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EFFECT OF ADDING DEXMEDETOMIDINE VS FENTANYL TO INTRATHECAL BUPIVACAINE SPINAL BLOCK CHARACTERISTICS IN ABDOMINAL PROCEDURES

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Abstract

Spinal anesthesia is a standard technique for lower abdominal surgeries due to its cost-effectiveness and ease of administration. However, postoperative pain management remains challenging because local anesthetics alone have a limited duration of action, necessitating early postoperative analgesic intervention. Intrathecal dexmedetomidine is an effective alternative to fentanyl in spinal anesthesia for lower abdominal surgeries, offering prolonged analgesia and motor blockade with opioid-sparing benefits and reduced postoperative analgesic consumption.

Keywords: Dexmedetomidine -5mcg, Fentanyl -25mcg, Hyperbaric Bupivacaine-0.5%, Spinal Anesthesia

INTRODUCTION

Spinal anesthesia is a standard technique employed for lower abdominal surgeries, given its cost-effectiveness and ease of administration. Nevertheless, managing postoperative pain remains challenging since spinal anesthesia involving solely local anesthetics offer limited duration of action; thus necessitating early intervention with analgesics during the postoperative phase. Several adjuvants like clonidine and midazolam have been researched as potential means to extend the effects of spinal anesthesia..[1,2]

In lower abdominal surgeries under spinal anesthesia, common issues include visceral pain, nausea, and vomiting.[3] The addition of fentanyl to hyperbaric bupivacaine improves the quality of intra operative and early postoperative subarachnoid block.[4] The addition of opioids to local anesthetic solution have disadvantages, such as pruritus.

Dexmedetomidine, an α2-adrenergic receptor (AR) agonist, extends sensory and motor blockade with any administration route. When given intrathecally, it acts at the spinal and supraspinal levels. It activates α2-AR in the spinal cord, reducing transmission of nociceptive signals, inhibiting substance P's release, and contributing to their analgesic action, and has a significant opioid-sparing effect[5]. At the supraspinal level, it binds to the presynaptic α2-ARs in locus ceruleus, producing sedation and anxiolysis; postsynaptic activation in CNS inhibits sympathetic activity leading to a reduction in heart rate and blood pressure. Rapid dexmedetomidine infusion can induce temporary hypertension through α2B-adrenoreceptor vasoconstriction. [6]

Very few studies are there in literature regarding usage of Dexmedetomidine as an adjuvant in spinal anesthesia. This study compares Dexmedetomidine and Fentanyl effects with 0.5% Hyperbaric Bupivacaine in intrathecal abdominal surgeries.

AIM: Compare Dexmedetomidine with Fentanyl added to intrathecal Bupivacaine for abdominal surgeries.

OBJECTIVES: 1.To evaluate sensory and motor block on set and duration.2.To assess intra operative hemodynamics3.To monitor post operative analgesia.4.To study complications like nausea, vomiting, sedation, hypotension

MATERIALS AND METHODS

Study design: Cross-sectional study **Duration of the study:** 18 months **Sample size**: 60

Group BD(n=30): Patients in this group will receive 3ml of 0.5% hyper baricbupivacaine+0.5ml (5mcg) of diluted preservative free Dexmedetomidine [normal saline was added to 1ml (100mcg/ml) of Dexmedetomidine to make it to 10ml (10mcg/ml), from this 0.5ml (5mcg) of solution was taken].

Group BF(n=30):Patients in this group will receive 3ml of 0.5% hyper baricbupivacaine + 0.5ml (25mcg) of Fentanyl.

The final volume of injected solution was 3.5 ml in both the groups.

Source of data: Patients undergoing elective abdominal surgeries at Katuri Medical College and Hospital were taken for the study after taking the informed written consent from the patients.

STATISTICAL ANALYSIS

Data Entry in Microsoft Excel 2013, analysis in SPSS V16.Qualitative data shown in frequencies and percentages, Quantitative data in mean and standard deviation. Tests: Unpaired t-test for inter group, Chi-square for qualitative data. Data visualized with bar diagrams, pie charts. Statistically significant: $p<0.05$.

Inclusion criteria

Age: 30 yrs to 50 yrs
ASA categorizes patients into physical status I and II.
BMI: <30kg/m2
Surgery: Elective Surgery
Normal liver and renal function tests, coagulation profile
Who have given valid informed consent
Airway: MMS(Modified Mallampati Score)1and2

Exclusion criteria

Hyper sensitivity to the study drug.
Renal or Hepatic dysfunction.
Coagulopathies.
Uncontrolled Hypertension, Diabetes mellitus.
Infection at injection site.
Patient with anticipated difficult airway.
Patient with abnormal spinal anatomy.

