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A Comparative Study Between Bupivacaine And Bupivacaine With Dexmedetomidine In Spinal Anaesthesia For Infraumbilical Surgeries- A Study Done In Katihar

Dr Tabrez Iqbal Rahmani, Dr Ashutosh Kumar Jha, Dr Sabir Hasnat, Dr. Syed Shadab Sultan
(Anesthesiology, Katihar Medical College And Hospital, India)

Abstract:
Background*: Spinal anesthesia is a widely utilized regional anesthesia technique, particularly for infraumbilical surgeries. It provides effective sensory and motor blockade, minimal systemic side effects, and stable hemodynamics, making it a preferred choice in various surgical procedures, including lower abdominal, urological, and lower limb surgeries. Bupivacaine, a long-acting amide local anesthetic, is frequently used in spinal anesthesia due to its potent analgesic effects and prolonged duration of action. Dexmedetomidine, a highly selective α2-adrenergic agonist, has emerged as a promising adjuvant to local anesthetics in spinal anesthesia.*
Materials and Methods*: 50 consecutive patients both male and female belonging to ASA I & II in age group of 18-60 years and body weight between 45-80 kg undergoing infraumbilical surgeries in KATIHAR MEDICAL COLLEGE. Group B (n=25) received 3 ml of 15 mg of heavy bupivacaine + 0.5 ml of 0.9% normal saline to a total volume of 3.5 ml. Group D (n=25) received 3 ml of 15 mg of heavy bupivacaine + 0.5 ml of 5 µg of dexmedetomidine with 0.9% saline to a total volume of 3.5 ml.*
Results*: Group D showed a significantly prolonged duration of motor block regression to Modified Bromage 1 (334.04 ± 26.53 min) compared to Group B (191.04 ± 16.53 min; p < 0.001). Group D had significantly prolonged sensory regression (360.96 ± 12.88 min) compared to Group B (219.96 ± 16.88 min; p < 0.001). Group D had a prolonged time to first request for postoperative analgesia (376.48 ± 13.37 min) compared to Group B (236.48 ± 15.36 min; p < 0.001).*
Conclusion: *Overall, the study demonstrates that dexmedetomidine significantly enhances sensory and motor block durations, delays postoperative analgesic requirement, and offers improved pain control with minimal side effects, aligning with recent literature findings. These results reinforce dexmedetomidine as a superior adjuvant to bupivacaine for spinal anesthesia*
Key Word*: Bupivacaine; Dexmedetomidine; Spinal Anaesthesia; Infraumbilical Surgeries.*

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I. Introduction

Bupivacaine, a long-acting amide local anesthetic, is frequently used in spinal anesthesia due to its potent analgesic effects and prolonged duration of action. However, its association with potential cardiotoxicity and motor blockade has led to the exploration of adjuvants to enhance its efficacy while minimizing side effects [1].

Intrathecal α2-receptor agonists are found to have antinociceptive action for both somatic and visceral pain [2]. Dexmedetomidine, a highly selective α2-adrenergic agonist, has emerged as a promising adjuvant to local anesthetics in spinal anesthesia. It has been shown to prolong the duration of both sensory and motor blockade when added to bupivacaine, with minimal adverse effects. Dexmedetomidine acts at the spinal cord level by modulating nociceptive transmission and reducing sympathetic outflow, leading to enhanced analgesia and sedation [3]. Compared to other adjuvants such as fentanyl and clonidine, dexmedetomidine has demonstrated superior efficacy in prolonging analgesia duration, reducing postoperative opioid requirements, and providing better hemodynamic stability [4].

Several studies have compared the efficacy of bupivacaine alone versus bupivacaine with dexmedetomidine, reporting superior analgesia, reduced postoperative opioid requirement, and prolonged sensory blockade in the combination group [5,6].

Intrathecal Dexmed (ITD) has been used as an adjuvant to different local anesthetics in humans with various doses ranging from 2.5 to 15 micrograms (µg)resulting in prolonged duration of sensory and motor blockade and a decrease in the requirement of the local anaesthetic dosage [7,8].

Till date, studies on evaluation of the effect of intrathecal dexmedetomidine as adjuvant to hyperbaric bupivacaine in spinal anaesthesia are sparse. Therefore, we planned this study at our institute with an aim to investigate the onset and duration of sensory and motor block, level of sedation, hemodynamic changes, post-operative analgesia and adverse effect profile following intrathecal administration of dexmedetomidine.

