPLE SIZE:** The power of the study was kept as 0.80 and the significance criteria are set at 0.05 and the sample size was calculated using the following formula for comparative studies:

$$N = \frac{4 \sigma^2 (z_{crit} + z_{pwr})^2}{D^2}$$

Where N=sample size,  $\sigma$ =assumed standard deviation of each group (assumed to be equal),  $Z_{crit}$ =value according to the table for the desired significance criterion,  $Z_{pwr}$ =values that given in table for the desired statistical power, D=minimum expected difference between two means. On the basis of results of preliminary studies, the standard deviation for the duration of sensory block is assumed to be 65 minutes. According to normal distribution 99% of the patients will experience if thrice the standard deviation used. A significance criterion of 0.05 and power of 0.80 was chosen. The difference of means was predicted by using conclusion of previous studies to be 120 min. With these assumptions,  $\sigma=2(65)=130$ ,  $Z_{crit}=1.960$ ,  $Z_{pwr}=0.842$ ,  $D=120$  cm, the above formula yields a sample size of 82.73 for both the groups. For practical purposes, the sample size rounded to the nearest whole number of 100 (50 in each group).

**Statistical Method Applied:** Statistical analysis was done using SPSS version 20.0. Descriptive statistics was done by calculating mean, standard deviation, range and proportion appropriately. The inferential statistics (test of significance) was done using unpaired t-test two way repeated measure ANOVA and chi-square.

#### Inclusion Criteria:

1. Adult patients aged between 18 to 65 years of both sex.
2. Patients belonging to ASA class I and II posted for elective lower limb surgical procedures.
3. Weight >50 kg.
4. Height 150-180 cms.

#### Exclusion Criteria:

1. Patients posted for Emergency Surgeries.
2. Obese patient with BMI >30.
3. Raised Intracranial Pressure.
4. Severe Hypovolemia.
5. Bleeding Coagulopathy.
6. Local Infection.
7. Uncontrolled Hypertension/Diabetes Mellitus.
8. Neurological Disorder and Deformities of Spine.
9. Cardiac Disease.
10. Hepatic Disease.
11. Allergy to Local Anaesthetics and Dexmedetomidine.
12. Patient Refusal for Regional Anaesthesia.
13. Pregnancy and Lactation.

**RESULTS:** The minimum age in groups RD and RF was 20 and 18 years respectively. The maximum age in both groups RD and RF was 65 years respectively. There was no significant difference in the age of patients between the Group RD and Group RF. Both groups were similar with respect to age distribution ( $p > 0.05$ ). The mean body weight in group RD was  $56.10 \pm 6.11$  kg and group RF is  $58.64 \pm 5.17$  kg. There was no significant difference in the body weight of patients between the groups ( $p=0.27$ ). The mean duration of surgery was  $90.83 \pm 23.12$  mins. in group RD, and  $96.83 \pm 27.49$  mins. in group RF. There was no statistically significant difference between the groups. The mean time of onset of sensory blockade in group RD was  $5.26 \pm 1.49$  mins. and in RF  $10.04 \pm 2.5$  mins. Statistically, significant difference was observed between the groups ( $p=0.000$ ). The mean time taken for the onset of motor blockade was  $11.22 \pm 2.61$  mins. in group RD and  $15.36 \pm 3.28$  mins. in group RF. There was statistically significant difference between the groups ( $p=0.000$ ). Group RD had the highest level of T5 and highest level in RF group was T6. There was no significant difference between the two groups ( $p > 0.05$ ) (Tab-3). Regarding motor blockade in both the groups, the number of patients with Bromage 1 were 15 in group RF and 0 in group RD whereas patients with Bromage 3 were 0 in group RF and 16 in group RD. More intense motor blockade of Bromage 3 was found in patients in group RD compared to patients in group RF. The p value being 0.001, which was highly significant (Tab-4). On comparing sedation scores in both groups, group RD had the highest score of 4 and highest score in group RF was 2. Dexmedetomidine had greater scores compared to fentanyl. There was statistically significant difference between the groups ( $p=0.001$ ) (Tab-5). The mean duration of sensory block was  $359.30 \pm 61.94$  mins. in group RD and  $198.0 \pm 24.05$  mins. in group RF.

