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Original Research Article

# Intraoperative Outcome of Subarachnoid Block Alone with Subarachnoid Block and Intravenous Infusion of Injection Dexmedetomidine in Elective Infra-Umbilical Surgical Cases: A Prospective Comparative Study

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**Conflict of interest: Nil**

**Abstract**

**Objectives:** The present study was to compare the efficacy of SAB alone with the combination of SAB and intravenous infusion of dexmedetomidine in elective infra-umbilical surgeries.

**Methods:** A total of 80 patients were undergone elective infra umbilical surgeries. All the cases were categorized into two groups. Group A- cases underwent subarachnoid block alone and Group B cases underwent subarachnoid block and intravenous infusion of injection Dexmedetomidine. A full anaesthetic checkup was done and patients accepted under ASA I & ASA II were enrolled. The onset of motor blockade was evaluated by using 4-Point modified Bromage score. Intra-operative requirement of sedatives was evaluated by Ramsay sedation score (RSS).

**Results:** Patients were divided into two groups of 40 patients each. Higher proportion of patients were in the age group of 46 to 60 years (40% in subarachnoid block versus 42.5% in SAB with dexmedetomidine). Five (05) patients in subarachnoid block group had T10 as maximum level of sensory block as compared to two (02) patients in SAB with dexmedetomidine group. 12 patients in subarachnoid block group had T8 as maximum level of sensory block as compared to five (05) patients in SAB with dexmedetomidine group. 22 patients in SAB with dexmedetomidine group had T6 as maximum level of sensory block, 18 patients in subarachnoid block had maximum level of sensory block at T6. While 11 patients in SAB with dexmedetomidine group had T4 as maximum level of sensory block, 5 patients in subarachnoid block alone group had maximum level of sensory block at T4. It was not statistically significant differenced ($p = 0.08$). The mean Ramsay sedation score was higher in SAB with dexmedetomidine group as compared to subarachnoid group. It was statistically significant difference at all observed time intervals ($p = 0.01$).

**Conclusion:** combination of SAB with dexmedetomidine resulted in significantly longer durations of sensory and motor blocks, providing an advantage in prolonging anaesthesia. No significant differences in intraoperative complications, vital signs, or adverse effects were observed between the clonidine and control group patients.

**Keywords:** Subarachnoid block, Dexmedetomidine, Infra-umbilical surgery, Introperative outcome.

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## Introduction

Subarachnoid block (SAB), commonly referred to as spinal anaesthesia, is a type of neuraxial blockade that involves the injection of local anaesthetic agents into the cerebrospinal fluid (CSF) within the subarachnoid space [1]. This space is located between the arachnoid and pia mater, and the injection is usually performed at the L3-L4 or L4-L5 intervertebral space to avoid damaging the spinal cord, which typically terminates at the level of L1 in adults. The procedure involves the use of a fine spinal needle, often a 25G or 27G Quincke or Whitacre needle, which is inserted into the intrathecal space until the characteristic free flow of CSF is observed. Once the correct placement is confirmed, a predetermined volume of local anaesthetic, such as bupivacaine, lidocaine, or ropivacaine, is injected, leading to a temporary but profound sensory, motor, and autonomic blockade [2]. Infra-umbilical surgeries refer to surgical procedures performed below the umbilicus, including hernia repairs, caesarean sections, urological surgeries (such as transurethral resection of the prostate or bladder tumour), gynaecological procedures (such as

hysterectomy), and orthopaedic procedures involving the lower limbs. SAB is particularly advantageous in these types of surgeries because it provides profound sensory and motor blockade while preserving spontaneous breathing and consciousness, making it an excellent choice for patients with compromised respiratory function or those at higher risk of complications from general anaesthesia [3].

The use of SAB in elective infra-umbilical surgeries offers multiple benefits. Firstly, it provides effective and predictable analgesia, eliminating the need for airway manipulation and reducing the risk of aspiration pneumonia, which is a concern in general anaesthesia. Secondly, it results in excellent muscle relaxation in the lower abdomen and pelvic region, which facilitates surgical exposure and reduces intraoperative bleeding due to sympathetic blockade and vasodilation [4]. Additionally, patients undergoing SAB generally experience reduced postoperative nausea and vomiting (PONV) compared to general anaesthesia, leading to enhanced recovery and patient satisfaction [5].

