

## Original Research Article

# Comparison of two different doses of dexmedetomidine (0.25 mcg/kg and 0.5 mcg/kg) in prolonging duration of spinal anaesthesia and postoperative analgesia in patients undergoing trans urethral resection of prostate: a prospective randomized double blinded study

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## ABSTRACT

**Background:** Trans urethral resection of prostate (TURP) under spinal anaesthesia (SAB) in elderly with associated cardio-pulmonary, endocrine or other co-morbidities induces detrimental physiological and psychological stress response to surgery and anaesthesia. Proper sedation during spinal anaesthesia can reduce this response. Aim of this study was to compare the characteristics of spinal block, hemodynamic changes, and postoperative analgesia, following administration of intravenous DMT (0.25 mcg/kg and 0.5 mcg/kg) in elderly patients undergoing TURP under SAB.

**Methods:** Sixty-eight patients were randomly allocated to two groups of 34 patients each. After giving spinal anaesthesia patients received two different doses of dexmedetomidine intravenously; 0.25 mcg/kg (Group D25) and 0.50 mcg/kg (Group D50) respectively. Drugs were given slowly in dilution of 10ml normal saline. Patients were monitored for intraoperative haemodynamics, sensory and motor block characteristics and postoperative analgesia in terms of VAS (visual analogue scale) and first and total dose of rescue analgesic.

**Results:** Mean value of lowest HR in Group D50 and D 25 was comparable ( $p=0.11$ ) and time taken to achieve lowest HR was also comparable ( $p=0.13$ ). Mean value of lowest SBP, DBP and MAP were lower in Group D50 than in Group D25 but the difference did not reach statistical significance ( $p=0.52, 0.95$  and  $0.41$  respectively). Onset of sensory block was comparable between the two groups,  $p=0.62$ . Maximum sensory block was achieved significantly earlier in Group D50 ( $10.64 \pm 2.75$  min versus  $12.94 \pm 3.04$  min in Group D25),  $p=0.0012$ . Group D50 patients achieved Bromage score 3 earlier ( $10.735 \pm 1.797$  min) than group D25 ( $12.794 \pm 2.52$  min) ( $p=0.00$ ). Recovery from motor block was found earlier in Group D25 group ( $141.325 \pm 4.97$  mins) compared to Group D50 ( $154.41 \pm 8.143$  mins). Group D50 reported significantly higher sedation than group D25 ( $p=0.00$ ). Group D25 reported more pain at 4 hours compared to Group D50 (VAS  $-4.705 \pm 0.462$  versus  $2.588 \pm 1.478$ ). Time of requirement of first rescue analgesia was delayed in Group D50 ( $270.59 \pm 50.78$  mins) than in Group D25 ( $172.50 \pm 10.46$  mins),  $p=0.000$ .

**Conclusions:** Dexmedetomidine is effective in relieving anxiety in elderly patients undergoing TURP under spinal anaesthesia. Dose of 0.50 mcg/kg is more effective than 0.25 mcg/kg without increasing the risk of adverse effect.

**Keywords:** TURP, Spinal anaesthesia, Sedation, Dexmedetomidine

## INTRODUCTION

Most of the patients coming for trans urethral resection of prostate (TURP) under spinal anaesthesia (SAB) are

elderly with associated cardio-pulmonary, endocrine or other co-morbidities.<sup>1</sup> Adjuvants are often used along with local anaesthetic agents, in order to minimize hemodynamic complications due to sympathetic blockade

and to improve the quality and duration of spinal anaesthesia in such patients with possible advantage of delayed-onset of postoperative pain and reduced analgesic requirement.<sup>2-8</sup> Proper sedation during spinal anaesthesia relieves patient's anxiety and improves physiological and psychological stress response to surgery and anaesthesia, and increases the satisfaction of both the surgeon and patient.<sup>9,10</sup>

We hypothesized that a small dose of DMT (0.25 mcg/kg and 0.5 mcg/kg) following low-dose Bupivacaine (8mg) spinal anaesthesia would produce an appropriate sensory block of TURP, rapid recovery from the limited motor block, and effective postoperative analgesia.

The aim of this study was to compare the characteristics of spinal block, hemodynamic changes, and postoperative analgesia, following administration of intravenous DMT (0.25 mcg/kg and 0.5 mcg/kg) combined with low-dose Bupivacaine in elderly patients undergoing TURP.