There was statistically significant difference between the groups (p=0.001). The mean duration of motor blockade was 233.70±15.26 mins. in group RD 149.00±14.21 mins. in group RF. There was statistically significant difference between the group (p=0.001) (Tab-6). There was no statistically significant difference in the mean heart rate between groups at various intervals. 4 patients in RD group developed bradycardia, which was treated with Inj. Atropine 0.6 mg.

There was no statistically significant difference in systolic blood pressure between both the groups. 7 patients in group RD and 4 patients in group RF developed hypotension, which was treated with intravenous fluids and Inj. Mephentermine.

Alert and Wide Awake (S1)	1
Arousable to Verbal Command (S2)	2
Arousable with gentle Tactile stimulation (S3)	3
Arousable with Vigorous Shaking (S4)	4
Unarousable (S5)	5

**Table 1: Sedation Scoring as per (Five Point Scale)**

Grade 0	No Motor Block
Grade 1	Inability to Raise Extended Leg, Able to Move Knees and Feet
Grade 2	Inability to Raise Extended Leg and Move Knee, Able to Move Feet
Grade 3	Complete Motor Block of the Lower Limbs.

**Table 2: Bromage Scale**

Max Sensory Level	Group RD (No. of Patients)	Group RF (No. of Patients)	p-value
T5	5	0	0.10
T6	38	31	
T8	6	17	
T10	1	2	

**Table 3: Maximum Level of Sensory Blockade**

	Group RD	Group RF	p-Value
Bromage 1	0	15	<0.001
Bromage 2	34	35	0.35
Bromage 3	16	0	<0.001

**Table 4: Grade of Motor Blockade**

Sedation Score	Group RD	Group RF	p-Value
S1	0	17	0.001
S2	15	33	
S3	29	0	
S4	6	0	

**Table 5: Sedation Score**

	Mean	SD	p-Value
Duration of Sensory Block			
Group RD	359.30	61.94	0.001
Group RF	198.00	24.05	
Duration of Motor Block			
Group RD	233.70	15.36	0.001
Group RF	149.00	14.21	

**Table 6: Duration of Sensory and Motor Blockade (Minutes)**

**Side Effects:** Bradycardia and dry mouth seen only in the RD group, none was in RF group. Hypotension, nausea and vomiting, tremors observed in both groups, which were statistically insignificant.

**Postoperative Analgesia:** Initial four hours of the postoperative period requirement of epidural top up was not required in the RD group. 50% of patients in RD group required epidural top ups in next 4-8 hrs. whereas after next 8 hrs. all the patients in the two groups required epidural top ups. Another finding was that the intensity of the pain was less in the RD group compared to the RF group.

**DISCUSSION:** Casati et al in their study of epidural anaesthesia for total hip replacement compared bupivacaine and ropivacaine and used graded epidural and found 15 mL of ropivacaine and 14 mL of bupivacaine is the volume required to achieve T10 anaesthesia.<sup>[6]</sup> In our study, all the patients were given epidural block in sitting position because the patients with lower limb fractures found sitting position more comfortable because lower lumbar and sacral nerves are the thickest nerve roots and they will have a dense block when the drug is given in the sitting position.<sup>[7]</sup> In our study, the mean time for onset of sensory analgesia at T10 is 5.26±1.49 mins in group RD and 10.04±2.55 mins in group RF. This is statistically significant (p <0.001). Bajwa SJ, Arora V, Kaur J et al showed onset of sensory analgesia at T10 in ropivacaine + dexmedetomidine group was 7.12±2.44 mins. vs. 9.14±2.94 mins. in ropivacaine + fentanyl group and this is also statistically significant similar to our study.<sup>[8]</sup>

Though Saravia P.S.F., Sabbag AT et al found no significant change in the onset time for sensory block between ropivacaine and ropivacaine-dexmedetomidine groups,<sup>[9]</sup> the studies conducted by Bajwa SJ, Bajwa SK, Kaur J et al showed onset of sensory analgesia at T10 in ropivacaine + dexmedetomidine group was 8.52±2.36 mins. vs. 9.72±3.44 mins. in ropivacaine + clonidine group and this is statistically significant similar to our study and supports our study.<sup>[10]</sup> In our study, the maximum level of sensory block in group RD was T4 (n=5) and in group RF was T8. The range of block was very wide in both the groups (T12-T4). Bajwa SJ, Arora V, Kaur J et al showed maximum level of sensory block at T4-6 level in group RD compared to T5-T7 in group RF, which was similar with our study and supports our results also.<sup>[8]</sup> Saravia P.S.F., Sabbag AT et al found maximum level of sensory block at

