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A Comparative study of an Intrathecal 2.5µg Dexmedetomidine and Fentany l25 µg as Adjuvants to Bupivacaine 2.5mg for Labour Analgesia"

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ABSTRACT: Single-dose spinal analgesia can successfully replace epidural analgesia during routine labour since it is a more effective, quicker, simpler, and less expensive approach. Main aim is to compare the effectiveness (duration and quality) of intrathecal analgesia during labour in parturients, using bupivacaine in combination with dexmedetomidine and fentanyl.
As the duration of analgesia was longer with low-dosage spinal than epidural method, It was proved to be an effective alternative to epidural analgesia. Decreased systemic absorption caused by the intrathecal injection and use of adjuvants results in a lower intrathecal dose requirement, further lowering the risk of dose-related side effects. We observed that: the two groups were similar in demographic attributes, haemodynamic, and neonatal outcome parameters. In the Bupivacaine and Dexmedetomidine group (BD), the maternal satisfaction score was higher than in the Bupivacaine and Fentanyl group (BF), While certain negative effects, such as hypotension and bradycardia, were statistically insignificant (p values > 0.05) in both the groups. But the incidenceof nausea, itching, and shivering was significantly higher in the Bupivacaine and Fentanyl group (p value was 0.027, 0.013, 0.001 respectively) as compared to other group.
KEYWORDS: Labour Analgesia, Outcome, Sensory blockade, Spinal anaesthesia

I. INTRODUCTION

According to Stephen Gaskin, "a woman's intuitive insight and compassion during childbirth can make her a conduit of healing and sympathy for other women."

For many women, experiencing labour pain during delivery is the most traumatic event. A woman is never afraid of having a baby since she typically lacks mental gratification, she is more sensitive to pain because of fear, anxiety and stress, which are common in prenatal patients. Consequently, the parturients began to express a greater interest in the idea of labour analgesia.

Effective analgesia minimizes the risk of complications during labour with improvedintrapartum mother and foetal outcomes. The optimal labour analgesic method should significantly lessen labour pain while enabling the expectant mother to take an active part in giving birth. Additionally, the development of labour or the foetus should be unaffected or barely noticeable. The most effective and least stressful kind of pain control during labour is a neuraxial blockade, which includes -epidural, spinal, combined spinal epidural (CSE), and continuous spinal blocks.[1]

When used for obstetric purposes, the spinal anaesthesia approach may cause side effects including hypotension, nausea, and vomiting. To combat the aforementioned side effect in our study, we combined a modest dose of local anaesthetic medication with a small dose of an opioid. Use of intrathecal bupivacaine and dexmedetomidine combination is shown in our study. It has the potential to be the analgesic of choice in labouring women producing profound analgesia. Dexmedetomidine may have significant benefits for labouring and delivering women due to its lack of side effects. [2]

The decision to employ a relatively low dose of intrathecal dexmedetomidine and bupivacaine was taken since using higher doses of local anaesthetics can impair motor function in labouring women.[3]In our study, we evaluate the impact of these drug combinations 2.5 µg

Dexmedetomidine and 25 µg Fentanyl with 2.5mg bupivacaine on labour pain,

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hemodynamic parameters, and neonatal outcome and maternal satisfaction score while considering the safety and efficacy of each individual drug.

II. MATERIAL AND METHODS

Proposed Research Design

The present study i.e- "**A comparative study of an Intrathecal 2.5 µg Dexmedetomidine and Fentanyl 25 µg as Adjuvants to Bupivacaine 2.5 mg for Labour Analgesia**" was conducted after approval of the Datta Meghe Institute of Higher Education And Research (JNMC), (AVBRH), Sawangi, Wardha, Ethical committee. Valid consent both written and informed obtained from all the 80 patients selected for the study and they were divided randomly into 2 groups of 40 each.

GROUP BD – 40 patients received hyperbaric bupivacaine 2.5 mg with dexmedetomidine 2.5µg.
GROUP BF – 40 patients received hyperbaric bupivacaine 2.5mg with fentanyl 25 µg
Study Period: 2 years
Study Area - JNMC & AVBRH, Department of Anaesthesiology
Research Design - Comparative Prospective Observational study
Study Population - Antenatal Patients(19-40 yr.)

PARTICIPANTS:-
INCLUSION CRITERIA:
1 Age group 19-40yrs.
2. Height ≥ 150cm
2. Patients with Term pregnancy (singleton foetus)
3. Cervical dilatation of at least 5cm or more
4. All vertex presentation
5. Uncomplicated pregnancies
6. Primi and Multigravida of physical status ASA grade I& II

EXCLUSION CRITERIA:
1. Patient refusal.
2. Cephalopelvic disproportion and bad obstetric history.
3. Active maternal haemorrhage
4. Maternal sepsis or infection (needle insertion site)
5. Maternal deranged coagulation profile.
6. Preeclampsia.
7. Preterm labour.
8. Morbid obesity (BMI>35).
9. Twin pregnancy.
10. Scoliosis.
11. Neurologic disorders
12. Previous caesarean section