## METHODS

This prospective randomised, double blind, clinical study was conducted for a duration of 18 months from January 2017 to June 2018. After taking approval of the institutional ethical committee and informed consent of each patient. this study was conducted out on 68 male patients aged 50-80 years with ASA grade I and II scheduled for Transurethral resection of prostate (TUR-P) under spinal anaesthesia.

Sample size has been calculated using software Epi Info™ 7, with the assumption of alpha error to be 5% and beta error to be 20% i.e., 95% confidence interval and 80% power of study. With assumption of exposed group taken to be 95% with 10% margin of error a sample size of 34 patients in each group was calculated.

After thorough pre-anaesthetic evaluation a day prior to surgery, all the patients received nil per oral instructions as per the standard protocol in the night.

Inclusion criteria were age 50-80 years, ASA grade I/II with no known drug allergy, while exclusion criteria was include ASA grade III and IV, known case of sinus bradycardia, history of coagulopathy, severe mitral stenosis, aortic stenosis, skin infection at spinal sites.

By a computer-generated randomization table. Patients were randomly allocated in two groups: group D25 and group D50. After 10 mins of spinal anaesthesia patients received IV Dexmedetomidine 0.25 mcg/kg and 0.50 mcg/kg respectively; diluted in 10 ml of normal saline, over a period of 10 min.

Group D25: Patients receiving I.V. DMT 0.25 mcg/kg in dilution of 10 ml over 10 minutes, immediately after spinal anaesthesia with 0.5% hyperbaric bupivacaine 1.3 ml (8 mg).

Group D50: Patients receiving I.V. DMT 0.50 mcg/kg in dilution of 10 ml over 10 minutes, immediately after spinal anaesthesia with 0.5% hyperbaric bupivacaine 1.3 ml (8 mg).

On the day of surgery procedure was explained to the participants and written informed consent was obtained from each participant. Intravenous access was secured and infusion of Ringer's lactate solution started. Patients were shifted to the operative room after which routine non-invasive monitor was applied and vital signs were monitored.

The anesthesiologist who was not participating in study prepared the drugs, while second anesthesiologist monitored the data intraoperatively and postoperatively.

After preloading the patients with ringer lactate 15 ml/kg, lumbar puncture was performed in sitting position at L3-L4 level with 25G Quincke type spinal needle. Injection bupivacaine 1.3 ml (8 mg) solution was injected intrathecally over 30 seconds. As per group allocation Injection DMT 0.25 mcg/kg or 0.5 mcg/kg in dilution of 10 ml was given by infusion pump over 10 mins, immediately after spinal anaesthesia.

Heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial blood pressure (MAP), oxygen saturation were measured at specific time interval that is baseline and at 2,5,10,15,30,60,120 minutes after DMT infusion.

Height of sensory block was assessed by pin-prick test in mid axillary line. Motor block was assessed by modified Bromage score (0 to 3). Any fall in the heart rate > 50 beats/minute was considered as bradycardia and treated with incremental doses of Injection intravenous (IV) atropine 0.3 mg. Systolic arterial blood pressure below 100 mmHg, a decrease in initial systolic arterial pressure of 20% from baseline, or both was considered as hypotension and treated with Injection Mephentermin 6 mg incremental boluses. Sedation score was assessed by Ramsey sedation score (RSS). Post-operative pain intensity was assessed using VAS scale at 2, 6, 10, 12, 24 hour (hr) and Injection Tramadol 50 mg was used as rescue analgesic once VAS score was >3.

The time for two segment sensory regressions and time to motor recovery that is time to reach to modified Bromage scale of 0 were also evaluated.

If patient complained of pain during surgery, it was considered as failure of SAB and Injection Fentanyl 2 mcg/kg was given as bolus and if necessary, supplementation with General anaesthesia was done. Patient requiring Inj. Fentanyl supplementation or G.A. was not included for statistical analysis.

Data was presented as mean, standard deviation, median (range), or percentage, as appropriate. Study data was

entered into the statistical package for social sciences (SPSS) software (version 17, SPSS, Chicago, IL) and was analyzed with the chi-square test for qualitative and student t-test for quantitative variables, between the trial and control groups, P values less than 0.05 was considered significant.

**RESULTS**

Both groups were comparable regarding mean value of age, weight, ASA grade and duration of surgery (p>0.05) (Table 1).