Key parameters analyzed in this study included the onset time of sensory and motor blockade, duration of analgesia, hemodynamic stability, and incidence of adverse effects. This study aimed to provide valuable insights into the role of dexmedetomidine as an adjuvant in optimizing spinal anesthesia outcomes.

II. Material And Methods

Study design: Prospective, randomized, double blind placebo-controlled study.

Study duration: 1 year after taking permission from the Institutional Ethics committees

Study area: KATIHAR MEDICAL COLLEGE.

Study population: 50 consecutive patients both male and female belonging to ASA I & II in age group of 18-60 years and body weight between 45-80 kg undergoing infraumbilical surgeries in KATIHAR MEDICAL COLLEGE. The patients were randomly allocated into two groups (n=50): Group B(n=25) and Group D(n=25).
Group B (n=25) received 3 ml of 15 mg of heavy bupivacaine + 0.5 ml of 0.9% normal saline to a total volume of 3.5 ml.
Group D (n=25) received 3 ml of 15 mg of heavy bupivacaine + 0.5 ml of 5 µg of dexmedetomidine with 0.9% saline to a total volume of 3.5 ml.

Sample size: Sample size was based on previous study done by Gautam B et al (9) using the formula for hypothesis testing of two means
By using the formula: $n = 2Sp2 (Z1-\alpha/2 + Z1-\beta)2/\mu 2d$
$Sp2 = S12 + S22/2$

With standard deviation value of 106.70 for Group B(n=25) and 121.51 for Group D(n=25) respectively considering a difference in duration of sensory block with alpha value of 5% and beta value of 20% (power 80%). Sample size will be calculated to 25 for group. So we will include 25 patients in each group.

Selection criteria:

- Inclusion criteria:

i. Subjects of either sex undergoing infraumbilical surgeries in KATIHAR MEDICAL COLLEGE & HOSPITAL.
ii. Patients with age of 18-50 years.
iii. Patients with height between 150- 170cms and body weight 50 - 80 kg.
iv. ASA grade – I & II.

- Exclusion criteria:

i. Subjects unwilling for sub-arachnoid Anaesthesia.
ii. Patients with a known history of allergy to the drug used in the study.
iii. Spinal deformity and other contra-indications for sub-arachnoid block.
iv. Pregnancy
v. After 15 minutes of subarachnoid block patients with sensory block below the level of T10 or those needed any analgesic supplementation or general anaesthesia during the operative procedure.

Pre-Operative:

Standard pre-operative protocol of my institute were adhered to, including the informed consent for anaesthesia, surgery and study protocol from the patient. She/he was made familiar with the variable to be used for the comparison in the study. Each patient went through complete pre anaesthetic check up which included detailed history taking, thorough physical examination, along with routine preoperative investigations. All patients had routine pre-operative preparations including fasting for at least 8 hours before surgery.

On The Day Of Surgery:

All enrolled subjects were assessed clinically preoperatively in the operation theatre Standard multi-para monitor were applied to monitor heart rate, non-invasive blood pressure (NIBP), oxygen saturation (SpO2), temperature, ECG. A 18G intravenous (IV) cannula was placed on a suitable peripheral vein in the forearm and

a rapid IV infusion of at least 500ml prewarmed Lactated Ringer's solution was done before giving sub-arachnoid block.

Randomization was done by a closed-envelope technique. The study drug was prepared by an anesthesiologist not involved in the study.

The study drug was then be prepared 5 minutes prior to spinal anesthesia and administered by an anesthesiologist not involved in the study. The investigator was also blinded regarding the content of those solutions prepared for the patients. The patient were placed in sitting position and will be anesthetized in the L3-L4 intervertebral disc space using a standard (25G) Quincke spinal needle and using a standard midline approach with strict aseptic precautions. Intrathecal drug administration were performed after free CSF flow gets confirmed in each quadrant while rotating the needle 360 degrees while removing the stylet. Immediately after the injection, the patient were placed supine on a horizontal operating table with a pillow under the head and neck. Time of onset of sensory block was evaluated by blunt pinprick at midclavicular line anteriorly every 1 minute interval after the injection, till the sensory block reaches up to the level of T10, thereafter every 10 minute. Surgery was allowed to start when adequate sensory block height (T8) was achieved. Postoperatively, the sensory block was assessed at 30 minute intervals till 90 minutes and 15 minute intervals thereafter until requirement of rescue analgesia.