III. METHODOLOGY:

• A history and clinical examination of each patient was done. All routine investigations were obtained and noted. The parturients were attached to the monitor for baseline vitals assessment, and foetal heart rate at different time intervals was also documented.
• The assessment of uterine contractions and cervical dilatation was done simultaneously. Preloading with fluids- ringer lactate or normal saline was done at 10ml/kg.
• Parturients were seated, their back was cleaned and draped to achieve and maintain asepsis on the attainment of 5 cm or more cervical dilatation. With 2 mL (1% lidocaine) local anaesthetic, the skin area over the L3-L4 spinal space was anaesthetized.
• During uterine contractions, a 23G spinal needle is utilised to administer the medication intrathecally into the L3–L4 intervertebral region. Every two hours, a pelvic examination was performed to assess cervical dilatation rate and duration of second stage of labour and to evaluate how labour was proceeding ahead.
• 0.5 % of 2.5 mg of bupivacaine (0.5 ml) intrathecally was administered to participants along with the adjuvants dexmedetomidine in group BD and fentanyl in group BF. After receiving a spinal medication, the patient was instructed to lie down with a wedge on her left side to prevent aortocaval compression.

The drug administration was done as mentioned below:
GROUP BD – received hyperbaric bupivacaine 2.5 mg(0.5ml) with dexmedetomidine 2.5µg(0.02ml)+ 0.5ml NS(normal saline) = total 1ml
GROUP BF – received hyperbaric bupivacaine 2.5mg(0.5ml) with fentanyl 25 µg(0.5ml) = total 1ml
• During labour, measurements of the foetal heart rate, blood pressure, saturation, and heart rate were taken every 15 minutes. APGAR scores were used to determine the neonatal status in 1 and 5 minutes.

ASSESSMENT AND MONITORING

Assessment of the sensory block level, by lack of sensation upon pin prick was noted. The onset of sensory block was recorded. The onset of the sensory blockade is defined as period between

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the administration of an intrathecal injection and the achievement of a sensory level of T10.
The sensory regression to S1 dermatome was also noted. The period between the spinal medication injection and the patient's initial request for analgesics is known as the duration of pain relief, which was also taken into account.
Motor block (using Bromage scale): Motor blockade if present, its degree was assessed
in the following manner
• Grade 0 -No block): full knee and foot flexion is possible.
• Grade1- (Partial block) : patient is able to flex knees & feet slightly.
• Grade II - (Almost complete): flexion of the foot is feasible but knee flexion is not
possible.
• Grade III – (Complete block): not able to move legs or feet.

Following parameters were recorded:
• **Maternal Heart Rate and Blood Pressure:** (manual sphygmomanometer) initially for half an hour every 5min. we will assess, then every 30 min. If the decrease in B.P is >20% when compared to initial baseline blood pressure then, considered as maternal hypotension and it is treated by giving more intravenous fluids to the patient.
• **Bradycardia:** Defined as heart rate < 50 beats/minute. Atropine (0.6mg) is kept ready in case of bradycardia.
• **Foetal heart rate:** It is monitored continuously by using Doppler(foetal)
• **Occurrence of any adverse events**: Bradycardia, pruritis, nausea, hypotension, shivering, vomiting, any motor block are also looked for and appropriately treated.
• **Neonatal weight and Apgar score:** Heart and respiratory rate, skin colour, muscle tone and grimace response to stimulus if these parameters at 1min, 5min. are <7, then it is considered as significant.
• Neonatal weight at the time of delivery was also assessed to look, if any resuscitation measures needed.
• **Maternal Satisfaction Score Following Delivery**: It is assessed by asking the parturient about pain relief. We also asked them if they would be ready to help popularize this method by talking to women in far-off villages about their experiences.
Excellent- patient is comfortable, analgesia effect is adequate, no addition of drugs required during the procedure.
Good – Analgesia effect is adequate, minimum discomfort present to patient during the procedure**.**
Poor- patient complaining severe, intolerable pain
Duration and Quality of analgesic effect were assessed on the basis of maternal satisfaction score also, as the time from giving drug intrathecally until demand for further analgesia by parturients.

The questions related to maternal satisfaction with delivery and the technique were answered on factors: - Anaesthetic effects, post-op problems, minor side effects.

In the postpartum period all the patients were admitted for 48 hrs, for close observation and they were advised for the bed rest and appropriate intake of fluids and also to inform immediately if there is any complaint of headache upon discharge.

IV. OBSERVATION AND RESULTS

Table 1 – Age wise distribution of study participants among the groups

Age group	Group		Total	t-test & p-value
	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine		
Less Than 25	18	22	40	T = - 0.676 & 0.501 NS
	45.0%	55.0%	50.0%	
25 To 30	19	18	37	
	47.5%	45.0%	46.3%	
More Than 30	3	0	3	
	7.5%	0.0%	3.8%	
Total	40	40	80	
	100.0%	100.0%	100.0%	
Mean ± SD	25.05 ± 3.78	24.52 ± 3.14		

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n = number, values in form of mean & standard deviation are expressed, a p-value of <0.05 denoting significance and NS denoting non-significant.