Mean baseline heart rate was comparable in both the groups. Both the groups reported significant fall in HR from baseline after giving study drug at various time interval during the surgery (2 mins till 60 mins). The difference in the HR from baseline was highly significant from 10 mins till 60 mins in Group D50 whereas in D25 groups this decrease in HR was highly significant at 15 mins and significant for rest of the time periods.

Baseline mean SBP and DBP were comparable in both the groups. Both the groups reported decrease in SBP after giving study drug but the difference was non significant between the groups on statistical scale at various time interval during surgery (2 mins till 60 mins). When decrease in SBP was compared within each group, D50 groups reported highly significant from 10 till 60 mins, whereas in D25 group fall in SBP was significant at 2 mins and highly significant at rest of the time periods.

To analyze the hemodynamic effect more precisely we recorded the lowest value of heart rate, SBP, DBP and MAP in each patient and time taken to achieve this lowest value. Mean value of lowest HR in Group D50 and D 25 was comparable (p=0.11) and time taken to achieve lowest HR was also comparable (p=0.13). Mean value of lowest SBP, DBP and MAP were lower in Group D50 than in Group D25 but the difference did not reach statistical significance (p=0.52,0.95 and 0.41 respectively). Mean value of time taken for lowest SBP, DBP and MAP were also comparable (p=0.60, 0.76 and 0.72 respectively) (Table 2).

**Table 1: Demographic comparison of both groups.**

	Group D50 (n=34)	Group D25 (n=34)	P value
Mean age (years)	65.41±6.98	70.00±7.72	0.012 (NS)
Mean weight (kg)	59.97±7.17	59.00±8.35	0.609 (NS)
ASA grade (I/II)	28/6	27/7	0.758 (NS)
Duration of Surgery (minutes)	66.18±22.16	60.74±13.82	0.229 (NS)

\*P<0.05 is significant(S), P<0.001 is highly significant (HS), Non-significant (NS)

**Table 2: Comparison of haemodynamic parameters in two groups.**

	Group D50 (n=34)	Group D25 (n=34)	P value	
<b>Heart rate (HR)</b>	Preoperative HR	84.88±13.55	83.35±14.58	0.65 (NS)
	Mean of lowest HR	63.794±11.138	67.5±12.34	0.11 (NS)
	Time taken to achieve lowest HR (min)	33.735±22.753	25.76±20.22	0.13 (NS)
<b>S.B.P. (mm of Hg)</b>	Preoperative SBP	132.82±13.48	134.05±12.66	0.69 (NS)
	Mean of lowest SBP	112.74±11.38	111.15±13.64	0.60 (NS)
	Time taken to achieve lowest SBP (min)	25.88±22.10	22.91±15.41	0.52 (NS)
<b>D.B.P. (mm of Hg)</b>	Preoperative DBP	82.67±9.12	86.61±9.27	0.08 (NS)
	Mean of lowest DBP	71.26±8.38	71.85±7.28	0.76 (NS)
	Time taken to achieve lowest DBP (min)	23.91±24.15	24.24±16.23	0.95 (NS)
<b>M.A.P. (mm of Hg)</b>	Preoperative MAP	94.58±11.22	96.58±12.35	0.49 (NS)
	Mean of lowest MAP	79.21±10.74	78.32±9.37	0.72 (NS)
	Time taken to achieve lowest MAP (min)	26.62±23.79	34.65±51.74	0.41 (NS)

Onset of sensory block was comparable between the two groups,  $p=0.62$ . Maximum sensory block was achieved significantly earlier in Group D50 ( $10.64\pm 2.75$  min) as compared to group D25 ( $12.94\pm 3.04$  min),  $p=0.0012$ . Two segment regression of sensory block was also found earlier in D25 group ( $116.91\pm 5.64$  min) as compared to D50

group ( $135.73\pm 8.27$  min) and the difference was highly significant,  $p=0.00$ . Total duration of sensory block was found to be more in Group D50 ( $180\pm 10.94$  min) as compared to ( $159.41\pm 6.715$  min) in Group D25,  $p=0.00$  which was highly significant between the groups. (Table 3)

**Table 3: Characteristic of sensory block.**

	Group D50 (min)	Group D25 (min)	P value
<b>Onset of sensory level (T10)</b>	2.71±0.68	2.62±0.82	0.62 (NS)
<b>Time for reach maximum highest sensory block (T6)</b>	10.65±2.75	12.94±3.04	0.0012 (S)
<b>Time to two segments regression of sensory block</b>	135.73±8.27	116.5.64±5.6	0.00 (HS)
<b>Total duration of sensory block</b>	180±10.94	159.41±6.715	0.00 (HS)

\* $P<0.05$  is significant (S),  $P<0.001$  is highly significant (HS), Non significant (NS).