The motor level was assessed according to modified Bromage score (10).

Progression of motor block was monitored every 1 minute interval till the block progressed to Grade3. Regression of motor block will be monitored every 15 min interval till block regressed to Grade 0. All durations was calculated considering the time of spinal injection as time zero.

Intraoperative fluid management was done in relation to body weight of the patient, vital signs and intraoperative blood loss. Haemodynamic parameters was monitored every 3 minutes for first 30 minutes and then at 15 minute intervals. Hypotension, defined as a decrease in systolic blood pressure (SBP) by 30% from baseline or less than 80 mm Hg, was managed with incremental IV boluses of 6 mg mephentermine or crystalloid fluids. Heart rate (HR) less than 50 beats/min was corrected using 0.6 mg of IV atropine sulphate. The incidence of adverse effects such as nausea, vomiting, shivering, itching, pruritus, respiratory depression and sedation was recorded.

Level of sedation was assessed by the Modified Ramsay sedation scale (11).

At the end of surgery the patient was shifted to the post-operative ward for monitoring. Pain scores were recorded using a 10-point Visual Analogue Scale (VAS) where 0 represents no pain and 10 represents the worst possible pain. Postoperatively, initially pain scores was recorded every 30 minutes for 2 hours, then every hour for the next 8 hours and every 4 hours for the next 24 hours .When VAS≥4 injection Diclofenac 75 mg was given intramascularly as rescue analgesia

III. Result

This prospective, randomized, double-blind study was conducted at Katihar Medical College & Hospital, to observe and compare the spinal block characteristics and postoperative analgesic efficacy of intrathecal hyperbaric bupivacaine 0.5% versus intrathecal hyperbaric bupivacaine 0.5% with dexmedetomidine 10µg, in patients of ASA physical status I & II of both sexes, of the age group 18-50 years, undergoing elective infra-umbilical surgery. No significant difference in age, height, and weight was observed between the two groups ($p > 0.05$), ensuring comparable baseline characteristics. Males were 52% in our study and females were 48%. The distribution was however, similar in both the groups. Mean duration of surgery was similar between groups B and D (67.28 ± 13.55 min vs. 66.80 ± 13.35 min; $p = 0.90$). This confirms uniform surgical conditions in both groups.

Table no 1: Comparison of onset of T10 sensory block between the two groups.

	Group	N	Mean	Std. Deviation	Std. Error Mean	P-value
Onset time of sensory block at T10(mins)	B	25	5.280	.8907	.1781	0.03
	D	25	4.800	.6455	.1291	

Group D achieved a significantly faster onset of sensory block at T10 compared to Group B (4.8 ± 0.64 min vs. 5.28 ± 0.89 min; $p = 0.03$). Highest level of sensory block was T6 in 2/3rds of cases followed by T4 and T8 in both the groups (Table 1).

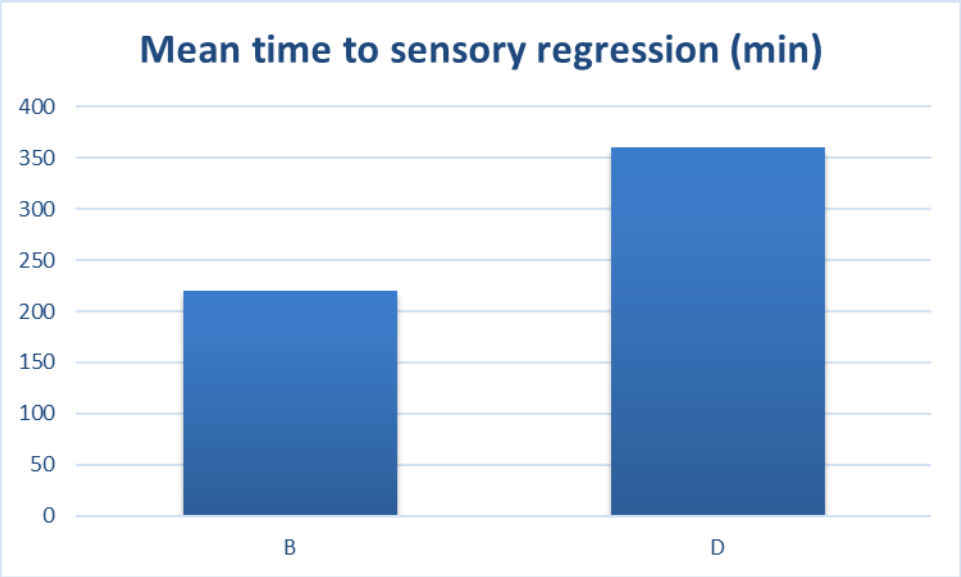
Table no 2: Comparison of Time of motor block Modified Bromage Grade 3 and of Time to motor regression to Modified Bromage 1 between the two groups.