Objective of the present study was to compare the efficacy of SAB alone with the combination of SAB and intravenous infusion of dexmedetomidine in elective infra-umbilical surgeries. By evaluating key outcomes such as the onset and duration of sensory and motor blocks, intraoperative and postoperative vital signs, pain scores, and complications, the study seeks to provide a comprehensive understanding of whether the addition of dexmedetomidine offers significant advantages over standard SAB.

## Material and Methods

The present study was conducted in the Department of Anaesthesiology, MGM Medical College, Navi Mumbai during the period from July 2023 to December 2024. Entire subjects signed an informed consent approved by institutional ethical committee of MGM institute of Health Sciences, Navi Mumbai was sought. A total 80 participants with age group 18 to 60 years were randomly included for lower abdominal (infraumbilical) surgeries. All the cases were categorized into two groups (Group A & Group B). Each group had 40 cases.

### Inclusion Criteria:

- Patients having ASA grade I and II

### Exclusion Criteria:

- Patient having ASA grade 3 and above
- Patient having Heart Rate < 60/minutes (Reason: Dexmedetomidine causes bradycardia)
- Patients having Allergy to study drugs
- Patients with peripheral neuropathy or motor weakness.

### Method:

All the patients were undergone lower abdominal (infraumbilical) surgeries. Group A patients were received Subarachnoid block alone and group B patients were received Subarachnoid block and intravenous infusion of injection Dexmedetomidine

**Procedure**: A full anaesthetic checkup was done and patients accepted under ASA I & ASA II were taken up for the study. Skin was disinfected and 1-2 ml of local anaesthetic was injected into the skin around L3- L4 intervertebral space. The spinal needle was then be inserted in L3-L4 intervertebral space and pushed inside until free flow of CSF was seen. The onset of sensory block was evaluated by the loss of pinprick sensation in the lower limbs and abdominal regions as per required level. The onset of motor blockade was evaluated by using 4-Point modified Bromage score.

Intravenous infusion of maintenance dose of 0.2 mcg/kg Injection Dexmedetomidine was started for Group B patients immediately after giving spinal anaesthesia as per calculation according to body weight of patient, after giving the bolus dose of 0.5 mcg/kg Inj Dexmedetomidine over 10 mins intravenously.

Rate of Dexmedetomidine infusion was adjusted according to the requirement and vital parameters of the patient. Duration of sensory and motor blockade was assessed every 2 hourly till recovery of sensations. Sedative effect of dexmedetomidine was assessed intra-operatively. Incidence of side-effects like bradycardia and hypotension was also recorded. If patients had bradycardia, Inj. Atropine was given to that patient. If patients had any episode of hypotension, Inj. Mephentermine or Inj. Phenylephrine was administered.

**Study parameters:** Duration of sensory and motor blockade was assessed by Modified Bromage score. Intra-operative requirement of sedatives was assessed by Ramsay sedation score (RSS).