METHOD OF DATA COLLECTION

1. Patient recruitment: Patients underwent abdominal procedures were selected and provided with information about the study. Informed consent was obtained from those willing to participate.
2. Randomization: Participants were randomly divided into either the Dexmedetomidine with hyperbaric bupivacaine (BD) or fentanyl with hyperbaric bupivacaine (BF) group equally by computer generated list of random numbers to ensure unbiased treatment allocation.
3. Data variables: Relevant variables were identified, such as demographic information (age, gender), type of abdominal procedures, pre-existing medical conditions, and anesthesia-related factors.
4. Outcome measures: The study defined specific outcome measures to evaluate efficacy, such as pain scores (numericrating scale), time to first analgesic request, duration of sensory and motor block, postoperative analgesic consumption, patient satisfaction, and any adverse events.
5. Data collection tools: Validated tools like standardized measurement scales utilized to collect data. Electronic data capture systems or paper-based forms could be used, depending on the study setting.
6. Equipotency of the drugs: In most of the studies, it is stated that 5mcg of Dexmedetomidine is noted to be equipotent with 25mcg of Fentanyl when added as an adjuvant to Bupivacaine for Subarachnoid block[17,19,20,23,24].

PROCEDURE:

Pre operative evaluation was performed.

In the operating room, appropriate equipment for airway management and emergency drugs were kept ready. The horizontal position of the operating table was checked. Patients were shifted to the operating room and positioned.

Following arrival in operation theatre, intravenous access was established with 18G cannula. Pulse ox meter, electrocardiogram and non invasive blood pressure monitors were connected.

The patients were placed in sitting position and lumbar puncture was performed under strict aseptic precautions at L3 –

L4 space using 25 G Quincke's spinal needle.
The anesthesiologist performing the procedure was blinded to the drug injected. According to the allocated group, the patients received either hyperbaric Bupivacaine 3ml with 5mcg of
Dexmedetomidine or hyperbaric Bupivacaine 3ml with 25mcg of Fentanyl.

The patients were then placed in supine position. An anesthesiologist blinded to patient allocation and study group performed the intra operative and postoperative assessment.
Systolic and diastolic blood pressure, heart rate and respiratory rate were recorded. Hypotension was said to have occur red if the systolic blood pressure and diastolic blood pressure had fallen below 20% from the base line and was treated with supplemental oxygen, increasing the infusion rate of intravenous fluids and Injection Ephedrine in incremental doses of 6mg.
Bradycardia was defined as heart rate lessthan50/min and was managed with intravenous Atropine in incremental doses. On completion of surgery, patients were transferred to postoperative ward after complete resolution of motor blockade and stabilization of blood pressure.

ASSESSMENT OF MOTOR BLOCKAD E:
Motor block was assessed by using **Modified Bromage Scale**.
The time of onset of motor block was defined as the time interval between the local anesthetic solution injected and the establishment of grade 3 on Bromage scale
Table1: Bromage scale grading
Grade | Criteria | Degree of Motor Block
0 – Full movement of legs and feet: **0% (No block)**
1 – Able to move feet freely and slightly bend knees: **33% (Partial block)**
2 – Unable to bend knees, but foot movement intact: **66% (Near complete block)**
3 – No movement in legs or feet: **100% (Complete block)**

ASSESSMENTS OF SENSORY BLOCK A DE:
The time of onset of sensory block was assessed as the time interval between local anesthetic injections to the onset of complete loss of pinprick sensation in anterior axillary line bilaterally at
T10 level. The level of sensory block achieved after 20 mins of local anesthetic injection was taken as the maximum level of sensory block achieved. Two segment regression time from the maximum level of sensory block achieved was taken as the duration of sensory block. Adverse effects such as giddiness, nausea, vomiting, shivering, pruritis and respiratory depression were noted.

ASSESSMENT OF PAIN IN POST OPERATIVE WARD:
The patient was shifted to post operative ward after completion of surgery. The vital signs were recorded till the regression of both motor block [Bromage 0] and sensory block [s1], pain was assessed every 15minutes. When the patient reaches the pain score 2, Injection Diclofenac 75mg IM was given. Duration of effective analgesia was defined as the time interval between onset of SAB and the time to reach pain score 2 or 3.