	Group	N	Mean	Std. Deviation	Std. Error Mean	P-value
Time to motor block Modified Bromage3 (mins)	B	25	6.240	.9256	.1851	0.00
	D	25	5.340	.8956	.1551	
	B	25	191.04	16.5340	3.3068	0.00

Time to motor regression to Modified Bromage1 (mins)	D	25	334.04	26.5340	4.3068	

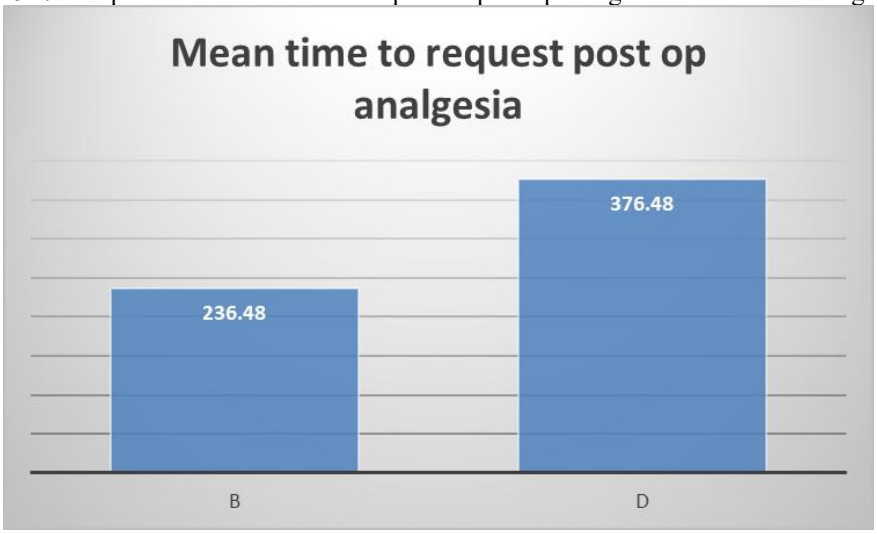
Group D showed a significantly prolonged duration of motor block regression to Modified Bromage 1 (334.04 ± 26.53 min) compared to Group B (191.04 ± 16.53 min; $p < 0.001$) (Table 2).

Figure 1: Comparison of Time to sensory regression to S2 between the two groups.



Group D had significantly prolonged sensory regression (360.96 ± 12.88 min) compared to Group B (219.96 ± 16.88 min; $p < 0.001$) (Figure 1).

Figure 2: Comparison of Time to first request of post-op analgesia between the two groups.



Group D had a prolonged time to first request for postoperative analgesia (376.48 ± 13.37 min) compared to Group B (236.48 ± 15.36 min; $p < 0.001$) (Figure 2).

- Heart Rate Trends: Group D showed stable heart rates comparable to Group B throughout the monitoring period.
- Systolic Blood Pressure Trends: Both groups displayed similar SBP patterns, with no significant instability.
- VAS Scores: Group D showed consistently lower VAS scores at 1, 2, 3, 4, 5, and 6 hours postoperatively, indicating superior pain control ($p < 0.05$ for all intervals).
- Adverse Effects: Incidence of bradycardia, hypotension, and shivering was comparable between groups, while dexmedetomidine exhibited a lower incidence of nausea and vomiting.

IV. Discussion

Adequate pain management is essential to facilitate rehabilitation and enabling the patients to return their normal activity more quickly. Postoperative pain management is one of the main challenges for anaesthesiologists and even with the help of multimodal analgesia techniques, patients still remain undertreated. Patients undergoing lower abdominal procedures under SAB with hyperbaric bupivacaine alone experience varying degrees of intraoperative pain and discomfort at the site of the surgery, in spite of an adequate level of sensory block.

