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# COMPARATIVE STUDY OF LOW DOSE LEVOBUPIVACAINE IN SUBARACHNOID BLOCK WITH FENTANYL VS DEXMEDETOMIDINE ON HEMODYNAMIC RESPONSE AND POST-OPERATIVE ANALGESIA IN TURP SURGERIES

Anaesthesiology

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## ABSTRACT

**Background:** Transurethral resection of the prostate (TURP) is commonly performed in elderly patients, where maintaining hemodynamic stability and providing adequate postoperative analgesia are essential. Low-dose levobupivacaine is widely used for spinal anesthesia; however, the addition of adjuvants such as fentanyl or dexmedetomidine may improve block quality and analgesic duration. **Methodology:** This prospective, randomized, comparative study included 100 patients (ASA I–II) undergoing elective TURP under spinal anesthesia. Patients were allocated into two groups: Group F received levobupivacaine (7.5 mg) with fentanyl (25 µg), and Group D received levobupivacaine (7.5 mg) with dexmedetomidine (5 µg). Hemodynamic parameters, sedation scores, pain scores (VAS), duration of analgesia, and adverse effects were recorded and analyzed using appropriate statistical tests. **Results:** Baseline characteristics were comparable between groups. Group D demonstrated significantly lower intraoperative heart rate and blood pressure ($p<0.05$), with higher sedation scores ($p<0.001$). Postoperative pain scores were significantly lower in Group D at all time intervals ($p\leq0.001$). The time to first rescue analgesia was prolonged in Group D (418.5±64.8 min vs 262.2±56.5 min), with reduced total analgesic consumption ($p<0.001$). Incidence of side effects was similar, except for higher pruritus in Group F ($p=0.003$). **Conclusion:** Dexmedetomidine is a superior intrathecal adjuvant to fentanyl when combined with low-dose levobupivacaine for TURP, providing better hemodynamic stability, enhanced sedation, prolonged postoperative analgesia, and reduced analgesic requirements.

## KEYWORDS

TURP, dexmedetomidine, fentanyl, levobupivacaine, spinal anesthesia

## INTRODUCTION

Benign prostatic hyperplasia (BPH) has a high prevalence in the male population that increases with age.[1,2] It often produces chronic and progressive lower urinary symptoms or chronic complications, leading many men to seek treatment.[3] It is one of the most common causes of lower urinary tract symptoms (LUTS) in men and starts after the age of 50 and by the age of 60 years 50% of men have histological evidence of BPH.[4] Transurethral resection of the prostate (TURP) has been the most common surgical procedure for relieving symptoms of BPH.[5] It offers a more favorable 5-year impact on symptoms and BPH complications than watchful waiting, without a higher risk of incontinence or erectile dysfunction.[6] Since the introduction of medical therapy and minimally invasive treatments such as laser and microwave therapy, there has been a dramatic decrease in the number of TURPs performed for symptomatic BPH in the last decade.[5]

Transurethral resection of the prostate, or TURP, is a type of surgery that is done through the urethra to remove part of the prostate. It is the most commonly used treatment for bladder outlet obstruction caused by an enlarged prostate. TURP can also help in treating prostatic abscesses by removing the blockage and may be used to open up the ejaculatory ducts in men who have obstructive azoospermia. This procedure is often used to treat benign prostatic hyperplasia, which is when the prostate grows larger and causes problems. Spinal anesthesia is usually chosen because it helps keep the patient comfortable, maintains stable blood pressure, and reduces the risk of complications.[7]

Subarachnoid block is the most common way to use anaesthesia for surgeries around the anus. It is easy to do, cheaper, gives long-lasting pain relief after surgery, and allows patients to stay in the hospital for a shorter time. When only spinal anaesthesia with local anaesthetics is used, the effect doesn't last very long, making it hard to manage pain after surgery. Because of this, different medicines have been tested along with local anaesthetics to improve the anaesthesia and give better pain control after the surgery.[8,9]

Fentanyl is a short-acting opioid used as an intrathecal adjuvant to enhance the analgesic effect of local anesthetics and improve intraoperative pain control. It provides rapid onset of analgesia and maintains hemodynamic stability, prolonging postoperative pain relief for approximately 180–240 minutes. However, its shorter duration often necessitates additional postoperative analgesia and may be associated with side effects such as pruritus, nausea, vomiting, urinary retention, and respiratory depression.[10,11,12] Dexmedetomidine is a highly selective α2-adrenergic agonist with potent analgesic, sedative, and sympatholytic properties that enhances the effects of spinal anesthesia and prolongs postoperative analgesia. It also reduces opioid requirements, although it may cause dose-dependent decreases in heart rate and blood pressure.[13,14,15].

