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ORIGINAL ARTICLE

Efficacy of Intrathecal Bupivacaine with Dexmedetomidine and Bupivacaine Alone in Lower Segment Caesarian Section Patients

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ABSTRACT

Objective: This research aims to compare the effectiveness of intrathecal bupivacaine combined with dexmedetomidine to bupivacaine alone in patients having caesarian procedures.

Methods: This randomized, controlled study was conducted at in operation theatre in Liaquat national hospital, with the agreement of the hospital's institutional review board. There were 272 patients total, and they were split evenly in two groups of 136 using non-probability consecutive sampling technique. Group A: Patients received subarachnoid block (2 ml of 0.5 % hyperbaric bupivacaine and 10 micrograms of normal saline). Group B: Patients received subarachnoid block (2 ml of 0.5 % hyperbaric bupivacaine and 10 micrograms of dexmedetomidine at L3-L4 or L4-L5 inter-vertebral space). Before the induction of anaesthesia, the patient's systolic blood pressure (BP), diastolic blood pressure (BP), mean arterial pressure (MAP), heart rate (HR), and peripheral capillary oxygen saturation (SPO2) will be monitored

Results: The mean age of the participants in both study groups were 27.14±5.3 and 25.9±3.65 years. A significant difference in the mean systolic blood pressure of the participants in both groups as observed at 15-, 45- and 60-minutes interval (p=0.000). The mean time interval from blocks to shivering occurrence in the participants in both study groups were 57.08±3.8 and 81.03±2.8minutes. A significant difference (P=0.000) in the mean time interval from blocks to shivering occurrence in the participants in both study groups was observed. 49% participants in the groups experienced shivering while 24% in group B.

Conclusion: From our findings, we infer that adding 10µg of dexmedetomidine to strong bupivacaine in SA may reduce the frequency and severity of shivering without causing any serious side effects.

INTRODUCTION

Recent decades have seen significant changes in the process of giving birth (1). Cesarean section is becoming more common all around the globe (2). Anesthesia after a C-section helps alleviate the mother and child from any discomfort, and it has few side effects. In an ideal anaesthetic procedure, the patient has few complications and the anaesthetic is established rapidly (3). Injury to mother and child may be minimised by carefully selecting an anaesthetic and using safe anaesthetic techniques. Most surgeries, including caesarean sections, now choose spinal anaesthesia (SA) (4). It's been shown that SA's rapid-onset and low-complication rate are a result of the dense and predictable block it provides. However, the risks associated with neuraxial analgesia should not be ignored. These include maternal hypotension, chills, nausea, and fainting (4). One of the most prevalent negative side effects of regional anaesthetic is shivering, which may be distressing for mothers having caesarean deliveries (5). When looking at review research, it was observed that neuraxial anaesthesia is associated with a median incidence of shivering of 55 (6). Electrocardiogram and pulse oximetry readings might be impacted by shivering. It may contribute to increased wound pain, slowed wound healing, and postponed release from the recovery unit, and it may increase the body's need for oxygen and generation of CO_2 by around fourfold (7). Therefore, it makes sense to try to stop patients from shaking during surgery, which could improve their results. In order to further improve anesthesia's safety, a number of adjuvant medicines are often used in conjunction with it (8). The most effective anaesthetic and adjuvant medications will not only have a restricted ability to cross the placenta and reach the foetus, but will also maintain the necessary anaesthetic effect throughout the puerperal phase. DEX is a highly selective agonist of beta 2-adrenergic receptors (9). More and more South African anesthesiologists are opting for DEX as a local adjuvant medication of choice because of its safety and efficacy. Research conducted between 2009 and 2012 indicates that DEX has the ability to prolong the blockage and improve the anaesthetic effect (10). Due to the unique nature of C-section, however, it is important to examine how DEX performs in this setting. Although multiple meta-analyses (11, 12) of RCTs have shown that DEX is a possible anaesthetic adjuvant that might promote greater anaesthetic effects in local anesthesia, little study has been focused on the use of DEX in C-section (13). Due to a paucity of data, it is unclear whether or if the inclusion of DEX is helpful. This research aims to compare the effectiveness of intrathecal bupivacaine combined with dexmedetomidine to bupivacaine alone in patients having caesarian procedures.