RESULTS

Distribution of the study population based on Age

	GroupBD		Group BF		Total	
	N	%	N	%	N	%
30–40	8	26.7%	14	46.7%	22	36.7%
41–50	22	73.3%	16	53.3%	38	63.3%
Total	30	100%	30	100%	60	100%
MeanAge	44.2±5.8		43.2±6.8		43.7±6.3	
Chisquaretest=2.58,p=0.27,Notstatisticallysignificant						

Distribution of the study population based on Anthropometric details

The average height of participants in Group BD was 159.03 ± 5.81 cm, while in Group BF it was 159.43 ± 5.94 cm. The difference in height between the two groups was not statistically significant (p = 0.79). Similarly, the mean weight in Group BD was 59.83 ± 6.17 kg compared to 61.13 ± 5.72 kg in Group BF, with no significant difference observed (p = 0.40).

In this study, group BD had a mean height of 159.03 ± 5.81 cms, while group BF had a mean height of 159.43 ±5.94 cms. No significant difference in mean height was found between the groups.

In this study, group BD weighed 59.83±6.17kgs while group BF had a mean height of 61.13±5.72 kgs. No statistically significant weight difference was found between the groups.

Distribution of the study population based on Diagnosis

	GroupBD		Group BF		Total	
	N	%	N	%	N	%
AUB	9	30%	12	40%	21	35%
FU	8	26.7%	4	13.3%	12	20%
UVP	13	43.3%	14	46.7%	27	45%
Total	30	100%	30	100%	60	100%
Chisquaretest=1.79,p=0.40,Notstatisticallysignificant						

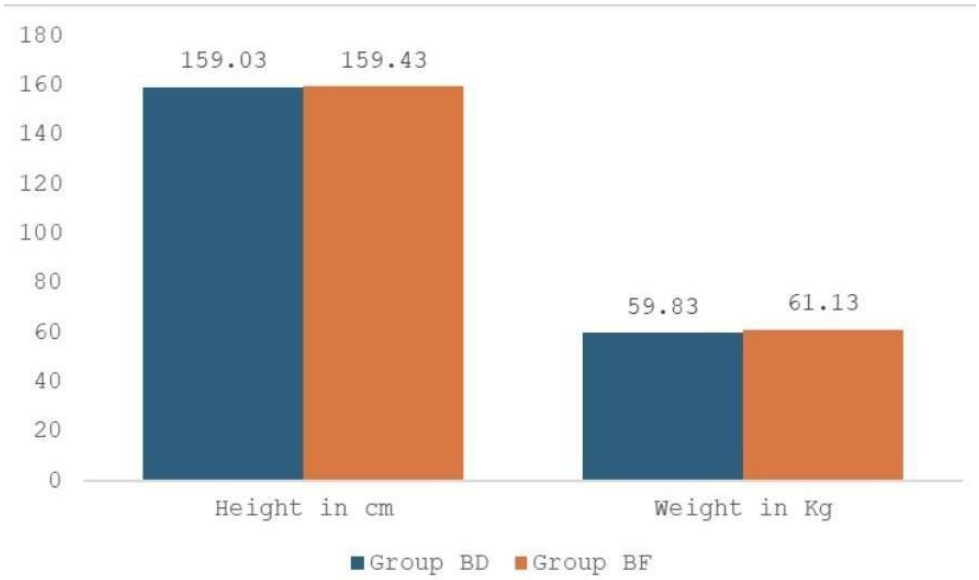


Table 5: Distribution based on surgery duration

The average duration of surgery was 76.66 ± 21.22 minutes in Group BD and 73.16 ± 23.09 minutes in Group BF. The difference between the two groups was not statistically significant ($p = 0.54$).

In the study, mean surgery durations were 76.66±21.22 mins for group BD and 73.16±23.09 mins for group BF. No significant difference was found across the groups

Distribution based on onset of sensory Block in minute satT10 level

The mean onset time of sensory block was 2.66 ± 0.47 minutes in Group BD and 2.86 ± 0.50 minutes in Group BF. The difference between the groups was not statistically significant ($p = 0.12$).

The study found that the mean time for onset of sensory block atT10 level was 2.66±0.47mins in group BD and 2.86 ±0.50 mins in group BF. There was no significant difference in onset duration across the groups.

Distribution based on onset of sensory block in minutes atT6 level

The average time for onset of sensory block was 4.73 ± 0.63 minutes in Group BD and 4.80 ± 0.76 minutes in Group BF. The difference between the two groups was minimal and not statistically significant ($p = 0.71$).

In this study, the mean onset time of sensory block atT6 level was 4.73±0.63mins for groupBD and 4.80 ±0.76 mins for group BF. There was no significant difference in onset duration at T6 level across groups.

Distribution based on mean time to reach motor block (Bromage3) min

The mean time to achieve motor block was 6.56 ± 0.67 minutes in Group BD and 6.60 ± 0.56 minutes in Group BF. The difference between the two groups was negligible and not statistically significant ($p = 0.83$).