While fentanyl and dexmedetomidine have both been investigated separately as intrathecal adjuvants with levobupivacaine, the literature currently in publication shows conflicting results about their relative effects on hemodynamic parameters and postoperative analgesia, especially when low-dose spinal anesthesia for TURP is involved. Numerous research have concentrated on non-urological procedures, younger surgical populations, or higher doses of local anesthetics, which limits the applicability of their findings to older patients undergoing TURP.[16]

## MATERIALS AND METHODS

This prospective, randomized, comparative study was conducted in the Department of Anaesthesiology at BRD Medical College, Gorakhpur, over a period of 18 months. Approval from the Institutional Ethical Committee was obtained before the commencement of the study.

**Inclusion Criteria**
- Patient giving informed consent for the study.
- Male patients aged 50-80 years
- American Society of Anaesthesia (ASA) class I and II
- Elective TURP procedure

**Exclusion Criteria**
- Not giving consent (patient refusal)
- Patients with contraindications to spinal anesthesia.
- History of allergy to study drugs.
- Severe cardiovascular, renal, or hepatic dysfunction.
- Coagulopathy or bleeding disorders.
- Patients on chronic opioid or α2-agonist therapy.
- American society of anaestheiologists (ASA Grade-III and IV)

**Sample Size:** 100 patients (50 patients in each group)
**Sample Size Calculation:** The sample size was estimated using the following

**formula**

$$n = \frac{Z^2pq}{d^2}$$

Where,
p= population proposition
$d^2$= margin of error
Z= use of Z table

$$n = \frac{(1.96)^2 (0.05) (0.95)}{(0.06)^2} = 52.77$$

Therefore the estimate sample size in each group is 50 (i.e, 50+50=100) Total sample size of 100 assuming equal group sizes.

**Methods:**
All patients were enrolled after obtaining written informed consent as per the inclusion and exclusion criteria. Patients were randomly assigned into two groups using a computer-generated randomization method.

Patients were divided into two groups:
- **Group F (Fentanyl Group):** Received low-dose levobupivacaine [7.5 mg (1.5 mL)] combined with fentanyl [25 µg (0.5 mL)] intrathecally (total volume: 2 mL).
- **Group D (Dexmedetomidine Group):** Received low-dose levobupivacaine [7.5 mg (1.5 mL)] combined with dexmedetomidine [5 µg (0.5 mL)] intrathecally (total volume: 2 mL).

**Statistical Analysis:**
Data were recorded in an Excel master chart and analysed using SPSS software version 26.0. Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables as percentages. An independent t-test was used for continuous variables and a chi-square test for categorical variables. A p-value <0.05 was considered statistically significant.

**RESULTS**
The study population consisted of 100 cases, which were equally distributed between the two groups. Group F (Fentanyl group) included 50 patients (50.0%), and Group D (Dexmedetomidine group) also included 50 patients (50.0%)

Table 1 shows that the demographic characteristics of the study participants were comparable between Group F and Group D. The mean age was 67.3±2.6 years in Group F and 68.1±2.4 years in Group D, with no statistically significant difference (p=0.113). Similarly, the mean height (166.2±5.8 cm vs. 165.7±5.2 cm; p=0.650), weight (64.5±7.3 kg vs. 65.1±6.8 kg; p=0.671), and BMI (23.4±2.1 kg/m² vs. 23.7±2.0 kg/m²; p=0.466) were comparable between the two groups. Regarding ASA physical status, the majority of patients belonged to ASA Grade II in both groups (64.0% in Group F and 60.0% in Group D), while ASA Grade I patients constituted 36.0% and 40.0% of the participants, respectively. The distribution of ASA grades did not differ significantly between the groups (p=0.680).