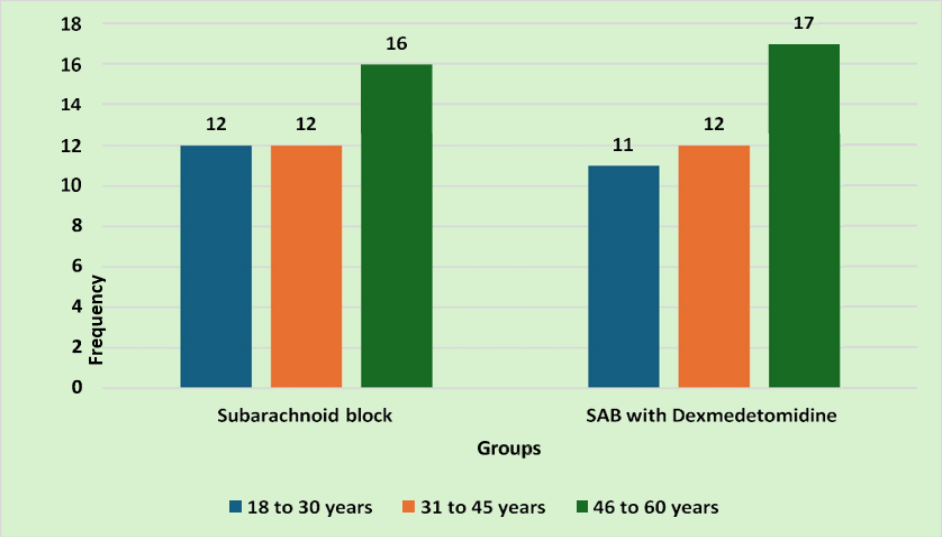
**Statistical Analysis:** The data was analyzed by using SPSS- version 25 software. Mean ± standard deviation was observed. Independent test and Chi-squared test were applied. P-value was taken less than or equal to 0.05 ($p \leq 0.05$) for significant differences.

## Results

A total of 80 patients were undergone elective infra umbilical surgery. Patients were divided into two groups of 40 patients each – Group A was

administered with subarachnoid block only while group B was administered with subarachnoid block along with intravenous infusion of injection dexmedetomidine. Gender distribution was comparable in both groups and the difference between the two groups was not statistically significant (p = 0.82).

Higher proportion of patients were in the age group of 46 to 60 years (40% in subarachnoid block versus 42.5% in SAB with dexmedetomidine). It was not statistically significant differenced (p = 0.96).




**Graph 1: Comparison of Groups based on Age**

26 patients in subarachnoid block with dexmedetomidine group had normal BMI while 25 patients in subarachnoid block group had normal BMI. Four (04) patients in both groups were obese. it was not statistically significant differenced (p = 0.97). In SAB with dexmedetomidine group, 23 patients had ASA I status while in subarachnoid block group, 25 patients had ASA I status. It was not statistically significant (p = 0.65).

**Table.1. Comparison of groups based on Maximum level of Sensory block**

| Maximum level of Sensory block | Groups | | p-value* |
|---|---|---|---|
| | Subarachnoid block n (%) | SAB with Dexmedetomidine n (%) | |
| T10 | 05 (12.5) | 02 (05) | 0.08 |
| T8 | 12 (30) | 05 (12.5) | |
| T6 | 18 (45) | 22 (55) | |
| T4 | 05 (12.5) | 11 (27.5) | |
| **Total** | 40 (100) | 40 (100) | |

*** p-value < 0.05 statistically significant; Chi square test applied**

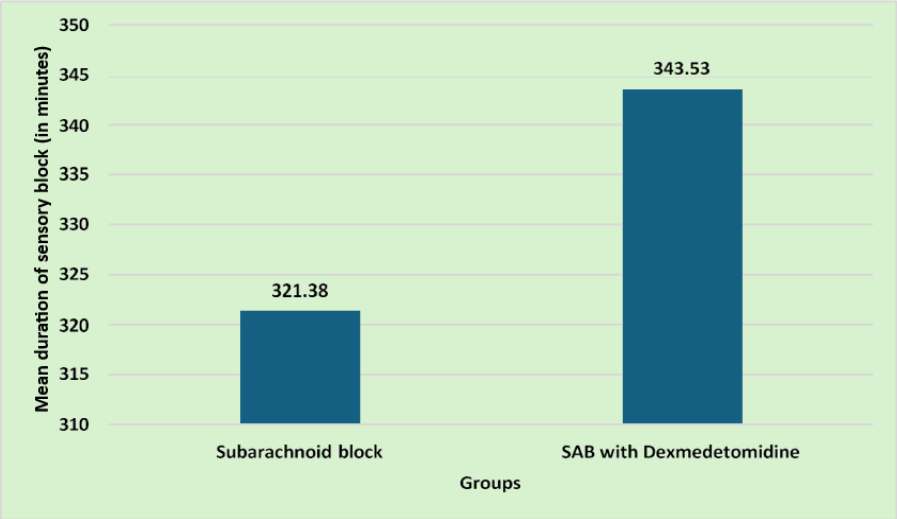
Five (05) patients in subarachnoid block group had T10 as maximum level of sensory block as compared to two (02) patients in SAB with dexmedetomidine group. 12 patients in subarachnoid block group had T8 as maximum level of sensory block as compared to five (05) patients in SAB with dexmedetomidine group. 22 patients in SAB with dexmedetomidine group had T6 as maximum level of sensory block, 18 patients in subarachnoid block had maximum level of sensory block at T6. While 11 patients in SAB with dexmedetomidine group had T4 as maximum level of sensory block, 5 patients in subarachnoid block alone group had maximum level of sensory block at T4. The difference was not statistically significant (p = 0.08). The mean time taken to onset of maximum sensory block was 9.45 ± 1.72 minutes among patients in SAB with dexmedetomidine group which was lower as compared to the mean time taken to onset of maximum sensory block among patients with subarachnoid block (9.78 ± 1.64 minutes). The difference was not statistically significant (p = 0.86).