**Table 4: Characteristic of motor block.**

	Group D50 (min)	Group D25 (min)	P value
<b>Time for modified Bromage score 3</b>	10.735±1.797	12.794±2.52	0.0002 (HS)
<b>Time for modified Bromage score 0</b>	154.41±8.143	141.325±4.97	0.00 (HS)

\* $P<0.05$  is significant (S),  $P<0.001$  is highly significant (HS), Non significant (NS).

**Table 5: Comparison of modified Ramsey sedation score.**

	Group D50	Group D25	P value
<b>Intraoperative</b>	2.425±0.607	1.857±0.378	<0.0001 (HS)
<b>Postoperative</b>	1.417±0.445	1.1029±0.172	0.0003 (HS)

\* $P<0.05$  is significant (S),  $P<0.001$  is highly significant (HS), Non significant (NS).

**Table 6: Comparison of postoperative Vas score.**

Time (hours)	Group D50	Group D25	P value
<b>4</b>	2.588±1.478	4.705±0.462	<0.0001(HS)
<b>10</b>	2.236±1.827	1.970±1.977	0.567 (NS)
<b>12</b>	2.059±2.102	3.382±2.256	0.0148 (S)
<b>24</b>	4.177±0.387	4.823±0.387	<0.0001 (HS)

\* $P<0.05$  is significant (S),  $P<0.001$  is highly significant (HS), Non significant (NS).

**Table 7: Time to first rescue analgesic dose and total rescue dose and number of dose.**

	Group D50	Group D25	P value
<b>Time to first rescue dose (min.)</b>	270.59±50.78	172.50±10.46	0.000 (HS)
<b>Total rescue dose (mg)</b>	140.44±24.63	239.71±23.12	0.00 (HS)
<b>Total no. of dose</b>	2.71±0.462	4.529±0.563	0.00 (HS)

\* $P<0.05$  is significant (S),  $P<0.001$  is highly significant (HS), Non significant (NS).

Group D50 patients achieved Bromage score 3 earlier ( $10.735\pm 1.797$  min) as compared to ( $12.794\pm 2.52$  min) in group D25 ( $p=0.00$ ). Recovery from motor block time i.e. time to reach modified Bromage score 0 was found earlier in Group D25 group ( $141.325\pm 4.97$  mins) compared to Group D50 ( $154.41\pm 8.143$  mins) in Group D50. Difference was highly significant on statistical scale. (Table 4)

Comparison of modified RSS between the groups in intraoperative and postoperative period reported in Group D50 was higher sedation than group D25 and the difference was highly significant in both the periods,  $p=0.00$ . (Table 5). In Group D25 reported more pain at 4 hrs compared to Group D50 (VAS- $4.705\pm 0.462$  versus  $2.588\pm 1.478$ ).

This difference in VAS was highly significant at statistical scale. At 10 hours Group D50 as compared to Group D25 reported lower VAS but difference was non significant. At 12, 24 hours Group D50 has lower VAS compared to Group D25 which was significant at 12 hours and highly significant at 24 hours. (Table 6)

Time of requirement of first rescue analgesia (Injection Tramadol 100 mg) was delayed in Group D50 (270.59±50.78 mins) than in Group D25 (172.50±10.46 mins),  $p=0.000$ . Postoperatively analgesic requirement in terms of number of doses and total dose in mg was higher in Group D25 as compared to D50 and the difference was statistically highly significance ( $p=0.00$ ). (Table 7)

Most common intraoperative adverse effects was vomiting 20.6% (n=7) in Group D50 and 14.7% (n=5) in Group D25,  $p=0.525$ . Incidence of hypotension and bradycardia and dryness of mouth was comparable. 23.5% (n=5) patients of Group D50 experienced restlessness as compared to 2.9% (n=1) patients in Group D25 showing significant difference ( $p=0.012$ ). Requirement of mephentermine in terms of number of doses and total dose in mg was comparable in two groups ( $p=0.18$  and  $p=0.78$  respectively). Similarly, there was no significant difference in requirement of atropine in terms of number of doses ( $p=1.00$ ) and total doses in mg ( $p=1.00$ ) in the two groups.