Table 2 shows that the Ramsay Sedation Score was comparable between Group F and Group D at baseline, with both groups having a mean score of 2.0 (p=1.00). However, following administration of the study drugs, sedation scores were significantly higher in Group D at all intraoperative time points. At 5 minutes, the mean sedation score was 2.60±0.50 in Group D compared to 2.10±0.30 in Group F (p<0.001). This difference persisted at 10 minutes (3.0±0.60 vs. 2.20±0.40), 15 minutes (3.20±0.65 vs. 2.30±0.45), 30 minutes (3.40±0.70 vs. 2.40±0.50),45 minutes (3.30±0.65 vs. 2.40±0.50), and 60 minutes (3.10±0.60 vs. 2.30±0.45), with all comparisons showing highly significant differences (p<0.001).

Table 3 shows that the postoperative pain scores, assessed using the Visual Analog Scale (VAS), were significantly lower in Group D compared to Group F at all postoperative time intervals. At 2 hours, the mean VAS score was 1.2±0.62 in Group D and 1.8±0.70 in Group F (p=0.001). Similarly, at 4 hours, the mean VAS score was significantly lower in Group D (2.0±0.83) than in Group F (2.9±0.91) (p<0.001). At 6 hours, Group D continued to demonstrate better analgesia with a mean VAS score of 2.9±0.97 compared to 4.1±1.0 in Group F (p<0.001). At 12 hours postoperatively, the mean VAS score remained significantly lower in Group D (2.6±0.83) than in Group F (3.5±0.92) (p<0.001).

Table 4 shows that the requirement for rescue analgesia was significantly lower in Group D compared to Group F. Rescue analgesia was required in 30 patients (60.0%) in Group F, whereas only 10 patients (20.0%) in Group D required additional analgesia. Conversely, 40 patients (80.0%) in Group D did not require rescue analgesia compared to 20 patients (40.0%)in Group F, and this difference was highly significant (p<0.001). The mean time to first rescue analgesia was significantly prolonged in Group D (418.5±64.8 minutes) compared to Group F (262.2±56.5 minutes) (p<0.001), indicating a longer duration of postoperative analgesia with dexmedetomidine. Furthermore, the total analgesic consumption was markedly lower in Group D (660±9.1 µg) than in Group F (1960±7.36 µg), with the difference being statistically highly significant (p<0.001). These findings demonstrated that intrathecal dexmedetomidine provided superior postoperative analgesia, prolonged the duration before the first rescue analgesic requirement, and significantly reduced overall analgesic consumption compared with intrathecal fentanyl when used as an adjuvant to low-dose levobupivacaine in TURP surgeries. Table 5 shows that the incidence of adverse effects was comparable between Group F and Group D for most parameters. Hypotension was observed in 5 patients (10.0%) in Group F and 8 patients (16.0%) in Group D (p=0.372). Bradycardia occurred in 2 patients (4.0%) in Group F and 7 patients (14.0%) in Group D; however, the difference was not statistically significant (p=0.080). Nausea and vomiting were reported in 6 patients (12.0%) in Group F and 3 patients (6.0%) in Group D (p=0.294). Similarly, shivering was noted in 7 patients (14.0%) in Group F compared to 2 patients (4.0%) in Group D, without reaching statistical significance (p=0.080). Pruritus was significantly more common in Group F, occurring in 8 patients (16.0%), whereas no patient in Group D experienced pruritus, demonstrating a statistically significant difference between the groups (p=0.003). The requirement for mephentermine was comparable between Group F and Group D, being observed in 5 (10.0%) and 8 (16.0%) patients, respectively (p=0.372).

Figure 1 compares intraoperative heart rate was comparable between Group F and Group D at baseline, with mean values of 78.6±7.4 bpm and 79.2±6.9 bpm, respectively (p=0.680). However, following administration of the study drugs, a significantly lower heart rate was observed in Group D at all subsequent time intervals. At 5 minutes, the mean heart rate was 77.8±7.1 bpm in Group F compared to 75.3±6.6 bpm in Group D (p=0.040). The difference became more pronounced at 10 minutes (76.9±6.8 vs. 73.2±6.1 bpm; p=0.010) and 15 minutes (76.4±6.5 vs. 71.8±6.0 bpm; p=0.002). Similarly, at 30 minutes, 45 minutes, and 60 minutes, Group D maintained significantly lower heart rates than Group F, with mean values of 72.5±5.8 bpm versus 77.1±6.9 bpm (p=0.003), 73.4±5.9 bpm versus 77.9±6.9 bpm (p=0.004), and74.2±5.7 bpm versus 78.3±6.6 bpm (p=0.006), respectively.

