

# Compare the Effectiveness of Hyperbaric Bupivacaine with Fentanyl and Isobaric Levobupivacaine with Fentanyl for Cesarean Section

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## ABSTRACT

**Aim:** To compare the effectiveness of hyperbaric bupivacaine with isobaric levobupivacaine for cesarean section.

**Study design:** Randomized control trial

**Place & duration of study:** Department of Anaesthesia, Doctors Trust Teaching Hospital, Sargodha from 1<sup>st</sup> July 2019 to 31<sup>st</sup> March 2020.

**Methodology:** Sixty patients have been included in this study for lower segment cesarean section. The age of the patient was between 20 to 40 years. They were divided into two groups; Group I contained 30 patients received 2 ml isobaric levobupivacaine 5mg/ml (10mg) with fentanyl 15µg, Group II, with 30 patients received hyperbaric bupivacaine 10 mg with a fentanyl 15µg. Time to block T10 was analyzed and contrasts between the two groups. Time to first rescue analgesia was recorded.

**Results:** The mean age was 27.84±6.33 years for Group I patients, and the mean age was 27.33±4.84 years for Group II patients. In the time of T10 sensory blockade, we found the findings were close. But we saw an important difference in time after skin closure to the first rescue analgesia. It was 273.40 minutes in Group I and 183.52 minutes for Group II.

**Conclusion:** Levobupivacaine and fentanyl combination give shorter block time for motors, more time to rescue analgesia as compared to hyperbaric bupivacaine in the spinal anaesthesia for cesarean section.

**Keywords:** Levobupivacaine, Spinal anaesthesia, Intrathecal, Bupivacaine

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## INTRODUCTION

Levobupivacaine is a relatively recent local anaesthetic for clinical practice. Levobupivacaine is a S (-) bupivacaine enantiomer and both substances have similar pharmacokinetic properties.<sup>1</sup> Several studies have shown that levobupivacaine has less common cardiovascular and central nervous system side effects than bupivacaine.<sup>2,3</sup> Based on these studies, levobupivacaine is recommended for patients with cardiovascular side effects as an alternative to bupivacaine. However further studies have been performed to explore in depth the effects of levobupivacaine. While levobupivacaine has been used extensively for epidural obstetric and non-obstetric anaesthesia, a lack of comparative clinical studies based on the administration of intrathecal levobupivacaine remains to be achieved. The goal of the study was to compare both intrathecal anaesthetics bupivacaine and levobupivacaine in patients who undergone elective caesareans under spinal anaesthesia for effects on motor and sensory blockages and hemodynamic parameters. The addition of 8% glucose enhances the predictability and safety of the solution and of the resulting block. While hyperbaric bupivacaine is known to be the cause of sudden cardiac arrest in the most used medication for spinal anaesthesia and can cause hypotension or bradycardia after mobilisation, especially with abrupt changes in the position.<sup>4,5</sup> The use of actual isobaric solutions could be

less vulnerable to place problems.<sup>6</sup> Levobupivacaine is a pure racemic bupivacaine anaesthetic, is truly isobaric in comparison to CSF in pregnant females<sup>7</sup> and is less CNS and cardiovascular toxic.<sup>8</sup> Its baricity provides the value of a less responsive block location.<sup>9</sup> Levobupivacaine' decreased toxicity is due to its faster protein binding rate. In the elective cesarean section very few experiments were performed using levobupivacaine to compare the intrathecal levobupivacaine and hyperbaric bupivacaine in parturient for the elective cesarean section in order to compile the block characteristics and side effects.

## MATERIALS AND METHODS

This randomized control trial was carried out at Department of Anaesthesia, Doctors Trust Teaching Hospital Sargodha from 1<sup>st</sup> July 2019 to 31<sup>st</sup> March 2020. A total of 60 patients who have undergone cesarean section surgery were comprised. The age of the patient was between 20 and 40 years. Uncooperative and uncontrolled diabetes patients were excluded. All the patients were equally divided into two groups. Group I contained 30 patients received 2ml isobaric levobupivacaine of 5 mg/ml (10 mg) with fentanyl 15µg, Group II, with 30 patients received hyperbaric bupivacaine of 10 mg with a fentanyl 15µg. Time to block T10 was analyzed and contrasts between the two groups. Time to first rescue analgesia was recorded. Quality of hemodynamic intra-operative anaesthesia and any intra-operative and post-operative complications were noted. All the data was analyzed by SPSS 24. Chi-square test was done to compare the effectiveness in term of sensory

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blockade time between two groups. P-value <0.05 was taken as significant.