Eighty (80) labouring women in total were accepted and took part in the study. Table 1 and Graph 1 displays the age distribution of the study participants in each group. In Group BF, the study population's mean age was 25.05 ± 3.78, while that of Group BD was 24.52 ± 3.14. The age variable was equivalent across the two groups, group BF (hyperbaric bupivacaine and fentanyl mixture) and group BD (hyperbaric bupivacaine and dexmedetomidine) (p=0.501).

Table -2 Weight and Heightwise distribution of study participants among the groups.

Variable	Group Bupivacaine + Fentanyl BF (n=40)		Group Bupivacaine + Dexmedetomidine BD (n=40)		p- value
	Mean	S.D	Mean	S.D	
Weight (in kg)	61.53	3.23	60.53	3.05	0.1585,NS
Height (in cm)	152.8	1.65	152.76	1.43	0.77,NS

n = number, values in form of mean & standard deviation are expressed, a p-value of <0.05 denoting significance and NS denoting non-significant.

Table 2 displays the mean weight and height distribution of the study participants in each group. In Group BF, the study population's mean weight was 61.53 ± 3.23, while that of Group BD was 60.53± 3.05. The distribution of study participants among the groups, according to weight showed no statistically significant variation (p=0.1585). In Group BF, the study population's mean height was 152.86± 1.65, while that of Group BD was 152.76± 1.43. The distribution of study participants among the groups, according to height showed no statistically significant variation (p=0.77).

Table 3 – Gravida wise distribution of study participants among the groups

Gravida	Group Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine	Total	p-value
Multi	26	18	44	
	65.0%	45.0%	55.0%	
Primi	14	22	36	0.058 NS
	35.0%	55.0%	45.0%	
Total	40	40	80	
	100.0%	100.0%	100.0%	

n= number; all values are expressed in number and percentages, p<0.05 is significant NS=non-significant

Table 3 compares the distribution of study participants in terms of gravida among the groups. In Group BD, there were 18 (45%) multi gravida and 22 (55%) primigravida, and in Group BF, there

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were 26 (65%) multi gravida and 14 (35%) primigravida. The distribution of study participants among the groups, according to gravida, showed no statistically significant variation (p=0.058).

Table 4 – Gestational age wise distribution of study participants among the groups

Gestational Age	Group		Total	t-test & p-value
	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine		
37 And Above	34	34	68	T = - 1.953 & 0.054 NS
	85.0%	85.0%	85.0%	
Less Than 37	6	6	12	
	15.0%	15.0%	15.0%	
Total	40	40	80	
	100.0%	100.0%	100.0%	
Mean ± SD	38.31 ± 1.44	37.71 ± 1.31		

n= number; all values are expressed in number and percentages, p<0.05 is significant NS=non-significant.

Table 4 compares the distribution of study participant's gestational age among the categories. In Group BF, the mean gestational age was 38.31 ± 1.44, while in Group BD, it was 37.71 ± 1.31. The distribution of research participant's gestational age among the groups did not show any statistically significant differences (p=0.054).

Table 5 – Comparison between onset of sensory block and duration of sensory block among the study participants in between the groups

	Group	Mean	t-test	p-value
Onset Of Sensory Block	Bupivacaine + Dexmedetomidine	3.85 ± 1.0	- 6.318	< 0.001 S
	Bupivacaine + Fentanyl	5.25 ± 0.98		
Duration Of Sensory Block	Bupivacaine + Dexmedetomidine	137.88 ± 10.62	20.19	< 0.001 S
	Bupivacaine + Fentanyl	98 ± 6.58		

n = number, values in form of mean & standard deviation are expressed, a p-value of <0.05 denoting significance and NS denoting non-significant.

Table 5 compares the study participants sensory block onset and duration, divided into two groups. In Group BF the sensory block arrived at the T10 dermatome in 5.25 ± 0.98 seconds, whereas in Group BD, it took 3.85 ±1.0 seconds. The T10 sensory block was obtained faster in Group BD (P< 0.001), indicates that there was a statistically significant difference between the groups. In Group BF, the sensory block lasted 98 ± 6.58 seconds, but in Group BD, it lasted 137.88 ±10.62 seconds. In Group BD, the sensory block's duration was extended (P< 0.001) indicates that there was a statistically significant difference between the group.

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Table 6– Comparison of Heart rate among the study participants in between the groups

Heart Rate	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine	p-value
0 min	90.25 ± 13.89	91.4 ± 4.84	0.623 NS
1 min	91.15 ± 4.12	89.85 ± 4.82	0.199 NS
5 min	90 ± 3.89	88.30 ± 5.01	0.095 NS
15 min	88.35 ± 4.14	87.17 ± 4.81	0.246 NS
30 min	88.05 ± 4.46	86.92 ± 4.39	0.26 NS
45 min	87.7 ± 4.87	87.35 ± 4.27	0.734 NS
60 min	87.12 ± 4.36	87.32 ± 4.09	0.833 NS
90 min	86.62 ± 3.76	87.1 ± 3.96	0.584 NS
180 min	87.27 ± 4.13	86.9 ± 3.74	0.672 NS

n = number, values in form of mean & standard deviation are expressed, a p value of <0.05 denoting significance and NS denoting non-significant