Figure 2 compares intraoperative mean arterial pressure (MAP) was comparable between Group F and Group D at baseline, with mean values of 99.0±7.5 mmHg and 98.4±7.1 mmHg, respectively (p=0.712). At 5 minutes after spinal anesthesia, the MAP was lower in Group D(94.5±6.5 mmHg) compared to Group F (97.1±7.0 mmHg), although the difference was not statistically significant (p=0.062). From 10 minutes onward, Group D demonstrated significantly lower MAP values than Group F. At 10 minutes, the mean MAP was 92.4±6.1 mmHg in Group D versus 95.8±6.7 mmHg in Group F (p=0.022). Similar significant differences were observed at 15 minutes (90.9±5.9

vs. 94.9±6.4 mmHg; p=0.012), 30 minutes (91.6±5.6 vs. 95.3±6.2 mmHg; p=0.015), 45 minutes (92.8±5.9 vs. 96.0±6.5 mmHg; p=0.023), and 60 minutes (93.7±6.0 vs. 96.8±6.7 mmHg; p=0.032).

Figure 3 compares intraoperative oxygen saturation ($SpO_2$) remained stable and comparable between Group F and Group D throughout the study period. At baseline, the mean $SpO_2$ was 98.2±0.82% in Group F and 98.1±1.0% in Group D, with no statistically significant difference between the groups (p=0.632). Similarly, at 5 minutes, the mean $SpO_2$ values were 98.1±0.83% and 98.0±0.95% in Group F and Group D, respectively (p=0.585). No significant differences were observed at 10 minutes (98.0±0.94% vs. 97.9±0.96%; p=0.652), 15 minutes (97.9±0.93% vs. 97.8±0.86%; p=0.542), 30 minutes (97.8±0.92% vs. 97.7±0.95%; p=0.595), 45 minutes (97.9±0.83% vs. 97.8±0.86%; p=0.632), or 60 minutes (98.0±0.84% vs. 97.9±0.88%; p=0.601).

**Table 1: Comparison of demographic data between Group F and Group D**

| Demographic data | | Group=F (n=50) | Group=D (n=50) | p-value* |
|---|---|---|---|---|
| Age (year) | | 67.3±2.6 | 68.1±2.4 | 0.113 |
| Height (cm) | | 166.2±5.8 | 165.7±5.2 | 0.650 |
| Weight (kg) | | 64.5±7.3 | 65.1±6.8 | 0.671 |
| BMI (kg/m2) | | 23.4±2.1 | 23.7±2.0 | 0.466 |
| ASA Grade | I | 18 (36.0%) | 20 (40.0%) | 0.680 |
| | II | 32 (64.0%) | 30 (60.0%) | |

* Independent Sample 't' test; P>0.05= statistically non-significant

**Table 2: Comparison of intraoperative sedation scores (Ramsay Sedation Scale) at different time intervals between Group F and Group D**

| SEDATION SCORE (RAMSAY) | Group=F (n=50) | Group=D (n=50) | p-value* |
|---|---|---|---|
| Baseline | 2.0±0.0 | 2.00±0.0 | 1.00 |
| At 5 minutes | 2.10±0.30 | 2.60±.50 | <0.001 |
| At 10 minutes | 2.20±0.40 | 3.0±0.60 | <0.001 |
| At 15 minutes | 2.30±0.45 | 3.20±0.65 | <0.001 |
| At 30 minutes | 2.40±0.50 | 3.40±0.70 | <0.001 |
| At 45 minutes | 2.40±0.50 | 3.30±0.65 | <0.001 |
| At 60 minutes | 2.30±.45 | 3.10±0.60 | <0.001 |

* Independent Sample 't' test; P<0.05= statistically significant; P>0.05= statistically non-significant