## DISCUSSION

Spinal anesthesia is the technique of choice in TURP.<sup>1</sup> Spinal anesthesia has the advantage of being able to maintain spontaneous breathing as well as relaxing the necessary muscles for surgery.<sup>9,10</sup> It also provides post-operative analgesia, reduces blood loss during surgery and prevents the need for tracheal intubation that may irritate the airway leading to coughing and straining and may exacerbate postoperative hemorrhage.

Although awake patient in regional anaesthesia has theoretical advantages, such as earlier detection of TURP syndrome but it is having potential disadvantage of limited time of anaesthesia, patient's anxiety for anaesthesia and surgery and discomfort in lithotomy position. Generally, most failures in regional anaesthesia, including spinal anaesthesia, are related to inadequate sedation and relief of anxiety rather than technical problems.

Adequate sedation in spinal anesthesia relieves the anxiety of the patient, improves physiological and psychological stress, and increases the satisfaction of both the surgeon and patient.<sup>9,10</sup> On the other hand excessive sedation not only masks the early signs of TURP syndrome but also produces postoperative delirium in elderly patients. So, the aim of sedation with spinal anaesthesia in TURP should be to provide a cooperative and arousable patient with cardiopulmonary stability.<sup>11</sup>

Dexmedetomidine is a sedative, hypnotic, analgesic, and to a certain extent can cover up inadequate block height and has minimal respiratory depressant effect.<sup>12</sup>

On analysis of the demographic profile both the groups were found to be comparable regarding age, weight, ASA (I, II) grade and duration of surgery. Similarly Kim et al when compared intrathecal dexmedetomidine with normal saline for patients undergoing TUR-P found that there was no statistically significant difference in the demographic characteristics like age, weight and duration of surgery in two groups.<sup>13</sup>

A bolus of dexmedetomidine results in transient increase in blood pressure and reflex decrease in heart rate. The initial response is attributed to the direct effects of B-adrenoreceptor stimulation of vascular smooth muscle. This response can be attenuated by a slow infusion over 10 minutes,

In our study we found that the mean baseline heart rate was comparable in both the groups and both the groups reported significant fall in HR from baseline after giving study drug at various time interval during the surgery (2 mins till 60 mins). Harsoor et al when compared IV dexmedetomidine bolus followed by infusion with normal saline on characteristic of spinal anesthesia with hyperbaric bupivacaine also found that intraoperative heart rate decreased statistically with intravenous dexmedetomidine from 15 mins till 90 minutes.<sup>14</sup> But unlike our study they injected dexmedetomidine bolus before giving SAB and used continuous infusion of dexmedetomidine throughout the surgery.

In contrary to our study Jung et al also found no significant difference in HR when compared two different doses 0.25 and 0.5 mcg/kg of IV dexmedetomidine with SAB for lower limb surgery.<sup>15</sup> Hamed et al (2014) when compared IV dexmedetomidine 0.5 mcg/kg after 5 mins of SAB to 3 mcg IT dexmedetomidine with 12.5 mg hyperbaric bupivacaine also found statistically significant fall in mean heart rate at 20 mins until 60 mins in IV dexmedetomidine group.<sup>16</sup>

In our study baseline SBP, DBP and MAP were comparable in both the groups. Significant fall in BP (SBP, DBP and MAP) was reported in both the groups after giving study drugs but it remains comparable when compared between the groups. As the time passed BP decreased further and became significantly low from baseline at various time interval during surgery. When mean value of lowest parameters of SBP, DBP and MAP were calculated and compared they were found to be lower in Group D50 than in Group D25 but the difference did not reach statistical significance ( $p=0.52, 0.95$  and  $0.41$  respectively). Mean value of time taken for lowest SBP, DBP and MAP were also comparable ( $p=0.60, 0.76$  and  $0.72$  respectively).

In agreement to our study Harsoor et al also reported significant decrease in blood pressure in Group D from 15 min following SAB which persisted to be low for 90 mins.<sup>14</sup> Contrary to this in our study BP started decreasing 2 mins after giving study drug. This could be explained by combined hypotensive effect of SAB and dexmedetomidine as we had given drug immediately after SAB. In their study MAP was significantly low from 60 min until end of surgery and for the initial 2 hours postoperatively, and this may be because of the continuous dexmedetomidine infusion 0.5 mcg/kg/hr.