In this study, group BD took 6.56 ±0.67 mins to reach motor block (Bromage 3), while group BF took6.60 ± 0.56 mins. There was no significant difference in motor block time at T6 level among the groups.

Mean time for regression of sensory block(S1)in min
The mean time for regression of the sensory block to the S1 dermatome was 457.20 ± 50.67 minutes in Group BD and 355.70 ± 51.25 minutes in Group BF. This difference was statistically significant ($p = 0.0001$).

In this study, the mean time for sensory block regression(S1) was significantly longer in group B(457.20 ±50.67 mins) compared to group BF (355.70 ±51.25 mins).

Mean time for regression of motor block (Bromage0) in min
The average time for motor block to regress to Bromage 0 was 284.70 ± 28.04 minutes in Group BD and 235.16 ± 39.47 minutes in Group BF. This difference was statistically significant ($p = 0.0001$).

The study found Group BD had a longer rmotor block regression time(284.70±28.04mins) compared to Group BF (235.16 ±39.47 mins), showing a significant difference.

Mean time for rescue analgesia in min
The mean time to first rescue analgesia was 270.73 ± 50.01 minutes in Group BD and 217.83 ± 42.28 minutes in Group BF. The difference between the two groups was statistically significant ($p = 0.0001$).

In this study, the mean time for sensory block regression from S1 in group BD was 270.73± 50.01mins, and in group BF, it was 217.83 ± 42.28mins. A statistically significant difference was found, with group BD showing a significantly higher mean regression time compared to group BF.

Grade of Motorblock
All participants in both Group BD and Group BF (100% in each group) were classified as Grade 3. No participants in either group were categorized as Grade 2. Thus, out of a total of 60 subjects, 100% were graded as Grade 3.

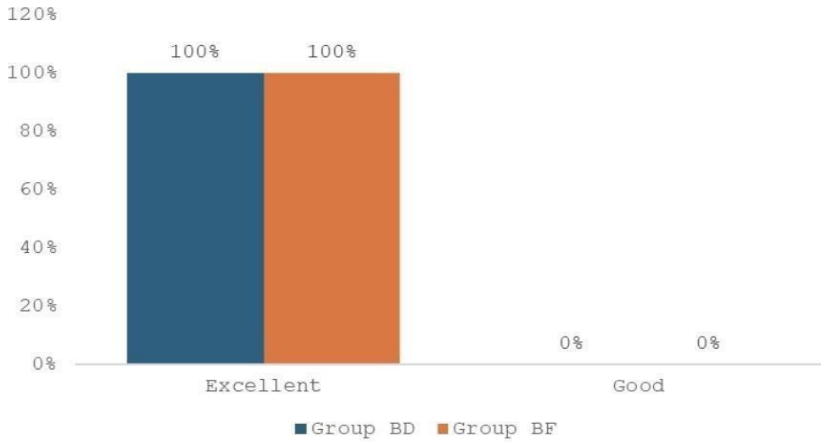
In both the group all the cases attained grade 3 motor block.
Maximum level of sensory block by(T4-T6)

In Group BD, 13.3% of participants achieved a sensory level of T4, while 86.6% reached T6. In Group BF, 10% attained T4 and 90% reached T6. Overall, 11.7% of the total participants achieved T4, and 88.3% reached T6.

In the present study in group BD maximum level of T4 block was attained among 13.3%of the subjects and it was T6 among 86.6% of the subjects. In group BF,10% of the subjects achieved maximum sensory block by T4, 90% had it till T6.

Quality of surgical anesthesia

	GroupBD		GroupBF		Total	
	N	%	N	%	N	%
Excellent	30	100%	30	100%	60	100%
Good	0	0%	0	0%	0	0%
Total	30	100%	30	100%	60	100%



Distribution of cases based on Hypotension

In Group BD, 26.7% of participants experienced the event (Yes), while 73.3% did not (No). In Group BF, 20.0% reported the event, and 80.0% did not. Overall, 23.3% of the total participants responded "Yes," and 76.7% responded "No."

In the present study, 23.3% of the subjects had hypotension and rest did not have any hypotension. Among the cases of groupBD,26.7%ofthe cases had hypotension and in group BF 20% of the cases had hypotension

Distribution of cases based on Side effects

In Group BD, 10% of participants experienced bradycardia, compared to 3.3% in Group BF, making a total incidence of 6.7%. Pruritus was not reported in Group BD but was observed in 23.3% of Group BF participants, with an overall incidence of 11.7%. Vomiting occurred in 3.3% of Group BD and 6.7% of Group BF, totaling 5.0%. No cases in either group required intraoperative analgesia.