**Table 3: Comparison of postoperative pain scores (VAS) at different time intervals between Group F and Group D**

| VAS Score | Group=F (n=50) | Group=D (n=50) | p-value* |
|---|---|---|---|
| At 2 hours | 1.8±0.70 | 1.2±0.62 | 0.001 |
| At 4 hours | 2.9±0.91 | 2.0±0.83 | <0.001 |
| At 6 hours | 4.1±1.0 | 2.9±0.97 | <0.001 |
| At 12 hours | 3.5±0.92 | 2.6±0.83 | <0.001 |

* Independent Sample 't' test; P<0.05= statistically significant

**Table 4: Comparison of time to first rescue analgesia and total analgesic consumption between Group F and Group D**

| | | Group=F (n=50) | Group=D (n=50) | p-value* |
|---|---|---|---|---|
| Required of first rescue analgesia | Yes | 30 (60.0%) | 10 (20.0%) | **<0.001** |
| | No | 20 (40.0%) | 40 (80.0%) | |
| Time to first rescue analgesia | | 262.2±56.5 | 418.5±64.8 | **<0.001** |
| Total Analgesia Consumption (micrograms) | | 1960±7.36 | 660±9.1 | **<0.001** |

* Independent Sample 't' test; P<0.05= statistically significant

**Table 5: Comparison of incidence of side effects between Group F and Group D**

| Side Effects | Group=F (n=50) | Group=D (n=50) | p-value# |
|---|---|---|---|
| Hypotension | 5 (10.0%) | 8 (16.0%) | 0.372 |
| Bradycardia | 2 (4.0%) | 7 (14.0%) | 0.080 |
| Nausea/Vomiting | 6 (12.0%) | 3 (6.0%) | 0.294 |
| Shivering | 7 (14.0%) | 2 (4.0%) | 0.080 |
| Pruritus | 8 (16.0%) | 0 (0.0%) | **0.003** |
| Mephentermin | 5 (10.0%) | 8 (16.0%) | 0.372 |

#Chi Square test; P<0.05= statistically significant; P>0.05= statistically non-significant

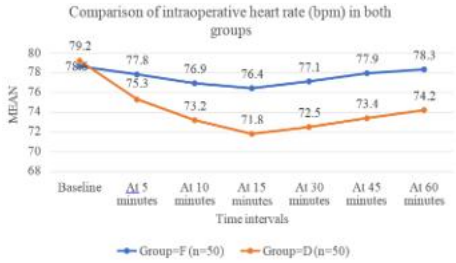


**Figure 1: Comparison of intraoperative heart rate (bpm) at different time intervals between Group F and Group D**

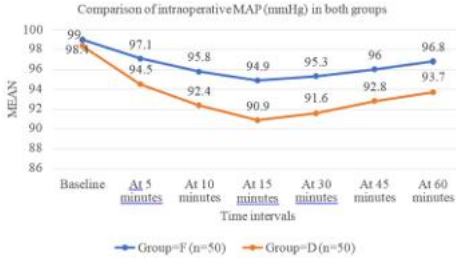


**Figure 2: Comparison of intraoperative mean arterial pressure (MAP) at different time interals between Group F and Group D**

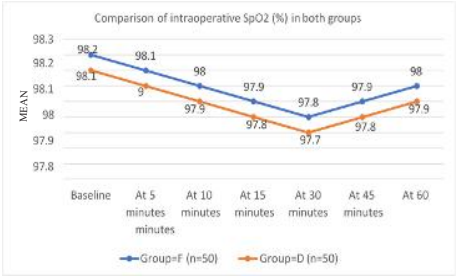


**Figure 3: Comparison of intraoperative oxygen saturation ($SpO_2$) at different time intervals between Group F and Group D**

## DISCUSSION

TURP is one of the most common operative procedures in elderly people.[17,18] It has largely replaced other method of operative management for BPH and still is regarded as gold standard treatment for LUTS due to BPH.[19] Over 95% of men with BPH are being treated by TURP and indication for which may be moderate to severe irritative and or obstructive symptoms not responding to medical therapy, or acute or chronic retention of urine leading to obstructive uropathy interfering in quality of life.[20] For large prostates (>80 gm) an open prostatectomy is still considered as a treatment of choice.[21,22] However, the qualification "large" is subjective and the limitation of the maximum prostate size for TURP varies up on the surgeon's skill, experience and resection speed.[19]