Sharma et al also found significant fall in intraoperative SBP, DBP from 10 mins till 85 mins in Group D as compared to control group.<sup>17</sup> They had injected dexmedetomidine 10 mins prior to SAB. Similar to our study Kubre et al also injected dexmedetomidine 0.5 mcg/kg post spinal but only after the haemodynamics effects of SAB were settled. Though there was fall in MAP in group D as well as Group C after spinal anesthesia, it was not clinically significant.<sup>18</sup> And there was no further decrease MAP after dexmedetomidine infusion.

Contrary to our study Hamed et al when compared IV dexmedetomidine with intrathecal dexmedetomidine found SBP, DBP were comparable among the three groups throughout the study period.<sup>16</sup>

Intravenous dexmedetomidine prolongs the motor and sensory block of bupivacaine by an additive or synergistic effect of both of them. Intravenous dexmedetomidine acts by depressing the release of C-fibres transmitters through binding to presynaptic C fibres and by hyperpolarization of postsynaptic dorsal horn neurons.

In our study maximum sensory block was achieved significantly earlier in Group D50 and block persisted for longer duration in this group compared to D25 group. Two segment regression of sensory block was found earlier in D25 group (116.91±5.64 min) as compared to D50 group (135.73±8.27 min) and the difference was highly significant,  $p=0.00$  which could be attributed to the lower doses of dexmedetomidine in D25 showing a positive additive or synergistic effect of higher doses of dexmedetomidine as seen in D50.

Similar to our study Jung et al had conducted a study where they compared two different doses of dexmedetomidine (0.25 and 0.5 mcg/kg) to control group and found that two-dermatome sensory regression time was significantly increased in dexmedetomidine groups.<sup>15</sup> The duration of motor and sensory anesthesia was significantly increased in group 0.5 mcg/kg. But maximum level of block was not found different in three groups.

More et al (2017) did not found any significant difference in time to achieve highest sensory block in dexmedetomidine group as compared to normal saline group but duration of sensory block, two segment regression of sensory block and regression of MBS 0 was

significantly prolonged in group D as compared to group C which supported our study.<sup>19</sup> They also noted earlier achievement of MBS 3 in dexmedetomidine group as compared to control but the difference was not significant. Similar to our study Annamalai et al (2013) also found that IV dexmedetomidine given before and 30 mins after intrathecal administration of bupivacaine prolongs the duration of sensory blockade and increases the maximum level of block during spinal anesthesia when compared with control group however duration of motor block was found similar in all the groups.<sup>20</sup> But in our study Group D50 patients achieved Bromage score 3 earlier as compared to group D25 ( $p=0.00$ ). Recovery from motor block time ie; time to reach modified Bromage score 0 was also found earlier in Group D25 group compared to Group D50.

Abdallah et al in a systematic review and meta analysis found that IV dexmedetomidine can prolonged the duration of sensory block by at least 34% (point estimate 8%), and motor block duration was prolonged by at least 17% (point estimate 21%),  $p<0.00001$  when compared with placebo.<sup>21</sup>

Lee et al used two different doses of dexmedetomidine (0.5 mcg/kg and 1 mcg/kg) 10 mins before SAB and found that two segment regression times of sensory block and time for regression of motor block was prolonged in dexmedetomidine group but contrary to our study they did not find statistically significant differences in duration of spinal anaesthesia between the D-1 and the D-0.5 groups.<sup>22</sup>

Harsoor et al gave dexmedetomidine (0.5 mcg/kg) 10 mins prior to SAB and found faster onset of sensory block and prolongation in time for two segment regression of sensory block.<sup>14</sup> Motor block was also found to be faster in onset and slower in regression when compared with control group. But in their study, they used infusion of dexmedetomidine throughout the surgery.