Table 6 compares the heart rates of the two groups BD and BF, at various time intervals. There is no statistically significant difference in heart rate between the two groups at any particular time point seen. (p>0.05)

Table 7 – Comparison of Systolic Blood Pressure among the study participants in between the groups

Systolic Blood Pressure	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine	p-value
0 min	128.55 ± 3.71	127.85 ± 3.91	0.414 NS
1 min	127.1 ± 3.53	126.3 ± 3.99	0.345 NS
5 min	125.25 ± 4.02	123.9 ± 5.02	0.188 NS
15 min	123.15 ± 5.18	121.45 ± 6.21	0.188 NS
30 min	122.6 ± 5.28	119.25 ± 7.46	0.023 S
45 min	123.9 ± 5.49	121.35 ± 6.55	0.063 NS
60 min	125.47 ± 4.6	123.85 ± 5.57	0.159 NS
90 min	126.7 ± 3.75	125.6 ± 4.82	0.258 NS
180 min	126.8 ± 3.47	126 ± 3.92	0.337 NS

n = number, values in form of mean & standard deviation are expressed, a p-value of <0.05 denoting significance and NS denoting non-significant

Table 7 compares the systolic blood pressure between the two groups, BD and BF, at various time points. At a 30-minute interval, there is a marginally significant (p< 0.05) difference seen in systolic blood pressure between the groups. Overall, there is no statistically significant difference between the two groups for systolic blood pressure at different time points seen. (p>0.05)

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Table 8 – Comparison of Diastolic Blood Pressure among the study participants in between the groups

Diastolic Blood Pressure	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine	p-value
0 min	85.15 ± 2.56	84.9 ± 3.04	0.692 NS
1 min	83.6 ± 2.27	83.1 ± 2.93	0.397 NS
5 min	82.1 ± 2.12	81.8 ± 2.51	0.566 NS
15 min	81.9 ± 1.81	81.45 ± 2.39	0.346 NS
30 min	82.77 ± 2.31	81.92 ± 2.62	0.129 NS
45 min	82.85 ± 2.07	82.65 ± 1.83	0.649 NS
60 min	83.05 ± 1.87	82.75 ± 1.90	0.479 NS
90 min	83.55 ± 1.60	83.75 ± 1.98	0.621 NS
180 min	82.5 ± 1.85	83.35 ± 1.83	0.043 S

n = number, values in form of mean & standard deviation are expressed, a p-value of <0.05 denoting significance and NS denoting non-significant.

Table 8 compares the diastolic blood pressure between the two groups, BD and BF, at various time points. At 180 minutes, there is a marginally significant ($p<0.05$) difference seen in diastolic blood pressure between the groups. Overall, there is no statistically significant difference between the two groups for diastolic blood pressure at different time points seen. ($p>0.05$).

Table 9 – Comparison of Mean Arterial Pressure among the study participants in between the groups

Mean Arteial Pressure	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine	p-value
0 min	99.61 ± 2.08	99.21 ± 2.27	0.414 NS
1 min	98.1 ± 1.8	97.5 ± 2.13	0.179 NS
5 min	96.61 ± 1.77	95.83 ± 2.56	0.116 NS
15 min	95.65 ± 1.77	94.78 ± 3.08	0.128 NS
30 min	96.06 ± 1.91	94.36 ± 3.66	0.012 S
45 min	96.53 ± 2.24	95.55 ± 2.93	0.096 NS
60 min	97.19 ± 2.09	96.41 ± 2.23	0.113 NS
90 min	97.93 ± 1.56	97.7 ± 2.22	0.588 NS
180 min	97.26 ± 1.92	97.56 ± 1.94	0.489 NS

n = number, values in form of mean & standard deviation are expressed, a p-value of <0.05 denoting significance and NS denoting non-significant.

Table 9 compares the mean arterial pressure between the two groups, BD and BF, at various time periods. At a 15-minute interval, there is a marginally significant ($p<0.05$) difference seen in mean arterial pressure between the groups. Between the two groups, there is generally no statistically significant difference in mean arterial pressure at different time intervals seen ($p>0.05$).

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Table 10 – Comparison Cervical dilation and Duration of second stage of labour among the study participants in between the groups

	Group	Mean	t-test	p-value
Cervical dilation	Bupivacaine + Dexmedetomidine	9.57 ± 0.5	1.805	0.075 NS
	Bupivacaine + Fentanyl	9.37 ± 0.49		
Duration of second stage of labour	Bupivacaine + Dexmedetomidine	39.5 ± 6.87	1.18	0.242 NS
	Bupivacaine + Fentanyl	37.62 ± 7.34		

n = number, values in form of mean & standard deviation are expressed, a p-value of <0.05 denoting significance and NS denoting non-significant.