In the present study it was observed that 6.7% of the cases had bradycardia, 11.7% of the cases had pruritus, 5% of the cases had vomiting and none of the subjects required intra op analgesia.IngroupBF,3.3%ofthecaseshadbradycardia,23.3%ofthecaseshadpruritus,and 6.7% of the cases had vomiting. In the group BD, 10% of the cases had bradycardia, 3.3% of the cases had vomiting.

Distribution of cases based on sedation score

All participants in both Group BD and Group BF (100% in each group) had a sedation score of 2. No participants in either group recorded a sedation score of 3 or 4. Overall, all 60 participants (100%) had a sedation score of 2.In the present study all the cases had achieved sedation score 2.

Heart rate

At baseline, the mean values were comparable between Group BD (84.70 ± 10.75) and Group BF (84.27 ± 13.97), with no significant difference ($p = 0.893$). Similarly, at 5 and 10 minutes, both groups showed similar readings with p-values of 0.861 and 0.338, respectively, indicating no statistical significance. However, from 30 minutes onward, Group BF consistently showed higher mean values compared to Group BD, and the differences became statistically significant. Notably, at 30 minutes ($p = 0.025$), 35 minutes ($p = 0.016$), 40 minutes ($p = 0.012$), 45 minutes ($p = 0.008$), and continuing through 120 minutes ($p = 0.022$), the values in Group BF remained significantly higher. These results suggest a statistically significant variation in the parameter measured (e.g., hemodynamic parameter such as blood pressure or heart rate, if applicable) between the groups from 30 minutes onward.

In the present study, it was observed that heart rate was significantly higher in group BF when compared to group BD after procedure.

SBP

At baseline, the mean values were similar between Group BD (127.20 ± 11.87) and Group BF (123.90 ± 6.85), with no statistically significant difference ($p = 0.193$). Throughout the observation period—from 5 minutes to 120 minutes—both groups demonstrated comparable trends with fluctuations in values. Although Group BD generally showed slightly higher means than Group BF in the earlier time intervals (e.g., at 5 min: 122.57 vs. 116.60, $p = 0.063$), none of the differences at any time point reached statistical significance ($p > 0.05$). Overall, the comparison indicates that there were no significant differences between the two groups in the measured parameter (e.g., systolic blood pressure, if applicable)

over time.

DBP

At baseline, the mean values were closely comparable between Group BD (80.00 ± 7.76) and Group BF (82.03 ± 7.26), with no statistically significant difference (p = 0.299). Throughout the monitoring period (from 5 minutes to 120 minutes), both groups showed similar trends in their measurements, with slight variations in mean values. However, none of the differences between the groups at any time point were statistically significant, as all p-values remained above 0.05. This indicates that there was no significant difference between Group BD and Group BF in the measured parameter (e.g., diastolic blood pressure, if applicable) across the entire duration of observation.

In the present study it was observed that there was no statistically significant difference in the mean DBP after procedure across the groups.

At the baseline measurement, both Group BD (95.73 ± 8.58) and Group BF (95.99 ± 6.34) had nearly identical mean values, with no significant difference (p = 0.896). Over the course of the study period, from 5 to 120 minutes, both groups exhibited similar trends, with mean values remaining close to one another. Minor fluctuations were observed between the groups at various time points; however, none of these differences reached statistical significance, as all p-values remained greater than 0.05. This indicates that there was no statistically significant difference between Group BD and Group BF in the parameter measured (e.g., mean arterial pressure, if applicable) throughout the observation period.

MAP

No statistically significant difference in mean MAP after procedure was observed among the groups in this study.

SPO2

At baseline, both Group BD (99.90 ± 0.31) and Group BF (99.93 ± 0.37) demonstrated nearly identical mean values, with no statistically significant difference (p = 0.703). Throughout the observation period (from 5 to 120 minutes), the mean values remained consistently similar between the two groups, with only minor fluctuations. Although Group BF showed slightly higher readings at several time points, all p-values remained above 0.05, indicating no statistically significant difference between the groups during any measured interval. This suggests that both groups maintained comparable values for the observed parameter (e.g., body temperature, if applicable) across the entire duration of monitoring.

This study found no significant difference in mean SpO2 after procedure across the groups.

DISCUSSION

Dexmedetomidine, a selective α-2 agonist, enhances analgesia and stability when used alongside local anesthetics intrathecally. Its mechanism involves binding to nerve fibers and neurons to inhibit pain signal transmission.

Intrathecaldexmedetomidine has antinociceptiveaction for somatic and visceral pain. The combination of local anaesthetics with α-2 adrenoceptor agonist prolongs local anesthetic action intrathecally. Motor block prolongation may be due to dexmedetomidine binding to motor neurons. Studies on intrathecaldexmedetomidine with bupivacaine show no reported postoperative neurological deficits in humans.