## RESULTS

In group I, the mean age was 27.84±6.33 with a mean body mass index of 24.56±2.28 kg/m<sup>2</sup>, and in group II mean age was 27.33±4.84 and mean BMI was 24.08±2.86 kg/m<sup>2</sup>. Mean gestational age in group I was 38.52±1.44 weeks and in group II it was 38.02±1.86 weeks (Table 1). According to the time to T10 sensory blockade, we found a significant difference between both groups I and II (2.96±0.51 min Vs 4.02±0.47 min) with p-value <0.05. A significant difference was observed regarding time to first rescue analgesia between both groups, in Group I it was 273.40±18.45 minutes and in Group II, it was 183.52±19.17 minutes (Table 2). P-value was P>0.05 for time to sensory block T10 while time to first rescue analgesia was P<0.05. Complications were also observed in both groups hypotension was in 11 patients in groups I while in groups II it was in 14 patients (Table 3).

Table 1: Demographical details of patients

Variable	Group I (n=30)	Group II (n=30)
Mean age (years)	27.84±6.33	27.33±4.84
Gestational age (weeks)	38.52±1.44	38.02±1.86
Body mass index (kg/m <sup>2</sup> )	24.56±2.28	24.08±2.86

Table 2: Comparison of effectiveness between both groups

Variables	Group I (n=30)	Group II (n=30)
Time to highest sensory block T10 (min)	2.96±0.51	4.02±0.47
Time to first rescue analgesia (min)	273.40±18.45	183.52±19.17

Table 3: Frequency of complication

Variables	Group I	Group II	P value
Shivering	10	4	0.0402
Itching	3	3	1.2567
Vomiting	4	6	0.5312
Nausea	7	10	0.9417
Bradycardia	3	5	0.7657
Hypotension	11	14	0.6392

## DISCUSSION

This research demonstrated that isobaric levobupivacaine showed better outcomes regarding sensory blockade, maternal hemodynamic and neonatal effects in C-Section under spinal anaesthetics, combined with isobaric levobupivacaine and hyperbaric bupivacaine and fentanyl. By incorporating intra-thecal opioids, the potency of local neuraxial anaesthetics is increased. These combinations are typically related to better analgesia and anaesthesia. It also permits the use of less local anaesthetics that helps to make hemodynamics more stable<sup>10-12</sup>.

In our analysis we found that the pure S (-) enantiomer, 0.5% levobupivacaine isobaric, in the caesarean section as effective as 0.5% bupivacaine hyperbaric. Early starting times for sensory and motor blocks are close to those of racemic bupivacaine, peak blocks and recovery times for sensory and hemodynamic changes. Responsive and motor block characteristics were

found to be identical in most studies, where levobupivacaine and bupivacaine were investigated.<sup>13,14</sup> In another volunteer studies 4, 8 and 12mg spinal anaesthesia with hyperbaric levobupivacaine and racemic bupivacaine was administered, and sensory and motor block features were compared at different doses. Hyperbaric levobupivacaine and racemic bupivacaine have been reported to have the same effects at the same dose.<sup>15</sup>

The only study comparing fentanyl with levobupivacaine is the study of Guler et al<sup>16</sup> They compared 0.5% intrathecal levobupivacaine (10mg) and a 5% hyperbaric bupivacaine (10mg) combined with intrathecal fentanyl (25µg). Hypotension is the most frequent complication in spinal anaesthesia. In the study, levobupivacaine had a major advantage of shorter than racemic bupivacaine motor blockades with higher hemodynamic stability. Guler et al<sup>16</sup> compared 2 ml of opium-adjuvant drugs with Subaşi et al<sup>17</sup> and Turkmen et al<sup>18</sup> and no major variations were found in the maximum distribution and the length of the sensory and motor blocks.

## CONCLUSION

Both levobupivacaine and hyperbaric bupivacaine are quick and successful induction of spinal anaesthesia for C-Section surgery without any adverse effects on neonates. However, levobupivacaine and fentanyl combination give shorter block time for motor and decreases adverse effects such as hypotension and bradycardia and thus offers greater hemodynamic stability to reduce risk and provide early mobility. Therefore, it is preferred to combine levobupivacaine with fentanyl.

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