T6 between only ropivacaine and ropivacaine with dexmedetomidine groups.<sup>[9]</sup> The study conducted by Bajwa SJ, Bajwa SK, Kaur J et al showed maximum level of sensory block at T5-6 level in group RD compared to T6-T7 in group RC, which compares with our study and supports our study.<sup>[10]</sup> In our study, the duration of sensory block was longer with RD group than the RF group. Mean 359.30±61.94 mins. RD group compared to mean 198.0±24.05 mins. with RF group. This was statistically significant ( $p < 0.001$ ). In the study conducted by Bajwa SJ, Arora V, Kaur J et al, they observed the mean duration of analgesia of 366.62±24.42 mins. in group RD compared to 242.16±23.86 mins. with group RF, which was highly significant.<sup>[8]</sup> In our study, it was found that group RD produced more intense motor block than group RF. 16 patients in RD group had grade 3 motor block compared with 0 patients in group R. Also, 15 patients in RF group had grade 1 motor block compared with 0 patients in group RD group.

This is statistically highly significant ( $p < 0.001$ ). In a study conducted by Bajwa SJ, Arora V, Kaur J et al, motor block was assessed using modified Bromage scale and complete motor block was achieved significantly earlier in RD group than the RF group, so it supports our study.<sup>[8]</sup> Saravia P.S.F., Sabbag AT et al found maximum motor block at level 3 in 68% and 32% had grade 1 and 2 block with no patient remained in grade 0 motor block in ropivacaine and dexmedetomidine group patients. In our study, group RD had the highest sedation score of 4 and in group RD was 2. Dexmedetomidine had greater scores compared to Fentanyl. This was statistically significant ( $p=0.001$ ).<sup>[9]</sup> Similar results were observed by Bajwa SJ, Arora V, Kaur J et al, dexmedetomidine has gained a lot of popularity as a sedative agent and similar findings were observed in our study as 38% and 42% of patients exhibited grade II and grade III sedation compared to 16% and 2% of patients in the RF group, respectively.<sup>[8]</sup> These sedation scores were highly significant on statistical comparison ( $P < 0.001$ ).

Only 12% of the patients in the RD group had sedation scores of 1 compared to 82% wide and awake patients in RF group, which was highly significant statistically ( $P < 0.001$ ). Coskuner I, Tekin M et al conclude that intravenous administration of dexmedetomidine prolonged the duration of epidural anaesthesia, provided sedation and had few side-effects.<sup>[11]</sup> Lopez SAO, Sanchez KAM et al in their study on lower abdominal surgeries concluded that the use of dexmedetomidine by epidural route at 1 µg/kg dose plus local anaesthetics is an alternative to achieve an anaesthetic quality that enables to keep the patient in a state of active sedation, which reduces the likelihood of respiratory depression, which can arise when adjuvant drugs are administered intravenously.<sup>[12]</sup>

**CONCLUSION:** A statistically significant difference in the onset of sensory and motor blockade observed between ropivacaine with dexmedetomidine and ropivacaine with

fentanyl group. Ropivacaine and dexmedetomidine group produced more intense motor blockade than ropivacaine with fentanyl group. Duration of sensory block is prolonged with ropivacaine with dexmedetomidine group compared to ropivacaine with fentanyl group. Duration of motor block is also prolonged with ropivacaine with dexmedetomidine group compared to ropivacaine with fentanyl group. Ropivacaine with dexmedetomidine group had greater sedation scores compared to ropivacaine with fentanyl group. Side effects like significant hypotension and bradycardia were not observed in any of these groups. Hence, it can be concluded that dexmedetomidine given epidurally with ropivacaine produces synergistic effects of profound prolonged motor blockade and also prolonged duration of sensory blockade.

Ropivacaine with dexmedetomidine can be a safe and effective agent for epidural blockade in lower limb surgeries. There was relatively less incidence of complications and side effects when dexmedetomidine used as an adjunct in the epidural anaesthesia. Hence, it is concluded that dexmedetomidine can be used as a more potent and safer alternative to fentanyl in epidural anaesthesia as an adjuvant to ropivacaine.

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