Transurethral Resection of prostate for benign prostatic hypertrophy is frequently performed in elder patients with cardiovascular comorbidities and systemic diseases. Considering this, it is desirable to limit the spinal block level to as low as possible to avoid hypotension owing to high sympathetic block and also maintain required level of anesthesia. For these reasons, local anesthetics combined with other drugs i.e,. an opioid (Fentanyl) or α-agonist (dexmedetomidine) have been used as adjuvants to provide synergestic analgesia and to reduce the dose of local anaesthetic used. Opioid like Fentanyl has been used as adjuvantmost commonly nowadays to reduce the dose of intrathecal local anaesthetics and improve the block quality.[23]

TURP is a commonly performed procedure, particularly in elderly patients who often have multiple comorbid conditions such as hypertension and cardiovascular disease, making maintenance of hemodynamic stability during spinal anesthesia critically important. Although levobupivacaine is preferred due to its favorable safety profile, the use of low-dose levobupivacaine alone may result in inadequate analgesia and shorter duration of action. To enhance the quality and duration of spinal anesthesia, adjuvants like fentanyl and dexmedetomidine are frequently used; however, they differ in their hemodynamic effects, duration of analgesia, and side effect profiles. Fentanyl provides rapid onset analgesia with relatively shorter duration, whereas dexmedetomidine, an α2-agonist, is known to

prolong analgesia but may be associated with bradycardia and hypotension.

In the present study, the mean age (67.3±2.6 vs 68.1±2.4 years for Group F and Group D) and height, weight, and BMI of participants in both groups are similar, with no significant differences (p-values of 0.650, 0.671, and 0.466, respectively). The American Society of Anesthesiologists (ASA) classification indicates a majority of participants in both groups are ASA II, with no significant difference between the groups (p=0.680). Our findings were comparable to the findings of **Moturi et al**[24] patients undergoing transurethral resection of prostate are usually elderly patients with unstable hemodynamics, where the mean age in Group D and Group F was 57.8±4.31 years and 58.2±4.78 years respectively, with no statistically significant difference, Similarly, anthropometric parameters including height, weight, and BMI were comparable between the two groups in the present study (p>0.05). Group F had mean height, weight, and BMI of 166.2±5.8 cm, 64.5±7.3 kg, and 23.4±2.1 kg/m² respectively, while Group D showed 165.7±5.2 cm, 65.1±6.8 kg, and 23.7±2.0 kg/m² and mean body weight was also similar between groups (65.56±11.18 kg vs 66.06±11.76 kg; p=0.8684), Furthermore, ASA physical status distribution in the present study was also comparable between the two groups (p=0.680)**.** Similarly, **Siddiqui TH S et al**[25] reported that a total of 90 patients fulfilling the inclusion criteria participated in the study. The demographic profiles (age, BMI, ASA physical status, duration of surgery) of the two groups were comparable. Between dexmedetomidine and fentanyl groups. Likewise, **Choudhary J et al**[26] studied Dexmedetomidine with propofol versus fentanyl with propofol and reported that the two groups were comparable in terms of patient characteristics such as age, ASA grading, Mallampatti grade (MPG).

In our study, based on Sedation Score (RAMSAY), the intraoperative sedation scores were comparable between Group F and Group D at baseline (2.0±0.0; p=1.00). However, from 5 minutes onwards, sedation scores were significantly higher in the dexmedetomidine group at all time intervals (p<0.001). In Group D, sedation score increased from 2.60±0.50 at 5 minutes to a peak of 3.40±0.70 at 30 minutes, remaining around 3.1–3.3 thereafter, indicating adequate and cooperative sedation. In contrast, Group F showed lower sedation scores ranging from 2.10±0.30 to 2.40±0.50. Our findings were comparable with previous studies. **Mahendru V et al.**[27] reported significantly higher Ramsay sedation scores in the dexmedetomidine group (mean scores (3.2±3.5) compared to fentanyl (2.1±2.4). Similarly, **Al-Mustafa MM et al.**[28] (2009) observed sedation scores around 3 in the dexmedetomidine group versus approximately 2 in the control group. Additionally, **Gupta R et al.**[15] reported higher sedation scores in the dexmedetomidine group (mean 3.0) compared to fentanyl (2.2), consistent with the present study.