In Table 10, the study participants rate of cervical dilatation and the length of the second stage of labour were compared between the groups. In Group BF, the mean rate of cervical dilatation was 9.37± 0.49, while in Group BD, it was 9.57± 0.5. In groups BF and BD, the average length of the second stage of labour was 37.62± 7.34 minutes and 39.5± 6.87 minutes, respectively. Between the groups, there was no statistically significant difference in the rate of cervical dilatation or the length of the second stage of labour (p>0.05)

Table 11 – Neonatal weight wise distribution of study participants among the groups

Neonatal weight	Group		Total	t-test & p-value
	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine		
2.5 And Less	10	10	20	T = 0.103 & 0.918 NS
	25.0%	25.0%	25.0%	
2.6 TO 3	30	30	60	
	75.0%	75.0%	75.0%	
Total	40	40	80	
	100.0%	100.0%	100.0%	
Mean ± SD	2.77 ± 0.22	2.78 ± 0.21		

n = number, values in form of mean & standard deviation are expressed, a p-value of <0.05 denoting significance and NS denoting non-significant

Participants in the study were divided into groups according to their newborn weight, as shown in Table 11 below. In Group BF, the mean newborn weight was 2.77 ± 0.22 while in Group BD, it was 2.78 ± 0.21. Neonatal weight between the groups did not differ statistically significantly (p>0.05).

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Table 12 – APGAR at 1 min in neonate among the study participants in between the groups

APGAR at 1 min	Group		Total	t-test & p-value
	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine		
7.0	21	15	36	T = 1.347 & 0.128 NS
	52.5%	37.5%	45.0%	
8.0	19	25	44	
	47.5%	62.5%	55.0%	
Total	40	40	80	
	100.0%	100.0%	100.0%	
Mean ± SD	7.47 ± 0.51	7.62 ± 0.49		

n = number, values in form of mean & standard deviation are expressed, a p-value of <0.05 denoting significance and NS denoting non-significant

Between the groups of study participants, neonates APGAR scores at 1-min intervals were compared, as shown in Table 12 .At a 1minute interval, the mean APGAR scores for Group BF were 7.47± 0.51 and Group BD were 7.62± 0.49. Neonatal APGAR SCORE at 1 minute did not differ statistically significantly across the groups (p>0.05).

Table 13 – APGAR at 5 min in neonate among the study participants in between the groups

APGAR at 5 min	Group		Total	t-test & p-value
	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine		
9.0	22	16	38	T = 1.342 & 0.148 NS
	55.0%	40.0%	47.5%	
10.0	18	24	42	
	45.0%	60.0%	52.5%	
	40	40	80	
	100.0%	100.0%	100.0%	
Mean ± SD	9.45 ± 0.5	9.6 ± 0.49		

n = number, values in form of mean & standard deviation are expressed, a p-value of <0.05 denoting significance and NS denoting non-significant

Between the groups of study participants, the neonate's APGAR score at a 5 minute interval was compared, as indicated in Table 13. At a 5 minute interval, the mean APGAR score for Group BF was 9.45± 0.5 while for Group BD it was 9.6 ±0.49. Neonatal APGAR SCORE at 5 minutes did not differ statistically significantly across the groups (p>0.05).

Table 14 – Comparison of maternal satisfaction among the study participants in between the groups

Maternal Satisfaction	Group		Total	t-test & p-value
	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine		
Excellent	4	9	13	T = - 2.152 & 0.034 S
	10.0%	22.5%	16.3%	
Good	26	27	53	
	65.0%	67.5%	66.3%	
Poor	10	4	14	
	25.0%	10.0%	17.5%	
Total	40	40	80	
	100.0%	100.0%	100.0%	

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n= number; all values are expressed in numbers and percentages, p<0.05 is significant

Table 14 compares the maternal satisfaction scores of the study participants in the various groups. More participants 9 (22.5%) in group BD compared to 4 (10.0%) in group BF had good satisfaction. Maternal satisfaction scores between the groups showed a statistically significant difference (p< 0.05).

Table 15 – Hypotension as complication among the study participants in between the groups

Hypotension	Group		Total	p-value
	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine		
Absent	39	34	73	Fisher's exact test applied p-value = 0.054 NS
	97.5%	85.0%	91.3%	
Present	1	6	7	
	2.5%	15.0%	8.8%	
Total	40	40	80	
	100.0%	100.0%	100.0%	

n= number; all values are expressed in number and percentages, p<0.05 is significant, NS=non-significant

The study participants differences in hypotension between the groups were examined, as indicated in Table 15. Group BD 6 (15.0%) experienced relatively lower blood pressure than group BF 1 (2.5%). But statistical analysis revealed that it was not significant. (p>0.05).

Table 16 – Bradycardia as complication among the study participants in between the groups

Bradycardia	Group		Total	p-value
	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine		
Absent	37	37	74	Fisher's exact test applied p-value = 0.662 NS
	92.5%	92.5%	92.5%	
Present	3	3	6	
	7.5%	7.5%	7.5%	
Total	40	40	80	
	100.0%	100.0%	100.0%	

n= number; all values are expressed in number and percentages, p<0.05 is significant, NS=non-significant.

Bradycardia was examined as a complication among the study subjects in relation to the groups, as indicated in Table 16. Participants in groups BD 3(7.5%) and BF 3 (7.5%) both exhibit a similar percentage of bradycardia. Between the two groups, there is no statistically significant difference seen. (p>0.05).