Dexmedetomidine reduces heart rate and blood pressure by lowering plasma catecholamines, aiding patients with tachycardia and hypertension. It enhances hemodynamic stability perioperatively. Intrathecal local anesthetics lower mean arterial pressure and sympathetic outflow by blocking axonal transmission in spinal nerves.

Fentanyl acts by binding to spinal cord opioid receptors and can spread supraspinalintrathecally, serving as an adjuvant in subarachnoid block to reduce visceral and somatic pain; its use is limited due to dose-dependent adverse effects.

This study compared the impact of adding dexmedetomidine or fentanyl to intrathecal bupivacaine for abdominal surgery.

Objectives of the study being-

To assess the start and length of sensory and motor block.

To assess intra operative haemodynamics

To monitor post operative analgesia.

To study complications like nausea, vomiting, sedation, and hypotension.

Socio-Demographic characteristics:

The study found that the majority of subjects were aged between 30 and 50 years, with the overall mean participant age at 45.70 ±6.86 years.

It was observed that there was no statistically significant difference in the mean age across the groups, thus they stand comparable.

In**ThadaBetal.'s**[18]study, the participants' mean age of 40.70±5.2 closely matched theme an age seen in the present study.

In **El-Attar et al.'sstudy**,[15] the participants' mean age of around 31 years closely matched the findings in the present study.
In the study by **Dhumane et al**.,[29]participants' mean age of around 45 years closely matched the observation in the present study.

Diagnosis:
In this study, 35% had AUB, 20% had FU, and 45% had UVP. **GautamB et al**.[30]found AUB as the most common reason for abdominal surgeries, consistent with the present study findings.

Duration of surgery:
In this study, surgery durations were76.66 ±21.22 mins in groupBD and 73.16 ±23.09 mins in group BF. There was no significant difference observed in surgery duration between the groups.
In their study, **Dhumane Pet al.** [29] found that the average duration was 118.42 mins, slightly longer than the present study.
In **GautamBetal.'sstudy**,[30] surgery lasted an average of 82 minutes, aligning with findings in the present study.

Onset of sensory block atT10 level:
The study found that the mean time for sensory block onset at T10 level in groups BD and BF were 2.66 ±0.47 mins and 2.86 ±0.50 mins, respectively. There was no significant difference in onset duration across groups.
In **Dhumane P et al.'s** [29] study, sensory blockade began sooner with dexmedetomidine than with Fentanyl, consistent with the present study findings.

Onset of Sensory blockT6level:
Sensory block onset at T6 level was similar (4.73 ±0.63 mins for BD, 4.80±0.76 mins for BF) with no significant difference in duration observed across groups.
In the study by **Thada et al**.,[18] it was found that both groups had a mean onset of sensory block at approximately 10.9 minutes, indicating no statistically significant difference, aligning with the present study's findings.

In **El-Attar et al.'s study**,[15] the onset of anaesthesia was faster with dexmedetomidine compared to the other group, contrary to the present study findings.
In **Dhumane P et al.'s**[29] study, they found that sensory anaesthesia onset took around 3 minutes with Fentanyl and 2 minutes with dexmedetomidine, aligning with the present study.

In **Mustafa MA et al.'s** [31]study, higher Dexmedetomidine doses led to increased sensory block levels and longer anesthesia duration compared to Fentanyl.
Ibrahim et al.'s[32] study found no significant difference in maximal sensory block when comparing 5µg Dexmedetomedine and 5µg sufentanylto 10mg heavy Bupivacaine,aligning with the present study findings.**Ghanem et al.** [33] observed no significant difference in the time to reach peak sensory level between Group D (5µg Dexmedetomidine + 25µg fentanyl + 10mg Bupivacaine) and Group F (10mg isobaric Bupivacaine). This finding aligns with the present study.

Mean time to reach motor block ((Bromage3)
In this study, the mean time to reach motor block (Bromage 3) was similar between groups BD (6.56 ± 0.67 mins) and BF (6.60 ± 0.56 mins), with no significant difference observed at T6 level across the groups.
In **Thada B et al.'s[18]**study, the onset of motor block differed insignificantly between groups Dexmedetomidine (7.8±1.0 minutes) and Fentanyl (7.5±1.0 minutes), aligning with the present study findings.
In **Dhumane P et al.'s[29]**study, they found that motor block onset was 8 minutes in group Fentanyl and 7 minutes in group Dexmedetomidine. This was significantly lower in those who received Dexmedetomidine, aligning with the present study.

M. Al-Ghanemetal.[34]found that 5µg Dexmedetomidine with Bupivacaine extended motor blockade more than 25µg Fentanyl. Similar results were also noted in the present study.