In our study, pain scores (VAS) were significantly lower in the dexmedetomidine group compared to the fentanyl group at all observed time intervals (p≤0.001). At 2 hours, the mean VAS score was 1.2±0.62 in Group D compared to 1.8±0.70 in Group F. This difference became more pronounced over time, with scores at 6 hours being 2.9±0.97 in Group D versus 4.1±1.0 in Group F. Even at 12 hours, Group D maintained lower pain scores (2.6±0.83 vs 3.5±0.92). These findings are consistent with previous studies **Mahendru V et al.**[27] reported significantly lower VAS scores in the dexmedetomidine group (approximately 2.5–3.0 at 6 hours) compared to fentanyl (around 3.5–4.0). Similarly, **Eid HEA et al.**[29] observed prolonged analgesia with lower pain scores in the dexmedetomidine group (VAS ~2.0–2.8) versus control groups (~3.5–4.5). Additionally, **Gupta R et al.**[15] demonstrated lower postoperative VAS scores in the dexmedetomidine group (mean ~2.2–2.8) compared to fentanyl (~3.0–3.8). Group D patients had low postoperative VAS score and reduced analgesic requirements.[24]

Our study, the comparison of postoperative rescue analgesia requirements revealed a highly significant difference between the two groups. In Group F, 30 (60.0%) patients required rescue analgesia, whereas only 10 (20.0%) patients in Group D needed analgesia (p < 0.001). Consequently, a substantially higher proportion of patients in Group D (40 patients, 80.0%) did not require any rescue analgesia during the postoperative observation period compared to only 20 patients (40.0%) in Group F. Among patients who did require rescue analgesia, the mean time to first rescue was markedly prolonged in Group D (418.5 ± 64.8 minutes) compared to Group F (262.2 ± 56.5 minutes) with p<0.001. Furthermore, total analgesic consumption was significantly lower in the dexmedetomidine group (660 ± 9.1 µg) than in the fentanyl group(1960 ± 7.36 µg), with p < 0.001. These findings indicate superior postoperative analgesic efficacy of intrathecal dexmedetomidine over fentanyl when used as an adjuvant to low-dose levobupivacaine in TURP surgeries under spinal anesthesia. This finding is supported by studies such as those by **Bajwa SJ et al**[30], which reported prolonged sedation and delayed recovery times in patients receiving dexmedetomidine compared to those receiving fentanyl. **Aho M et al**[31], which demonstrated that dexmedetomidine provides effective analgesia and reduces the need for additional analgesics postoperatively. Another study by **Kaya FN et al**[32] found that patients receiving dexmedetomidine reported lower pain scores and required fewer rescue analgesics compared to those receiving fentanyl.

In our study, the incidence of complications such as nausea, vomiting, hypotension and bradycardia, is generally low in both groups. The differences in complication rates between the groups are statistically significant (p>0.05), and pruritus had a significant difference (<0.05). Our findings were supported by **Bajwa SJ et al**[30] who reported that dexmedetomidine significantly reduced the incidence of PONV compared to fentanyl. This is likely due to dexmedetomidine's ability to provide stable hemodynamics and its antiemetic properties. Similarly, **Gupta K et al**[33] found no significant difference in the incidence of PONV between the two groups, supporting the findings of the present study. Dexmedetomidine is known to cause hypotension and bradycardia due to its sympatholytic effects. However, the present study found no significant difference in the incidence of these complications between the groups. This is supported by the findings of **Kaya FN et al**[32], who reported that while dexmedetomidine can cause bradycardia and hypotension, these effects are generally mild and manageable. Similarly, fentanyl, although less likely to cause bradycardia, can lead to hypotension, especially in higher doses.

## CONCLUSION

Our findings indicate that both fentanyl and dexmedetomidine are effective intrathecal adjuvants to low-dose levobupivacaine for spinal anesthesia in TURP surgeries. However, dexmedetomidine demonstrated superior clinical efficacy with better intraoperative hemodynamic stability and higher sedation scores. It provided significantly lower postoperative pain scores, prolonged analgesia, and delayed the need for rescue analgesia. Total analgesic consum-ption was also significantly reduced in the dexmedetomidine group. Adverse effects were generally comparable between groups, although pruritus was more common withfentanyl. Overall, dexmedetomidine proved to be a safer and more effective adjuvant, improving perioperative analgesia, patient comfort, and surgical outcomes.

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