

## ORIGINAL RESEARCH

# Effect of intrathecal labor analgesia using fentanyl 25 µg alone and fentanyl 20 µg plus bupivacaine 2.5 MG on the progress of labor

<sup>1</sup>Dr Harmeet Singh, <sup>2</sup>Dr Mandeep Goma, <sup>3</sup>Dr Manoj Joshi, <sup>4</sup>Dr Parveen Sharma

<sup>1</sup>Assistant Professor, <sup>2</sup>Professor & Head, Department of Anaesthesia, Dr S.S. Tantia Medical College Hospital and Research Centre, SriGanganagar, Rajasthan, India

<sup>3</sup>Professor, Department of Anatomy, Dr S.S. Tantia Medical College Hospital and Research Centre, SriGanganagar, Rajasthan, India

<sup>4</sup>Director, Academic Research, Tantia University, SriGanganagar, Rajasthan, India

### Correspondence:

Dr Harmeet Singh

Assistant Professor, Department of Anaesthesia, Dr S.S. Tantia Medical College Hospital and Research Centre, SriGanganagar, Rajasthan, India

### ABSTRACT

**Introduction:** The effective intrapartum analgesia greatly minimizes pain, stress, and anxiety which cause release of stress hormones as well as beta-endorphins. This this present study is followed to evaluate the effect of intrathecal labour analgesia on the progress of labour was compared between fentanyl 25µg alone and fentanyl 20µg plus bupivacaine 2.5mg.

**Materials and Methodology:** Patients in the group SA (n = 33) were administered with an intrathecal injection of 0.5% hyperbaric bupivacaine 2.5 mg (0.5 mL) and fentanyl 25 µg (0.5 mL), volume made to 1.5 mL with normal saline. And the matching group C (n = 33) who refused to give consent for neuraxial analgesia. The two groups were evaluated with regards to the progress of labour, maternal hemodynamic variations, foetal heart rate, and neonatal outcome during labour in parturient undergoing normal vaginal delivery.

**Results:** Parturient in group SA has gained excellent pain relief throughout their labour and VAS score remained less than 4 till delivery as compared to group C, in which VAS score was more than 7 at all time. There were no observed significant changes in FHR when compared to the baseline in both the groups and none had observed with the interventions of foetal compromise. The mode of delivery in all parturient in the study group was mostly vaginal delivery without any instrumental delivery. The parturient who required caesarean section due to other indication were excluded from the study.

**Conclusion:** A single dose of intrathecal fentanyl 25 µg and bupivacaine 25 mg which were given in the active phase of first stage of labour had rapid onset with satisfactory pain relief and minimal motor block, which completely regressed at the time of second stage of labour.

**Keywords:** analgesia, parturient, bupivacaine, intrathecal fentanyl

### INTRODUCTION

The amount of pain that has been experienced by a woman during their childbirth is marked as severe<sup>1</sup> and frequent and these parturient particularly in those developing countries residents have scanty or almost no options for their relief when experiencing labour pain during childbirth. There have been quite a lot of parenteral opioids and sedatives which are the most frequently prescribed agents for women during their labour in many poor resource facilities.<sup>2</sup> And this method of relieving pain has been shown to have little or almost nil

effective on their labour pain.<sup>3</sup> And this analgesic effect not only provides patient's comfort but also minimizes the release of stress hormones whose actions can draw from the parturient reserves as well as depriving the oxygen of foetus and nutrients.<sup>1</sup> The provision of providing effective labour analgesia is now thought to reduce the inhibitory effects of endogenous maternal catecholamine on uterine contractility, decreasing maternal acidosis and enhances intrapartum maternal well-being.