The aim of this study was to compare the analgesic efficacy, onset and duration of sensory and motor blockade of bupivacaine heavy (0.5%) and bupivacaine heavy (0.5%) with preservative free dexmedetomidine (5µg) 0.5ml through subarachnoid route in patients undergoing elective lower abdominal surgery. Perioperative haemodynamic changes and any obvious side effects were also taken into consideration and were recorded.

In this study 50 patients of either sex belonging to ASA I & II in age group of 18-50 years and body weight between 50-80 kg were included. The patients were randomly allocated into two groups of 30 each according to drug administered.

Group B (n=25) received 3 ml of 15 mg of heavy bupivacaine + 0.5 ml of 0.9% normal saline to a total volume of 3.5 ml.

Group D (n=25) received 3 ml of 15 mg of heavy bupivacaine + 0.5 ml of 5 µg of dexmedetomidine with 0.9% saline to a total volume of 3.5 ml.

The dose of intrathecal dexmedetomidine has not yet been fixed. The search in literature revealed that different studies have been done with different doses of dexmedetomidine.

Halder et al. conducted a prospective parallel group study on 80 patients, (20-60yrs) posted for elective lower limb orthopedic surgery of traumatic origin under spinal anaesthesia. The patients were divided into 2 equal groups (Group D5&D10) in a randomized, double-blind fashion. Group D5(n=40) 3ml 0.5% hyperbaric bupivacaine+5µg dexmedetomidine in 0.5 ml of normal saline and group D10 (n=40) 3ml 0.5% bupivacaine+10µg dexmedetomidine in 0.5 ml of normal saline were administered intrathecally. Sensory and motor block onset times and block durations, time to first analgesic use, total analgesic need, postoperative VAS, hemodynamics and side effects were recorded for each patient. It was observed that sensory and motor block in group D10($p<0.05$) was earlier than group D5. Sensory, motor block duration and time to first analgesic use were significantly longer and the need for rescue analgesics was lower in group D10($p<0.05$) than D5. 24 h VAS score was significantly lower in group D10($p<0.05$). Intergroup hemodynamics was comparable ($p>0.05$) without any appreciable side effects (12).

A randomized, controlled, double blinded study which included 100 adult ASA I and II patients was conducted by Shagufta Naaz et al. They were allocated into five groups (n=20). Groups were designed as 2.5ml hyperbaric bupivacaine with 0.5ml saline (Control) or 0.5ml dexmedetomidine: 5mcg (D1), 10mcg (D2), 15 mcg (D3) and 20mcg (D4). The mean duration of analgesia and need of first rescue analgesics was 201.5±29.1 mins in control group but in D1 group 259.1±15.2 mins, D2 310.7±48.1mins, D3 540.3±51.6 mins and D4 702.4±52 mins. p=0.003. The mean highest VRS score along with analgesic requirements were significantly reduced in dexmedetomidine groups, but D3 and D4 had hypotension which needed correction. They concluded that 10 mcg of dexmedetomidine is optimum intrathecal dose (13).

A similar study was conducted by Halvadia S, Patel D. 75 patients of ASA I & II status were randomly divided into three groups of 25 patients each. Group A received 5 µg dexmedetomidine, Group B received 10 µg dexmedetomidine and Group C (control group) patients received only 0.5 ml of normal saline along with 2.5 ml hyperbaric bupivacaine. It was noted that time for onset of analgesia in Group C was 3.18 ± 0.30 min but in Group A was 2.33 ± 0.14 min and in Group B was 2.24 ± 0.06 min. Duration of motor block was significantly higher in study group; 279.36 ± 14.54 min and 344.21 ± 9.19 min in Group A and B respectively, whereas it was 169.39 ± 6.96 min in control group. Duration of analgesia was also significantly higher in study Group A (342.62 ± 13.06 min) and in Group B (398.24 ± 12.31 min) compared to control group which was 204.95 ± 8.54 min. They concluded that 10 µg dexmedetomidine is preferred adjuvant to hyperbaric bupivacaine in spinal anesthesia with early onset of analgesia and motor block, longer duration of motor and sensory block with hemodynamic stability and minimum side effects (14).

Hence we selected 0.5ml dexmedetomidine as an adjuvant to subarachnoid bupivacaine for spinal anaesthesia in infra-umbilical surgeries to prolong the postoperative analgesia.