**Table 2: Comparison of groups based on Time of Onset of Motor block**

| Variable | Groups | | | | p-value* |
|---|---|---|---|---|---|
| | Subarachnoid block | | SAB with Dexmedetomidine | | |
| | Mean | SD | Mean | SD | |
| Time to onset of Motor block (minutes) | 7.43 | 1.43 | 7.02 | 1.39 | 0.21 |

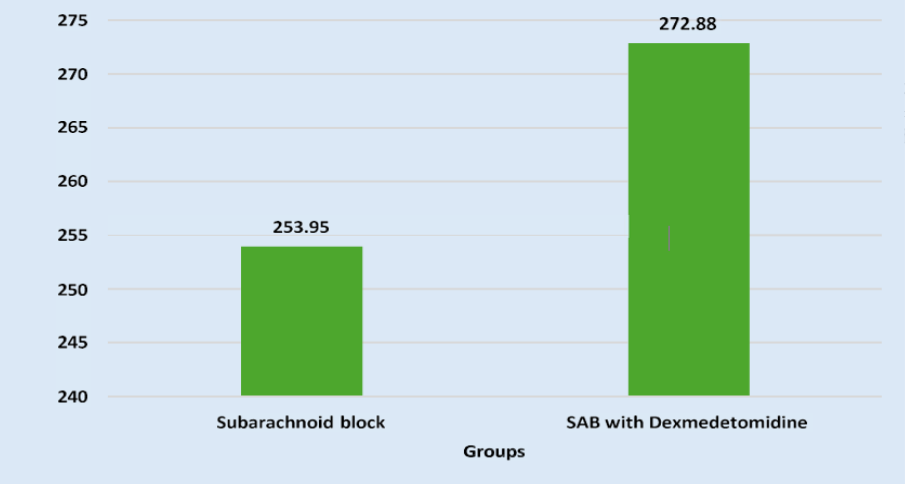
*** p-value < 0.05 statistically significant; Independent samples t-test applied**

The mean time of onset of motor block was lower in patients with SAB with dexmedetomidine groups (7.02 ± 1.39 minutes) as compared to mean time of onset of motor block in patients with subarachnoid block (7.43 ± 1.43 minutes). However, the difference between the two groups was not statistically significant (p = 0.21). The mean time to onset of maximum motor block was lower in patients with SAB with dexmedetomidine groups (13.38 ± 2.29 minutes) as compared to mean time to onset of motor block in patients with subarachnoid block (13.78 ± 2.35 minutes). The difference between the two groups was not statistically significant (p = 0.44).




**Graph 2: Comparison of groups based on Duration of Sensory block**

The mean duration of sensory block was higher among patients in SAB with dexmedetomidine group (343.53 ± 23.67 minutes) as compared to the mean duration of sensory block among patients in subarachnoid block alone group (321.38 ± 20.14 minutes). The difference between the two groups was statistically significant (p = 0.01) with longer duration of sensory block among patients administered SAB with dexmedetomidine.