Table 17 – Nausea as complication among the study participants in between the groups

Nausea	Group		Total	p-value
	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine		
Absent	35	40	75	Fisher's exact test applied p-value = 0.027 S
	87.5%	100.0%	93.8%	
Present	5	0	5	
	12.5%	0.0%	6.3%	

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Total	40	40	80
	100.0%	100.0%	100.0%

n= number; all values are expressed in number and percentages, p<0.05 is significant.

As a complication, nausea was examined among the study subjects throughout the groups, as seen in Table 17. Group BF 5 (12.5%) experienced more nausea than group BD 0 (0%) did. Between the groups, statistically significant difference was seen. (p<0.05)

Table 18 – Itching as complication among the study participants in between the groups

Itching	Group		Total	p-value
	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine		
Absent	34	40	74	Fisher's exact test applied p-value = 0.013 S
	85.0%	100.0%	92.5%	
Present	6	0	6	
	15.0%	0.0%	7.5%	
Total	40	40	80	
	100.0%	100.0%	100.0%	

n= number; all values are expressed in number and percentages, p<0.05 is significant

Between the groups, the study participants itching was examined as a complication, as indicated in Table 18. In comparison to group BD 0(0.0%), group BF 6(15.0%) experienced more itching . Between the groups, a statistically significant difference was seen (p<0.05)

Table 19 – Shivering as complication among the study participants in between the groups

Shivering	Group		Total	p-value
	Bupivacaine + Fentanyl	Bupivacaine + Dexmedetomidine		
Absent	30	40	70	Fisher's exact test applied p-value = 0.001 S
	75.0%	100.0%	87.5%	
Present	10	0	10	
	25.0%	0.0%	12.5%	
Total	40	40	80	
	100.0%	100.0%	100.0%	

n= number; all values are expressed in number and percentages, p<0.05 is significant

Shivering as complication was studied among the study participants in between the groups, shown in Table-19. Relatively shivering was seen in group BF 10 (25.0%) as compared to group BD 0(0.0%). There was a statistically significant difference seen between the groups (p<0.05)

V. DISCUSSION

In our research, we discovered that using dexmedetomidine and bupivacaine together lowered more the overall quantity of medication required for labour analgesia as compared to fentanyl and bupivacaine combination without aggravating adverse effects.[4]

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The following parameters were studied and analyzed:-

DEMOGRAPHIC DATA:

According to table 1 and 2, in the two groups(BF and BD) variables were comparable. There was no statistical significance seen in parturients in terms of variables- age,weight and height,as the P value was >0.05.

GRAVIDA STATUS: In Table 3 the obstetric factors in relation to gravida (multi gravida and primigravida)were compared. There was no statistically significant variation in the distribution of study participants in terms of gravida among the groups (Group BF and Group BD).

GESTATIONAL AGE

With reference to the mean gestational age of the study population, obstetric characteristics were compared between the two groups in Table 4.

SENSORY BLOCK ONSET AND DURATION:

The results of the current investigation in our study shown that, in comparison to the administration of intrathecal 25 µg fentanyl, the duration of analgesia was significantly extended by combining 2.5 µg of spinal dexmedetomidine with 2.5 mg of bupivacaine, was adequate to cover the entire length of labour in the parturients.

According to a study by **Gupta et al.**[5] that assessed the analgesic efficacy of fentanyl with dexmedetomidine, dexmedetomidine has markedly increased analgesic efficacy.

Al-Mustafa et al.[6]**and Hala et al.**[7]found that intrathecal dexmedetomidine dosages of 5, 10, and 15 µg resulted in a dose-dependent lengthening of the duration of analgesia with a decreased analgesic demand.

In the current study, it was shown that the dexmedetomidine group experienced sensory block more quickly than the fentanyl group. **Palmer et al**.[8] have demonstrated, however, that greater fentanyl dosages dramatically hasten the onset of analgesia.

Sufentanil alone and fentanyl have each had dose-response trials for intrathecal medications used in labour [9,10] Comparing fentanyl alone to bupivacaine has been demonstrated to lengthen and hasten the onset of analgesia.[11,12]

A relatively little amount of intrathecal dexmedtomidine/bupivacaine was employed in our investigation. The choice of this dose was influenced by the idea of striking a compromise between preserving the mother's expulsive effort and maintaining the longest possible duration of analgesia.