It was seen that there was no statistically significant difference between the two groups in terms of demographic parameters like age, body weight, height, sex distribution, ASA distribution and duration of surgery (p-value >0.05).

The mean time to onset of sensory block for group B was 5.28 ± 0.89 minutes, while for group D was 4.8 ± 0.64 minutes. There was statistically significant difference between the two groups ($p = 0.0001$). The mean time taken for onset of maximum motor block in our study was 6.24 ± 0.92 minutes in group B and 5.34 ± 0.89 minutes in group D. There was statistically significant difference between the two groups ($p = 0.0001$).

These observations are similar to that observed in previous study by Halder et. Al (12). Thus, the addition of dexmedetomidine to hyperbaric bupivacaine for SAB hastens the speed of onset of sensory block and also the time taken for onset of maximum motor block compared to hyperbaric bupivacaine alone.
All patients had a grade 3 motor blockade in term of modified bromage scale in both groups.

Two groups were comparable in terms of mean heart rate, mean systolic blood pressure, mean diastolic blood pressure and mean arterial pressure. There was no statistically significant difference between the two groups in terms of mean hemodynamic parameters like (HR, SBP, DBP, MAP) at 0 min, 5min, 10min, 15 min, 30min, 45min, 60min, 75min, 90min, 105min and 120min.

In our study, we found that there was decrease in BP starting from 9 min after administration of subarachnoid block up to 60 min in group dexmedetomidine and 60 min in control (bupivacaine alone) group in peri-operative period.

Dexmedetomidine evokes a biphasic BP response: a short hypertensive phase and subsequent hypotension. The two phases are considered to be mediated by two different α2-AR subtype; the α2B receptor is responsible for initial hypertensive phase whereas hypotension is mediated by α2A receptor. α2 receptors are located in blood vessels where they mediate vasoconstriction and on sympathetic terminals, they inhibit norepinephrine release. The responses of activation of α2 receptors cause contraction of vascular smooth muscles leading to hypertension. The initial response lasts for 4–5 min and is followed by decrease in BP of 10%–20% below baseline and also stabilization of the heart rate below the baseline values. Both these effects are caused by the inhibition of central sympathetic outflow overriding the direct stimulating effect (16).

In group B sensory regression to S2 dermatome took 219.9 ± 16.8 minutes and group D took 360.9 ± 12.88 minutes. In group B time taken for modified bromage scale 0 from modified Bromage scale 3 was 191.0 ± 16.53 minutes, where as in group D it took 334.0 ± 26.53 minutes.

The differences in the mean times are highly significant between the two groups as indicated by $P < 0.0001$. This clearly states that dexmedetomidine is far superior to bupivacaine alone in this regard.

Al-Mustafa et al. did a study on 66 patients to determine the effect of adding dexmedetomidine to bupivacaine for neuraxial anesthesia. The patients were randomly assigned into 3 groups, each receiving spinal bupivacaine 12.5mg combined with normal saline (group N) Dexmedetomidine 5 µg(group D5), or dexmedetomidine 10 µg(group D10). They found the regression time to reach S1 dermatome was 338.9 ± 44.8 minutes in group D10, 277.1 ± 23.2 minutes in D5, and 165.5 ± 32.9 minutes in group N. The regression to Bromage 0 was 302.9 ± 36.7 minutes in D10, 246.4 ± 25.7 minutes in D5, and 140.1 ± 32.3 minutes in group N. Onset and regression of sensory and motor block were highly significant (N vesus D5, N versus D10, and D5 versus D10, $p<0.001$). It was concluded that dexmedetomidine prolongs the duration of spinal anesthesia in a dose-dependent manner (7).

Mahendru V et. al. conducted a prospective randomized double-blind study to compare intrathecal dexmedetomidine, clonidine, and fentanyl as adjuvants to hyperbaric bupivacaine for lower limb surgery The mean time of two segment sensory block regression was 147 ± 21 min in dexmedetomidine group , 117 ± 22 in clonidine group, 119 ± 23 in fentanyl group, and 102 ± 17 in control group ($P < 0.0001$). The regression time of motor block to reach modified Bromage zero (0) was 275 ± 25, 199 ± 26, 196 ± 27, 161 ± 20 in Group BD, BC, BF, and BS, respectively ($P < 0.0001$). They concluded that intrathecal dexmedetomidine is associated with prolonged motor and sensory block, hemodynamic stability, and reduced demand of rescue analgesics in 24 h as compared to clonidine, fentanyl, or lone bupivacaine (17).