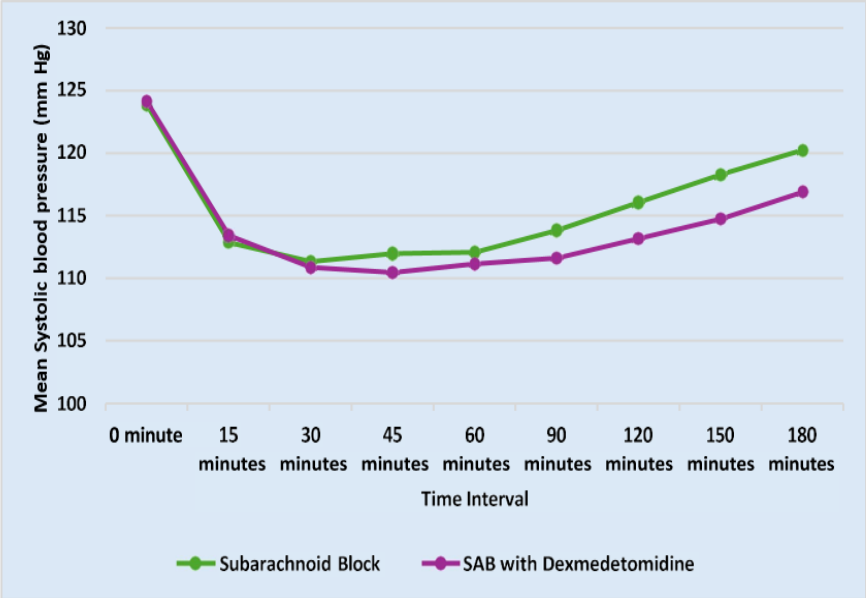



**Graph 3: Comparison of groups based on Duration of Motor block**

In our study, the mean duration of motor block was higher among patients in SAB with dexmedetomidine group (272.88 ± 14.72 minutes) as compared to patients in subarachnoid block alone (253.95 ± 18.51 minutes).

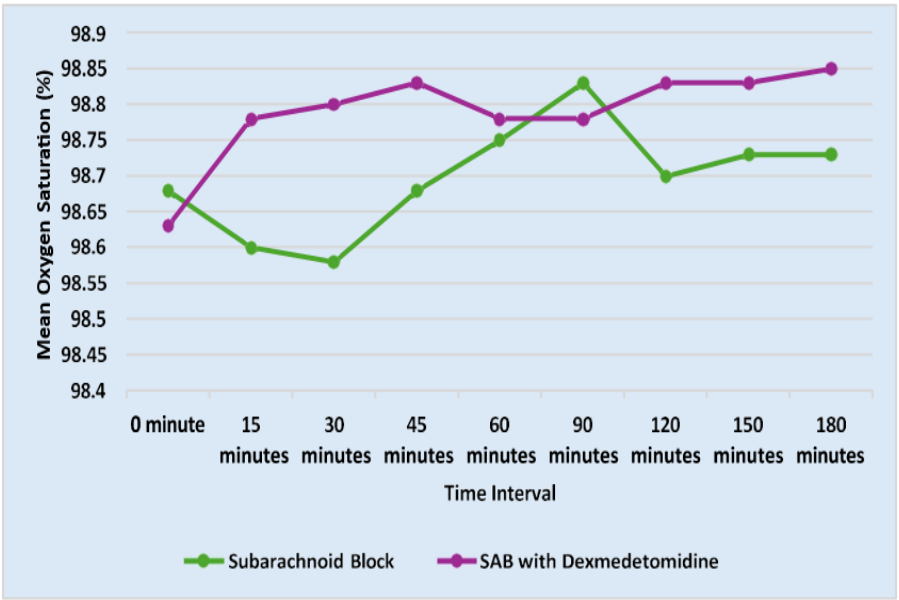
The difference between the two groups was statistically significant (p = 0.01) with longer duration of motor block among patients administered with SAB with dexmedetomidine. Intraoperative pulse rate was comparatively lower in SAB with dexmedetomidine group as compared to subarachnoid block alone group at most of observed time intervals.