There have been certain neuraxial analgesia techniques are considered to be the most effective protocols to provide pain relief during labour. The epidural analgesia is the most common and effective technique for providing pain relief during their labour.<sup>4</sup> Anozie et al had assessed the effects of epidural analgesia in a study sample among the Nigerian obstetricians and mentioned high costs and lack of sufficient skills as the potent reasons for not using the epidural technique.<sup>5</sup> However, some clinicians might prefer spinal analgesia to epidural analgesia. This method has used some little doses of local anaesthetic, mainly because it can spread directly in the spinal fluid. On the other hand, spinal analgesia needs to use a thinner needle to give a spinal block, which means making a tiny hole in the dura. Additionally, a spinal block technique can take relatively a shorter time than an epidural block.<sup>6</sup> Some studies that have mentioned about the spinal analgesia not only be applied more easily but also is relatively faster, less expensive and more effective than epidural analgesia.<sup>7</sup> The administration of opioid drugs in neuraxial blocks, which by its classification do not affect the sympathetic activity, along with local anaesthetics, is a very common technique in order to avoid negative consequences like hypotension that has been encountered in these techniques.<sup>8</sup> Therefore, the local anaesthetic dose that can safely provide effective, long lasting labour analgesia without motor block must be effectively documented. The current study has been aimed to compare the spinal analgesia with combined local anaesthetics and narcotics versus intermittent epidural analgesia to manage labour pain effectively.<sup>8</sup> Hence, this present study is followed to evaluate the effect of intrathecal labour analgesia on the progress of labour was compared between fentanyl 25µg alone and fentanyl 20µg plus bupivacaine 2.5mg.

## **MATERIALS AND METHODOLOGY**

After obtaining the approval from the institutional ethical committee, the study was performed in 66 nulliparous parturient at term pregnancy (ASA grade – I) were included for this prospective study purpose. The inclusion criteria include those patients with singleton pregnancies and vertex presentation who were in the active phase of their labour observed with a cervix dilatation of more than 3 cms and with a normal heart rate (FHR).

Patients in the group SA (n = 33) were administered with an intrathecal injection of 0.5% hyperbaric bupivacaine 2.5 mg (0.5 mL) and fentanyl 25 µg (0.5 mL), volume made to 1.5 mL with normal saline.

And the matching group C (n = 33) who refused to give consent for neuraxial analgesia. The two groups were evaluated with regards to the progress of labour, maternal hemodynamic variations, foetal heart rate, and neonatal outcome during labour in parturient undergoing normal vaginal delivery.

Statistical analysis was performed using software Statistical Package for the Social Sciences (SPSS) version 21 (Armonk, NY: IBM Corp). Unpaired and paired student t-test was used to analyze the data; P value of 0.05 was considered to be significant.

## **RESULTS**

Table – 1 tabulated the parturient characteristics that include cervical dilatation, visual analogue scale at the time of the commencement of the study.

Table – 2 depicted the mean VAS score and this VAS score provided intrathecal analgesia at all the time intervals as compared with group – C.

Table – 3 recorded the comparison of progress of labour. Parturient in group SA has gained excellent pain relief throughout their labour and VAS score remained less than 4 till delivery as compared to group C, in which VAS score was more than 7 at all time. There were no observed significant changes in FHR when compared to the baseline in both the groups and none had observed with the interventions of foetal compromise. The mode of delivery in all parturient in the study group was mostly vaginal delivery without any instrumental delivery. The parturient who required caesarean section due to other indication were excluded from the study.

**Table 1: Parturient characteristics**

Parameters	Group – SA (n=33), mean ± SD	Group – C (n=33), mean ± SD
Age (years)	23.31 ± 3.722	21.91 ± 2.29
Weight (kgs)	57.42 ± 3.41	58.22 ± 4.16
Height (cms)	154.87 ± 3.68	155.3 ± 3.17
Cervical dilatation (cms)	4.21 ± 0.67	4.15 ± 0.65
Oxytocin supplement	7 (20%)	8 (23.3%)
VAS score	7.63 ± 0.65	7.31 ± 0.71

**Table 2: Mean visual analogue scale score**

Time (min)	Group – SA (mean ± SD)	Group – C (mean ± SD)	P - value
0	7.63 ± 0.65	7.31 ± 0.71	0.056
4	1.19 ± 1.16	7.31 ± 0.71	<0.001
10	0	7.31 ± 0.71	<0.001
20	0	7.45 ± 0.52	<0.001
30	0	7.72 ± 0.49	<0.001
60	0	8.27 ± 0.52	<0.001
90	0.16 ± 0.06	8.75 ± 0.66	<0.001
120	1.37 ± 0.71	9.45 ± 0.58	<0.001
150	2.38 ± 1.11	9.87 ± 0.34	<0.001

**Table 3: Comparison of progress of labour**

Parameters	Group – SA (mean ± SD)	Group – C (mean ±SD)	P - value
First stage duration (min)	115.56 ± 27.35	134.12 ± 21.21	0.005
Second stage duration (min)	18.07 ± 8.29	10.15 ± 5.91	<0.001
Total duration (min)	133.55 ± 29.97	144.17 ± 23.37	0.152
Rate of cervical dilatation (cm/h)	3.04 ± 0.589	2.52 ± 0.52	<0.001