In contrast, Lugo et al in their study noted prolongation of sensory block without significant effect on motor block while using 1 mcg/kg bolus followed by 0.5 mcg/kg/h infusion of dexmedetomidine.<sup>23</sup> Similarly Kaya et al (2010) also reported that the use of single dose of 0.5 mcg/kg of dexmedetomidine did not affect the duration of motor block.<sup>24</sup>

Sedation produced by dexmedetomidine is like that of natural sleep as it act on the locus cereleus of the brain, which induces sedation resembling natural sleep by means of sleep modulation and maintaining respiratory control.<sup>12</sup>

Group D50 reported significantly higher sedation than group D25 both intraoperatively and postoperatively in our study. In contrast Jung et al found that there was no significant difference in sedation scores with two different doses of dexmedetomidine (0.25 and 0.5 mcg/kg).<sup>15</sup> Harsoor et al found higher intraoperative sedation with dexmedetomidine when compared the control group but

postoperative sedation scores were comparable in their study.<sup>14</sup> Lee et al also reported higher sedation score in group given higher doses of dexmedetomidine (1 mcg/kg) as compared to 0.5 mcg/kg.<sup>22</sup>

Dexmedetomidine inhibits the release of substance P from the dorsal horn of spinal cord, leading to primary analgesic effects, which was well proven in our study by different parameters assessed for postoperative analgesia.

Most of the studies compared the effects of dexmedetomidine either IV or IT to control group and found dexmedetomidine was an effective analgesic and prolonged duration of analgesia and time for first rescue analgesia.

In our study, Group D25 reported more pain at 4 hrs compared to Group D50 (VAS-4.705±0.462 versus 2.588±1.478) which was highly significant at 12 and 24 hours Group D50 had lower VAS as compared to Group D25 which was significant at 12 hours and highly significant at 24 hours.

In our study we compared two different doses of dexmedetomidine and found that time for need of first rescue analgesia (Injection Tramadol 100 mg) was delayed in Group D50 than in Group D25 (p=0.000). Postoperatively analgesic requirement in terms of number of doses and total dose in mg was higher in Group D25 as compared to D50 and the difference was statistically highly significance (p=0.00). Dinesh et al also reported prolongation in time for request of first rescue analgesic and 24 hours mean analgesic requirement lesser in dexmedetomidine group compared to control group.<sup>25</sup> Similarly Reddy et al when compared intravenous dexmedetomidine with clonidine before spinal anesthesia observed longer interval for first rescue analgesic in dexmedetomidine group.<sup>26</sup>

Abdallah et al revealed that use of intravenous dexmedetomidine produces 60% reduces in pain score at 6 hrs.<sup>21</sup> Annamalai et al has used 1 mcg/kg dexmedetomidine as slow bolus over 10 min, either 10 min before or 30 min after the spinal anesthesia with bupivacaine reported reduced pain score and longer duration of postoperative analgesia by dexmedetomidine.<sup>20</sup> Kaya et al reported no significant difference in VAS score between the groups postoperatively at 4,12, 24 hours.<sup>24</sup>

In our study most common intraoperative adverse effects was vomiting 20.6% (n=7) in Group D50 and 14.7% (n=5) in Group D25, p=0.525. Incidence of hypotension and bradycardia and dryness of mouth was comparable. 23.5% (n=5) patients of Group D50 experienced restlessness as compared to 2.9% (n=1) patients in Group D25 showing significant difference (p=0.012).

Similar to our Lee et al did not found difference in incidence of hypotension and bradycardia among the

groups.<sup>22</sup> More et al also reported less incidence of nausea, vomiting and shivering in dexmedetomidine group as compared to control group.<sup>19</sup>

In our study requirement of mephentermine in terms of number of doses and total dose in mg was comparable in two groups (p=0.18 and p=0.78 respectively). Similarly, there was no significant difference in requirement of atropine in terms of number of doses (p=1.00) and total doses in mg (p=1.00) in the two groups.

Incidence of hypotension and bradycardia had been reported and compared in many studies Hameed et al, Harsoor et al, Sharma et al but doses of mephentermine and atropine required were not compared.<sup>14,16,17</sup>

Jung et al found no difference in incidence of hypotension and treatment-needed bradycardia among the groups while More et al found that bradycardia and hypotension do occur but it is transient and responds to atropine and mephentermine.<sup>15</sup>

## CONCLUSION

We concluded that 0.5 mcg/kg of IV dexmedetomidine is significantly better (p<0.001) in terms of sensory, motor block characteristics and postoperative analgesic requirement as compared to 0.25mcg/kg while the incidence of hypotension, bradycardia, sedation, vomiting and dryness of mouth were comparable in both the groups.

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