However, the difference between the two groups was not statistically significant at any time intervals (p > 0.05).



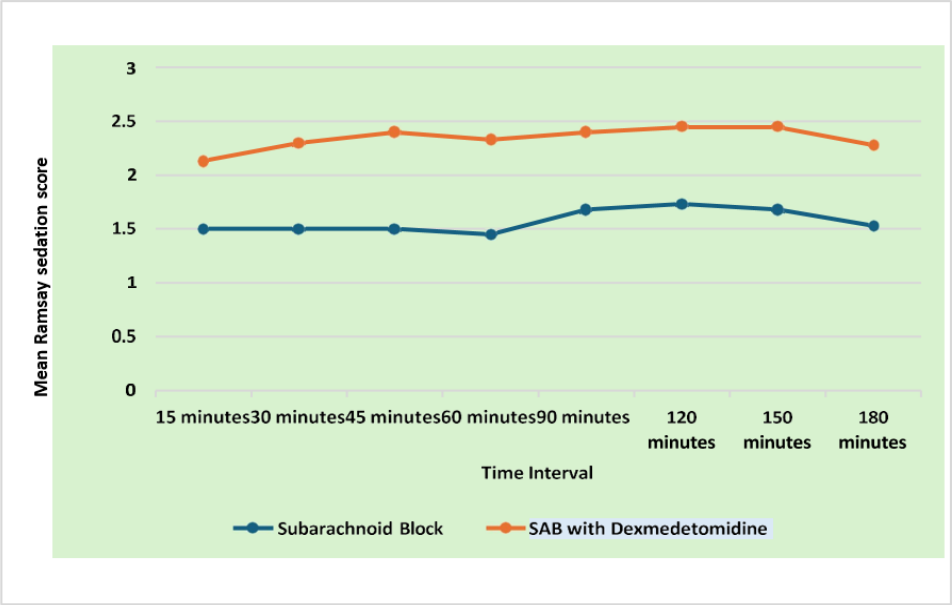

**Graph 4: Comparison of groups based on Intraoperative Systolic blood pressure**

The mean systolic blood pressure was lower at most of observed time intervals in SAB with dexmedetomidine group in comparison to subarachnoid block alone group. the difference was not statistically significant at any observed time intervales ($p > 0.05$). In the present study, the intraoperative diastolic blood pressure was comparatively lower in SAB with dexmedetomidine group as compared to subarachnoid block group at most of observed time intervals. It was not statistically significant differenced ($p > 0.05$).




**Graph 5: Comparison of groups based on Intraoperative Peripheral Oxygen Saturation**

Mean oxygen saturation of between both group patients was no statistically significant differenced ($p > 0.05$). it was observed at any time interval.




**Graph 6: Comparison of groups based on Intraoperative Ramsay Sedation Score**

The mean Ramsay sedation score was higher in SAB with dexmedetomidine group as compared to subarachnoid group. It was statistically significant difference at all observed time intervals (p = 0.01).

## Discussion

The management of anaesthesia for elective infra-umbilical surgeries is a critical aspect of ensuring patient comfort, safety, and optimal surgical outcomes. Among the various anaesthetic techniques employed, subarachnoid block (SAB) is a widely used method for providing regional anaesthesia due to its effectiveness in achieving profound sensory and motor blockade [6].