In their study, **Kanazietal.**[33]found that combining12mg of Bupivacaine with dexmedetomidine and clonidine in trathecally leads to comparable motor block duration extension as observed in the present study with 12mg of Bupivacaine alone.

Mustafa et al.[31] found a dose-dependent effect of Dexmedetomidine on motorblockade duration compared to Fentanyl,

aligning with the present study findings.
Ibrahim et al.[32] found significant differences in motor blockade duration when 5µg Dexmedetomidine was added to 2ml heavy Bupivacaine, alongwith 5µg Su Fentanyl to 2ml heavy Bupivacaine, aligning with the present study's observations.

Mean time for regression of sensory block(S1)

In this study, the group BD showed a sensory block regression time of457.20 ± 50.67 mins, while group BF had aregression time of 355.70±51.25mins. A statistically significant difference was found in regression time, with BD showing higher values compared to BF.

In **Dhumane et al.'s**[29] study, the sensory block duration was notably longer in group Dexmedetmidine compared to the Fentanyl group, aligning with the present study's findings.
In **Mustafa MA et al.'s**[31]study, they noted dose-dependent onset and regression of sensory and motor block in SAB. This study showed prolonged anesthesia duration with Dexmedetomidine.

In **M. Al-Ghanem SM et al.'s**[34] study, they noted that anesthesia duration was prolonged in Dexmedetomidine recipients, aligning with the present findings.

Kanazi et al.[33] discovered that adding 3µg Dexmedetomidine to 12mg intrathecal Bupivacaine or 30µg clonidine notably extended the sensory block.

Mean time for regression of motor block(Bromage0)

The study found a difference in motor block regression time between groups BD and BF. Group BDhadsignificantlylongerregressiontimeat284.70±28.04minscomparedtogroupBFat
235.16±39.47mins.
minutes, significantly longer in the dexmedetomidine group compared to the fentanyl group (76 minutes). This aligns with the present study's findings.
In **Gautam B et al.'s**[30] study, Dexmedetomidine provided longer surgical analgesia compared to Fentanyl, aligning with the present study findings; therefore, it is a safe option for cases expecting prolonged analgesia.
In **Thada B et al.'s**[18] study, the mean motor block regression time was approximately 117.5

Require men to frescue analgesia in minutes:

In this study, the mean time for motor block regression (Bromage 0) was significantly longer in group BD (270.73 ±50.01 mins) compared to group BF (217.83 ±42.28 mins).
Dhumaneetal.'s[29]studyfoundprolongedpost-operativeanalgesiawithDexmedetomidine compared to Fentanyl, aligning with the present study findings.
In **Mustafa MAetal.'s**[31] study, it was found that the analgesic effect lasted longer inpatients given dexmedetomidine, aligning with findings in the present study.

Grade of motor block:

In both the groups all the cases attain the grade 3 motor block.

Maximum level of sensory block by(T4-T6)

In the present study in group BD maximum level of T4 block was attained among 13.3% of the subjects and it was T6 among 86.6%of the subjects.
In group BF,10% of the subjects achieved maximum sensory block by T4,90% had it till T6.

Quality of surgical anaesthesia:

All cases in the study achieved excellent surgical anesthesia.

Ibrahim et al[32] observed better surgical anesthesia quality with 5µg sufentanyl compared to 5µg Dexmedetomidine when added to 2ml heavy Bupivacaine.
In**GautamBetal.'s**study[30]bothdrugsprovidedexcellentsurgicalanesthesia.

Hypotension:

Intrathecal local anaesthetics block sympathetic outflow, reducing blood pressure. This block is near-maximal in spinal anaesthesia doses. Adding low α2 agonist doses to high local anaesthetics doesn't enhance sympatholysis beyond near-maximal levels.
In the study, 23.3% of subjects had hypotension. In group BD, 26.7% experienced hypotension, and in group BF, 20% had hypotension.

In a study by **Thada B et al.,** [18]12.5% of group Dexmedetomidine and 9.37% of group Fentanyl experienced hypotension, showing a statistically significant difference consistent with the present study findings.

In **Dhumane P et al.'s**[29] study, 18% of group Dexmedetomidine and 10.5% of group Fentanyl subjects had hypotension. Dexmedetomidine recipients showed higher hypotension rates, consistent with the present study's findings.

In **Ibrahim et al.'s** [32]study, the addition of Dexmedetomidine and sufentanyl to spinal Bupivacaine at specific doses did not significantly impact hypotension incidence.