Our study corroborates with the above two studies. In our study, the duration of effective analgesia was estimated by requirement of first rescue analgesia by the patient or whenever the VAS score was ≥ 4 during postoperative period. We also found that prolonged duration of analgesia was obtained in Group D. Time of 1st rescue analgesia in Group D was 376.48 ± 13.3 min and Group B was 236.48 ± 15.36 min. p value was <0.0001 and It is statistically highly significant.

Gupta R. et.al in their study found that time for 1st analgesic request in intrathecal magnesium group was (478.4±20.9 min) as compared to control group (241.67±21.67 min).p value was <0.05. Our study is consistent with this study (3).

In our study we observed VAS score at 1hr, 2hr, 3hr, 4hr, 5hr and 6 hr after surgery. We found patients of Group D have less VAS score than Group B at 1hr, 2hr, 3hr, 4hr, 5hr, 6hr after surgery (p value - 0.02, 0.01, 0.04 ,0.01, 0.04 and 0.09 respectively). At 6 hour after surgery VAS score becomes insignificant in between two group.

Mahendru V et. al. noted significantly less postoperative VAS scores and total analgesic requirement in 24 h 5 µg dexmedetomidine when compared to 30 µg clonidine ($P = 0.05$) and 25 µg fentanyl ($P = 0.009$) which supports the analgesic efficacy of dexmedetomidine as an intrathecal adjunct (17).

Shagufta Naaz et al. conducted a study to find out the optimum dose of dexmedetomidine to be used in lower abdomen surgery intrathecally. Groups were designed as 2.5ml hyperbaric bupivacaine with 0.5ml saline (Control) or 0.5ml dexmedetomidine: 5mcg (D1), 10mcg (D2), 15 mcg (D3) and 20mcg (D4). The mean duration

of analgesia and need of first rescue analgesics are 201.5±29.1 mins in control group but in D1 group 259.1±15.2 mins, D2 310.7±48.1mins, D3 540.3±51.6 mins and D4 702.4±52 mins. p=0.003. The mean highest VRS score along with analgesic requirements were significantly reduced in dexmedetomidine groups (13).
Our study is consistent with the studies of Mahendru V et. Al (17) and Shagufta Naaz et al (13).

Two (8%) patients in dexmedetomidine group and two(8%) patients in control group had hypotension for which injection mephentermine 6 mg was given, around five(20%) patients in dexmedetomidine group and two(8%) patients in control group had bradycardia which was treated with injection atropine 0.6 mg. No patient had nausea or vomiting in dexmedetomidine group. One (4%) patient had episode of nausea vomiting in control group. No patients in either group had respiratory depression or pruritus. The maximum intraoperative sedation scores were similar in the two groups. However, five (20%) patients in control(bupivacaine alone) group and none in dexmedetomidine developed shivering which is statistically significant(p value = 0.03)

Elhadary et al. have shown in their study that the use of intrathecal DEX combined with bupivacaine resulted in lower incidence of shivering, but more bradycardia in comparison with those who received intrathecal bupivacaine only. There was no difference between the study groups as regards the incidence of nausea, vomiting, and pruritus (18).
Our study corroborates with the above studies.

V. Limitations

The limitation of our study is that we have considered the analgesic effect of intrathecal dexmedetomidine in healthy patients of ASA I and II. Its effect on patients of ASA III and IV and those having comorbidities is yet to be studied. We cannot comment about its effect on patients in extremes of age. So, use of recommended dose of dexmedetomidine in comorbid, elderly and complicated systemic illness should be weighed before use. Also, the total analgesic requirement during 24 h was not noted in this study.

VI. Conclusion

On the basis of present study following conclusions were drawn:
1. Intrathecal dexmedetomidine with bupivacaine heavy (0.5%) produces excellent surgical analgesia and an extended analgesia in postoperative period.
2. Subarachnoid dexmedetomidine with bupivacaine heavy (0.5%) delays the onset of sensory and motor block but prolongs the duration of sensory and motor block.
3. Dexmedetomidine reduces the incidence of shivering thus avoiding any other medication.
4. Thus, overall the combined effect of magnesium sulphate and bupivacaine heavy (0.5%) is superior over (0.5%) heavy bupivacaine alone in case of subarachnoid block.

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