**Gender and Age:** In the present study, 42.5% of patients in the SAB with dexmedetomidine group were in the 46 to 60 years age range, while 40% of patients in the subarachnoid block group fell within the same age group. The difference between the two groups was not statistically significant (p = 0.96). In a study by Harsoor S et al. [7] the mean age of participants in the Dexmedetomidine + SAB group was 40.72 ± 8.92 years, while in the only SAB group it was 39.8 ± 11.51 years, with no statistically significant difference between the two groups (p = 0.753). The gender distribution in the Dexmedetomidine + SAB group was 15 males to 10 females, whereas in the only SAB group it was 18 males to 7 females. This difference was also not statistically significant (p = 0.557). Similarly, in our study gender distribution was not statistically significant differenced (p=0.82). In a study by Bhalerao A et al. [8] the mean age of patients in the only SAB group was 38.20 ± 10.46 years, whereas in the Dexmedetomidine + SAB group, it was 38.75 ± 11.66 years. The difference in age between the groups was not statistically significant (p = 0.825). In the only SAB group, there were 21 males and 19 females, while in the Dexmedetomidine + SAB group, there were 22 males and 18 females. There was no significant difference in gender distribution between the two groups.

**ASA:** In the present study, 23 patients in the SAB with dexmedetomidine group had ASA I status, while 25 patients in the subarachnoid block group were classified as ASA I. The difference between the two groups was not statistically significant (p = 0.65). In a study by Chaitanya S et al. [9] regarding the ASA physical status, Group-B had 27 patients classified as ASA I and 13 as ASA II, while Group-BD had 28 patients classified as ASA I and 12 as ASA II. There was no significant difference between the groups (p > 0.05).

**Characteristics of Sensory Block:** In our study, the mean time to onset of sensory block was 4.23 ± 1.19 minutes in the SAB with dexmedetomidine group, compared to 4.45 ± 1.24 minutes in the subarachnoid block group. The difference was not statistically significant (p = 0.41). Regarding the maximum level of sensory block, five patients in the subarachnoid block group reached T10, while only two patients in the SAB with dexmedetomidine group did. Twelve patients in the subarachnoid block group achieved T8 as the maximum level, compared to five patients in the SAB with dexmedetomidine group. In contrast, 22 patients in the SAB with dexmedetomidine group had T6 as the maximum level, while 18 patients in the subarachnoid block group did. The difference between the groups was not statistically significant (p = 0.08). In terms of the time to reach the maximum sensory block, the mean time was 9.45 ± 1.72 minutes in the SAB with dexmedetomidine group, which was slightly lower than the 9.78 ±

1.64 minutes observed in the subarachnoid block group, although this difference was not statistically significant (p = 0.86). When comparing the duration of sensory block, the SAB with dexmedetomidine group experienced a significantly longer mean duration (343.53 ± 23.67 minutes) compared to the subarachnoid block group (321.38 ± 20.14 minutes). This difference was statistically significant (p = 0.01), indicating a prolonged sensory block in the group administered SAB with dexmedetomidine.

Lugo et al. [10] in their study noted prolongation of sensory block and duration of analgesia without significant effect on motor block while using 1 mcg/kg bolus followed by 0.5 mcg/kg/h infusion of dexmedetomidine.

In a study by Bhalerao A et al, [8] the onset of L1 block in the only SAB group was 1.500 ± 0.5064 minutes, while in the Dexmedetomidine + SAB group it was 1.175 ± 0.3848 minutes, with a statistically significant difference (p = 0.0018). The time for peak sensory levels was 8.238 ± 1.881 minutes in the only SAB group, compared to 8.738 ± 1.368 minutes in the Dexmedetomidine + SAB group, with no statistically significant difference (p = 0.1783).

In another study by Kumari R et al. [11] the onset of sensory block was earlier in the dexmedetomidine group (9.6 ± 5.2 minutes) compared to the control group (9.8 ± 2.8 minutes), though the difference was not statistically significant (P < 0.001). The duration of sensory blockade was significantly prolonged in the dexmedetomidine group (341.7 ± 20.8 minutes) compared to the control group (329.6 ± 22.1 minutes), with a p-value of <0.001. Additionally, the mean time for two dermatomal regression of sensory blockade was significantly longer in the dexmedetomidine group (115.5 ± 8.7 minutes) compared to the control group (95.8 ± 11.4 minutes), with a p-value of <0.001.