## DISCUSSION

In this study, Intrathecal fentanyl 25 µg was administered in our study for its rapid onset of action and at this specified dose, it has maximum potential in duration of analgesia with least maternal and foetal adverse effect. *Palmer et al*<sup>9</sup> had effectively compared 5–50 µg fentanyl in parturient for labour analgesia and had found that at this specified 25 µg dose, duration of analgesia was 90 min with least maternal and foetal hemodynamic alterations. Bupivacaine was added to alleviate somatic pain.<sup>10</sup> The somatic pain experienced at the second stage of labour cannot be effectively blocked by fentanyl alone therefore local anaesthetic can be

administered which can effectively block them. Thus, 0.5% hyperbaric bupivacaine 2.5 mg was used in this study. Wang et al<sup>11</sup> recorded a synergism between fentanyl and bupivacaine in an animal study. Palmer et al<sup>12</sup> researched various doses of bupivacaine with fentanyl and observed that the duration of analgesia in only fentanyl group was  $92 \pm 23$  min, in fentanyl and bupivacaine 1.25 mg group was  $94 \pm 25$  min, and in fentanyl and bupivacaine 2.5 mg group was  $108 \pm 20$  min.

In this present study, the mean duration of the active phase at the first stage of labour was greatly minimized by 19 min in group SA as compared to group C. The mean rate of cervical dilation in active phase of first stage of labour was relatively faster in group SA as compared to group C. Jix et al<sup>13</sup> in their study resulted with a significant decrease ( $P < 0.05$ ) in the duration of first stage of labour and total duration of labour in the combined spinal epidural group by 78 min as compared to controls and inhaled nitrous oxide group. Bindu et al<sup>14</sup> reported a reduction in the duration of first stage of labour in the epidural group by 20.95 min when compared to the control group. On the other hand, a Cochrane review<sup>15</sup> correlated that there was no difference in the duration of the first stage of labour (mean difference: 18.51 min, 95% CI: 12.91–49.92; 11 trials, 2981 patients). Due to the enrolment of a small sample size in our study which might account for these discrepancies. Tsen et al<sup>16</sup> depicted a faster rate of cervical dilation in women randomized to receive combined spinal epidural analgesia compared with those who received epidural analgesia (2.3 vs 1.3 cm/h, respectively;  $P = 0.015$ ).

The mean duration of second stage of labour was significantly prolonged in group SA ( $18.07 \pm 8.29$  min) as compared to group C ( $10.15 \pm 5.91$  min). This difference was statistically significant ( $P < 0.001$ ). A Cochrane review<sup>15</sup> concluded there was a longer second stage of labour (mean difference: 13.66 min, 95% CI: 6.67–20.66; 13 trials, 4233 patients) in those who were receiving neuraxial analgesia when compared to those receiving systemic opioids or no analgesia. Moreover, recent studies have suggested that a longer second stage is, in itself, not harmful to the mother or neonate as long as the FHR pattern is reassuring and there is ongoing descent of the foetal head. Possible reason for a prolonged second stage could be relaxation of the abdominal wall musculature secondary to neuraxial local anaesthetic resulting in reduced effectiveness of maternal expulsive efforts.<sup>17</sup>

Changes observed in the mean heart rate and blood pressure did not require any intervention throughout the observed period. Mendall et al<sup>18</sup> had analysed effect of subarachnoid 25  $\mu$ g fentanyl in parturient and observed a significant reduction in heart rate, systolic blood pressure and diastolic blood pressure after 25 min, which was not due to vasodilatation but due to onset of effective analgesia. In the present study, intrathecal labour analgesia in healthy parturient was not found to be related with any FHR abnormalities, foetal distress or adverse neonatal outcome and prognosis. Most common adverse effects that were reported seemed to be pruritus which was seen in 4 parturient of group SA, which was mild and no intervention was necessary. In group SA, 3 parturient complained of nausea as compared to 4 parturients of group C.

## CONCLUSION

To conclude, a single dose of intrathecal fentanyl 25  $\mu$ g and bupivacaine 25 mg which were given in the active phase of first stage of labour had rapid onset with satisfactory pain relief and minimal motor block, which completely regressed at the time of second stage of labour. Most commonly it was corroborated with rapid cervical dilatation with no delay in the labour progress, without observable maternal and foetal hemodynamic changes.

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