When used neuraxially, higher doses of local anaesthetics can impair motor function in labouring women.[13] Increased rates of caesarean sections and instrumental deliveries may be the outcome of such motor function impairment. Use of low doses of adjuvants dexmedetomidine (2.5 µg) and fentanyl (25 µg) in labouring patients, reduces the significant risk of motor block as we observed in our study .This results inthe preservation of maternal expulsive effort among parturients. In humans, small doses of intrathecal dexmedetomidine (3 µg) combined with bupivacaine have been found to increase the length of the motor and sensory block while preserving hemodynamic stability and preventing drowsiness.[14]

MATERNAL HEART RATE:

The maternal heart rates in the two groups shown above in Table-6, did not significantly differ every 30 minutes from the beginning until the baby was delivered. Maternal plasma catecholamine concentrations may rise as a result of the anxiety and pain of labour, with the clinical manifestations of tachycardia, systolic hypertension, hyperventilation, and sweating. Dexmedetomidine reduces maternal anxiety during labour by acting on presynaptic C fibres and post-synaptic neurons.[15]

According to **S. M. Al-Ghanem, I. M. Massad, M. M. Al-Mustafa, et al** [16] study to evaluate the analgesic property of dexmedetomidine on maternal hemodynamics were similarly found to follow similar tendencies in our study, with no discernible variations between the two groups. Dexmedetomidine, a selective alpha agonist with vagomimetic activity, had no effect on the mother's hemodynamic condition, heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, or oxygen saturation.

MATERNAL ARTERIAL SYSTOLIC BLOOD PRESSURE, DIASTOLIC
BLOOD PRESSURE, MEAN ARTERIAL PRESSURE

Table 7 and Table 8 showing that the change in systolic and diastolic blood pressure thereafter every 30 minutes till baby's birth was insignificant. The baseline mean arterial blood pressure had slightly changed after 30 minutes, in BD group and BF group as seen in Table 9,but the variation was insignificant.

The dexmedetomidine group significantly displayed adverse effects in the form of bradycardia and hypotension compared to other

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groups. By seeing little change in maternal blood pressure following intrathecal delivery of dexmedetomidine **Fyneface Ogan et al**[17] findings supported our study findings. In humans use of intrathecal dexmedetomidine has been shown to be safe in clinical investigations.[18]

Dexmedetomidine, when given intravenously or neuraxially, has been demonstrated to cause hypotension in quite high dosages .By reducing sympathetic output, local anaesthetics injected intrathecally can drop blood pressure. In our study, dexmedetomidine was administered at a lower dose (2.5 µg), and the parturient's hemodynamic stability was preserved. No significant changes in maternal hemodynamics were seen when adjuvants, such as opioids and alpha 2 agonists, were administered to local anaesthetics; instead, high-quality analgesia and maternal satisfaction were seen. [19]

LABOUR CHARACTERISTICS
ESTIMATING THE SECOND STAGE OF LABOUR'S CERVICAL DILATION AND DURATION

Table 10 representing the duration of the second stage of labour and the rate of cervical dilatation in our study groups BD and BF having no statistically significance.

A similar study involving 100 expectant mothers was conducted by the **Gian Chauhan et al**. [20] Intrathecal injection(2.5 mg)bupivacaine, fentanyl (25 µg), and morphine(1ml) were given to Group S. According to the procedure of planned labour for a typical vaginal delivery, Group C was treated. They discovered that the average second-stage duration and the rate of cervical dilatation did not differ (P = 0.359) among groups.

The majority of the participants in our study and the study conducted by **Zhang et al**[21]intrathecal labour analgesia studies reach the maximum slope of the cervicograph at 5–6 cm cervical dilatation, indicating that the results may have been influenced by the significantly higher cervical dilatation at the time of administering intrathecal labour analgesia may be the cause of the faster rate of cervical dilatation.

Similar to our investigation, **Mathur P and colleagues et al**[22] found that the second stage lasted a much shorter time (18.03 ± 8.27 min).The use of different intrathecal drug techniques could be contributing reason. Although bupivacaine and fentanyl were provided in amounts identical to those in our trial, dexmedetomidine was not employed. The discrepancy can be related to the fact that dexmedetomidine was administered in addition to bupivacaine and fentanyl in the current trial, whereas in the other investigations, only bupivacaine and fentanyl were used for intrathecal labour analgesia. Due to the synergistic effects of dexmedetomidine with local anaesthetics, the parturients receiving bupivacaine/dexmedetomidine experienced longer-lasting analgesia and less pain as compared to those receiving bupivacaine/fentanyl or bupivacaine alone.[17]

NEONATAL OUTCOME
NEONATAL WEIGHT AND APGAR SCORE

We chose neonatal weight and Apgar rating at 1 and 5 minutes because they accurately assess newborn's health just after birth. Evaluation of the newborn upon birth and over the following hours by Apgar scores is a key component in determining the effects of local anaesthetic and adjuvants such as dexmedetomidine and fentanyl on the foetus. Referring to tables 11 and 12, 13 the newborn weight and the APGAR scores at 1 minute and 5 minutes, respectively, in both groups, were within the normal range and were not statistically significant.

Similar to this, **Mahdy et al**.[23] found that intrathecal dexmedetomidine and fentanyl injection had no adverse effects on mothers or babies in either group. The baseline foetal heart rate, pH of umbilical venous blood, and the Apgar score were not significantly different, according to **Fyneface-Ogan et al.**[17]

The majority of case studies that discussed the dexmedetomidine use in pregnant women indicated that the babies delivered had normal APGAR ratings, demonstrating that even if there is any uteroplacental transfer, it has no effect on foetal well-being.

Additionally, **Mardirosoff et al**[24] study also concluded that spinal opioids had no discernible clinical impact on caesarean section rates, instrumental delivery rates, or 5-min Apgar ratings.