**Characteristics of Motor Block:** In our study, the mean time to onset of motor block was slightly lower in the SAB with dexmedetomidine group (7.02 ± 1.39 minutes) compared to the subarachnoid block group (7.43 ± 1.43 minutes). It was not statistically significant (p = 0.21). Similarly, regarding the time to onset of maximum motor block, the mean time was shorter in the SAB with dexmedetomidine group (13.38 ± 2.29 minutes) than in the subarachnoid block group (13.78 ± 2.35 minutes), though the difference was again not statistically significant (p = 0.44). When examining the duration of motor block, the SAB with dexmedetomidine group experienced a significantly longer mean duration (272.88 ± 14.72 minutes) compared to the subarachnoid block group (253.95 ± 18.51 minutes). This difference was statistically significant (p = 0.01), indicating a prolonged motor block in the group receiving SAB with dexmedetomidine. Al-Mustafa et al. [12] also observed similar findings in their study and in addition, there was prolongation of motor blockade with a similar dose of dexmedetomidine. In another study by Elcicek K et al. [13] observing the effect of dexmedetomidine infusion on spinal anaesthesia with ropivacaine, it was observed that dexmedetomidine bolus of 1 mcg/kg followed by infusion at 0.4 mcg/kg/h prolonged the duration of sensory and motor regression.

**Pulse Rate:** In the present study, the intraoperative pulse rate was generally lower in the SAB with dexmedetomidine group compared to the subarachnoid block group at most observed time intervals. However, the difference between the two groups was not statistically significant at any time point (p > 0.05). At 4 hours postoperatively, the mean pulse rate was similar between the two groups, with no statistically significant difference (p = 0.98). Likewise, at 8 and 12 hours postoperatively, the pulse rates between the groups were comparable, and the differences were not statistically significant (p > 0.05). In a study by Bhagavatha A et al. [10] it was observed that the trend of mean heart rate in the dexmedetomidine group appeared to be lower than that in the SAB group, but there was no statistically significant difference between the groups. The mean heart rates between the groups were maintained between 60 – 85 beats per minute, indicating hemodynamic stability in the dexmedetomidine group at the given dosage.

**Blood Pressure:** In our study, the mean intraoperative systolic blood pressure was lower in the SAB with dexmedetomidine group compared to the subarachnoid block group at most observed time intervals. The difference between the two groups was not statistically significant at any time point (p > 0.05). In a study by Harsoor S et al. [7] a similar trend was observed in systolic, diastolic, and mean arterial pressures 60 minutes following SAB in the Dexmedetomidine + SAB group. The pressures in this group were lower compared to the only SAB group, indicating a notable difference in hemodynamic response during the intra-operative period.

**Oxygen Saturation:** Assessment of intraoperative oxygen saturation revealed that the mean oxygen saturation was almost comparable in both groups and had no statistically significant difference between them at any observed time intervals (p > 0.05. In a study by Harsoor S et al. [7] oxygen saturation was comparable between the Dexmedetomidine + SAB group (98%) and the only SAB group (97.85%), with no statistically significant difference (p = 0.153).

**Ramsay sedation score:** Mean RSS score was higher in the SAB with dexmedetomidine group compared to the subarachnoid block group at most observed time intervals. This difference was statistically significant at all time points ($p = 0.01$). In a study by Bhagavatha A et al. [10] the mean Ramsay Sedation Score (RSS) was higher in the Dexmedetomidine + SAB group ($3.83 \pm 0.329$) compared to the only SAB group ($1.83 \pm 0.407$), which was statistically significant ($p < 0.001$). In a study by Kumari R et al. [11] Intraoperative Ramsay Sedation Scores were significantly higher in the dexmedetomidine group (mean - $3.4 \pm 0.7$, range 2– 4) compared to control group (mean- $2.9 \pm 0.3$, range 2–4) with a p-value of <0.001.

## Conclusion

The present study concluded that the combination of SAB with dexmedetomidine resulted in significantly longer durations of sensory and motor blocks, providing an advantage in prolonging anaesthesia. No significant differences in intraoperative complications, vital signs, or adverse effects were observed between the clonidine and control group patients.

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