In **Kanazi et al.'s** [33] study, adding Dexmedetomidine or clonidine to Bupivacaine did not significantly lower blood pressure during or after surgery. In **M. Al Ghanem et al.'s** study, [34] hypotension was slightly higher in the fentanyl group than in the Dexmedetomidine group, but the difference was not significant. A few patients in each group experienced mild hypotension after spinal injection and in the PACU, which aligns with findings in the present study.

Side effects:
In the present study it was observed that 6.7% of the cases had bradycardia,11.7% of the cases had pruritus,5% of the cases had vomiting and none of the subjects required intra-opanalgesia. In group BF, 3.3% of the cases had bradycardia, 23.3% of the cases had pruritus, and 6.7% of the cases had vomiting.
In the group BD,10% of the cases had bradycardia,3.3% of the cases had vomiting.

In the study by **Thada B et al.,** [18] 3.12% had bradycardia in group Dexmedetomidine,3.12% had nausea, and vomiting, while 6.25% had nausea, 3.12% had pruritus, and 3.12% had urinary retention in group Fentanyl. There was no significant difference in side effects between the groups, aligning with this study's findings.

In **Gautam B et al.'s** study,[30] visceral pain was notably higher in the fentanyl group than the dexmedetomidine group, although there were no serious cardio-respiratory issues, just more intra-operative hypotension in the former, managed easily with fluids and vasopressors without impact on outcomes.

In **Ibrahim et al.'s**[32] study, no significant difference was found in Bradycardia incidence between the two groups receiving different drug combinations.

In **M. Al Ghanem et al.'s**[34] study, no significant difference was found in Bradycardia incidence between two groups: 5µg Dexmedetomidine with 10mg isobaric Bupivacaine and 25µg fentanyl with 10mg isobaric Bupivacaine intrathecally. More bradycardia was observed with Dexmedetomidine, aligning with the present study's findings.

Ibrahim et al.[32] observed a significant difference in pruritus incidence between
theSufentanyl group, aligning with the present study findings.

M. Al Ghanemet al. [34]found a significant difference in pruritus incidence. The reported pruritus after intrathecal fentanyl is 40-70%, higher than in this study, explained by its benign nature leading to underreporting.
BograJetal.[35] observed as ignificant difference in pruritus incidence when adding 10mg or
12.5mg of fentanyl to hyperbaric Bupivacaine. Pruritus appeared dose-dependent, aligning with the present study's findings.

Sedationscore:
In this study all the cases had achieved sedation score 2
In **Gautam B et al.'s**[30] study, the sedation score was <3 for all subjects, matching findings from this current study.

Haemodynamic changes:
Heart rate:
In the present study, it was observed that heart rate was significantly higher in group BF when compared to group BD after procedure.
Thada B et al.'s[18] study found a significant heart rate difference over time in both groups, but no distinction in the heart rate decrease pattern between them.
Blood Pressure:
The study found no significant difference in mean SBP and DBP after procedure across both the groups.

MAP:
The study found no significant difference in mean MAP after procedure among the groups.

SpO2:
The study found no significant difference in mean SpO2 after procedure among the groups
Thada B et al.'s[18] study found both groups had stable hemodynamics, consistent with the present study. While they noted a significant difference in MAP, no variation was seen in the patterns of blood pressure decrease across groups.
In **Gautam B et al.'s** [30] study, the Dexmedetomidine group exhibited greater hemodynamic stability compared to those receiving Fentanyl, consistent with findings from the present study.

CONCLUSION
IntrathecalDexmedetomidine supplementation of spinal block seems to be a good alternative to intrathecal fentanyl since it produces prolonged sensory block and motor block. It is evident that this type of block may be more suitable for abdominal surgeries where prolonged anaesthesiawillbe required evenaftersurgery, thus reducing thecost of rescueanalgesiainthe post op period.

SUMMARY
The study included 60 women aged 30-50 who had spinal anesthesia during total abdominal hysterectomy. They were randomly divided into two groups: BD (bupivacaine- dexmedetomidine) and BF (bupivacaine-fentanyl). The groups were comparable in terms of age, height, weight, diagnosis, and duration of surgery.
There were no significant differences in onset time of sensory block between groups at T10 and T6 levels, and in time to reach motor block (Bromage 3). The BD group showed significantly longer regression times for sensory block (S1) and motor block (Bromage 0) compared to the BF group.
All subjects had successful anesthesia. Similar hypotension rates in both groups; more bradycardia in BD and pruritus in BF groups. No subjects needed intra operative analgesia or rescue medications for side effects like hypotension or bradycardia.
After procedure, the BF group had a significantly higher heart rate than the BD group. No significant differences were found between the groups in systolic, diastolic, mean arterial pressures, and oxygen saturation post-procedure.

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