Allakokko et al [25] compared the placental transfer trends of clonidine to the more recent alpha 2 agonist medication dexmedetomidine.They came to the conclusion that dexmedetomidine retained more of itself in placental tissue due to its high lipophilicity and that it transferred less to the foetal circulation than clonidine.

MATERNAL SATISFACTION:

Referring to Table 14, it was found that Maternal satisfaction is improved more in dexmedetomidine group as compared to the

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fentanyl group, producing longer duration of analgesia with a lower analgesic demand. [26]

In agreement with our findings, **Selim et al**. [27] evaluated the effects of bupivacaine with two adjuvants on the uterine and umbilical arteries. Maternal satisfaction was higher in the dexmedetomidine group than in the fentanyl group, This means that dexmedetomidine provided a good amount of analgesia with fewer side effects to the mother and foetus.

Similar to this, 62 labouring women were evaluated by **Kuczkowski KM et al**[28] on how satisfied they were with the way single-dose spinal analgesia managed their obstetric pain. They came to the conclusion that bupivacaine, morphine, and clonidine combined with a single dose of spinal analgesia offered very high levels of maternal satisfaction and successful labour pain management. Additionally, they came to the conclusion that the spinal method is highly cost-effective and needs to be suggested for common obstetric pain management. Their analysis supported the findings from our investigation. In our study, mothers engaged enthusiastically while not feeling physically weary.

ADVERSE EVENTS:

The incidence of hypotension was greater in the BD group than the BF group, as shown in Table 15 but this difference was not statistically significant and Table 16 shows a similar incidence of bradycardia in both groups. In the current study, patients werehemodynamically stable in both groups. Similarly **Gupta R et al** [7]supported our study's findings, despite hypotension being more frequent in the dexmedetomidine group than the fentanyl group, they found that it was not statistically significant. Overall, they came to the conclusion that dexmedetomidine offers great postoperative analgesia, hemodynamically stable circumstances, effective intraoperative analgesia, and few adverse effects.

Referring to Table 17, The incidence of nausea was shown to differ statistically significantly between the fentanyl group than dexmedetomidine group. According to **Mathur P and colleagues**[22] this difference was comparable to the frequency of nausea and vomiting observed in the fentanyl group when administered intrathecally. Nausea and vomiting (8.4%) were side effects noted by **Tshibuyi PN et al**[29]. Since the condition was modest and resolved on its own, no medication was provided.

Table 18 shows the incidence of itching present in the fentanyl group as compared to no cases in the dexmedetomidine group. In a study by **Tshibuyi PN et al.**[29] pruritis was detected in groups receiving fentanyl-bupivacaine and morphine (14.6%) and fentanyl-bupivacaine (6.3%). The duration and intensity of pruritus are decreased when lipid-soluble opioids like fentanyl and sufentanil are used, Intrathecal morphine causes longer-lasting pruritus in the study mentioned above.

Prostaglandins (PGE1 and PGE2) and unmyelinated C-nerve fibres enhance transmission to the central nervous system, which amplifies pruritus. It appears that the same population of sensory neurons transmits both pain and pruritus.[30]

Mathur P and colleagues[22]noted pruritis incidence of 10% was in the fentanyl group. Our study, which offers sufficient analgesia and has a very low incidence of pruritus compared to other studies, suggests the use of minimally effective analgesic dosages of neuraxial opioids in conjunction with a local anaesthetic.

Referring to Table 19, our study indicated that the incidence of shivering differed statistically significantly between the groups, fentanyl(25%) and dexmedetomidine (0.0%). According to **Talke et al** [31]α-2 adrenergic drugs like dexmedetomidine have antishivering properties. It inhibits the maternal thermoregulation centre by reducing heat generation and central α2-adrenoceptor activity. In the dexmedetomidine group, we also not noticed any instances of shivering.

Agreed with the findings of our investigation, **Camann et al** [32] also hypothesised that bupivacaine, with or without fentanyl, elevated the maternal body temperature during labour. Although opioid analgesic fentanyl can be used for shivering, but it is not effective as dexmedetomidine.

VI. CONCLUSION

The use of intrathecal low-dosage bupivacaine for labour analgesia has been proven and found to be beneficial when Bupivacaine is combined with adjuvants dexmedetomidine and fentanyl, while epidural labour analgesia is still regarded as the gold standard for pain management during labour. Dexmedetomidine is used in the best doses during obstetric anaesthesia, according to numerous research. Excellent maternal satisfaction and favourable maternal and newborn results are offered by this wonder drug.

Fentanyl-like opioids combined with a small dose of local anaesthetic also provide rapid analgesia These adjuvants provide complete

coverage of labour in both primigravida and multigravida without any risk of side effects.In the end, low resource economies will benefit more from the study's findings where there is a lack of equipment, accessories, and knowledge necessary to implement an epidural analgesia service, allowing flexibility to match patient needs and enhance mother's wellbeing.

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Ethical Approval- After obtaining ethical approval from the committee, Valid consent both written and informed obtained from all the 80 patients selected for the study.

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