METHODOLOGY

This randomized, controlled study was conducted at in operation theatre in Liaquat national hospital with the agreement of the hospital's institutional review board. 272 full-term ASA grade I and II pregnant women who were scheduled to have an elective lower segment caesarean section under subarachnoid block were enrolled in the research. Patient refusal, a history of chronic drug addiction, bleeding issues, local infection, or allergy to study medicines were all reasons for exclusion. All patients gave their written permission after being briefed on the study's methodology. There were 272 patients total, and they were split evenly in two groups of 136 using non-probability consecutive sampling technique. Group A: Patients received subarachnoid block (2 ml of 0.5 % hyperbaric bupivacaine and 10 micrograms of normal saline at L3-L4 or L4-L5 inter-vertebral space via midline or para-median approach in sitting position after ensuring free flow of cerebrospinal fluid and patients will be placed supine with one pillow after administration of the drug in the subarachnoid space). Group B: Patients received subarachnoid block (2 ml of 0.5 % hyperbaric bupivacaine and 10 micrograms of dexmedetomidine at L3-L4 or L4-L5 inter-vertebral space via midline or para-median approach in sitting position after ensuring free flow of cerebrospinal fluid and patients will be placed in supine position. Standardized intra- and post-operative care will be provided to all patients. Before the induction of anaesthesia, the patient's systolic blood pressure (BP), diastolic blood pressure (BP), mean arterial pressure (MAP), heart rate (HR), and peripheral capillary oxygen saturation (SPO2) were monitored. If the mean arterial pressure (MAP) drops by more than 20% from the baseline value, an intravenous bolus of phenylephrine 50 mcg will be given, and the dosage may be repeated after 5 minutes if necessary. Atropine (0.6 mg) IV will be administered if heart rate is less than 60 beats per minute. A

custom-made proforma will be used to keep track of all the information. SPSS version 26 was utilized for the statistical analysis. Means and standard deviations was provided for numerical variables such as age, body mass index, ASA-PS score, length of surgery, and pre-op SBP, DBP, MAP, HR, and SpO2. Qualitative data, including appropriate sensory block, the modified Bromage scale, and the adequacy of surgical condition, were provided as frequencies and percentages and compared between the groups using the chi-square test ($p \leq 0.05$ will indicate statistical significance).

RESULTS

Demographic and clinical parameters of the participants in study group A and B is presented in Table 1. The mean age of the participants in both study groups were 27.14±5.3 and 25.9±3.65 years. No significant difference (P=0.35) in the mean ages of the participants in both study groups was observed. The mean weight of the participants in both study groups were 71.15±5.7 and 74.71±7.29Kg. A significant difference (P=0.000) in the mean weights of the participants in both study groups was observed. The mean gestation age of the participants in both study groups were 38.65±1.21 and 38.70±1.25 months. No significant difference (P=0.6000) in the mean gestation age of the participants in both study groups was observed. The mean surgery time of the participants in both study groups were 54.96±1.45 and 51.40±3.08 minutes.

Table 1: Demographic and clinical parameters of the participants in both study groups

Parameters	Bupivacaine (n=136)	Bupivacaine + dex (n=136)	P Value
Age	27.14±5.3	25.9±3.65	0.35
Weight	71.15±5.7	74.71±7.29	0.000
Gestational Age	38.65±1.21	38.7±1.25	0.6
Surgery Time	54.96±1.45	51.40±3.08	0.000

Table 2: Comparison of heartrate of the participants in both study groups

HR (beat/min)	Bupivacaine (n=136)	Bupivacaine + dex (n=136)	P Value
0 min	81.36±11.5	78.6±10.3	0.28
15 min	78.35±9.85	79.1±10.4	0.558
30 min	79.1±10.7	78.6±9.9	0.12
45 min	77.3±8.5	76.6±7.7	0.462
60 min	76.3±7.6	75.8±5.8	0.552

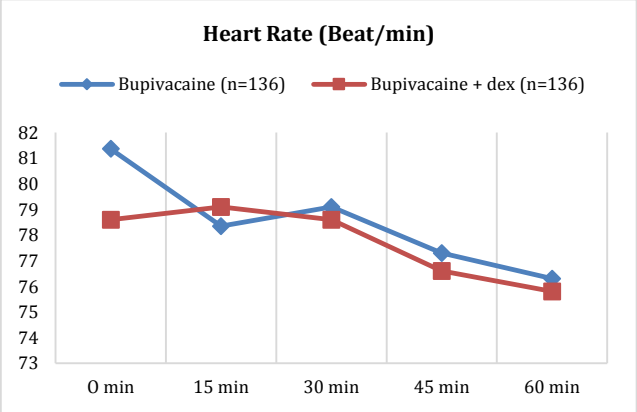

Figure 1: Heart rate during the study showed no significant differences between two groups

A significant difference (P=0.000) in the mean surgery time of the participants in both study groups was observed. Figure 1 and Table 2 shows the mean± SD of the participants heart rate in both groups. No significant difference in the mean heart rate of the participants in both groups as observed at any time interval. Figure 2 and Table 3 shows the mean± SD of the participants core body temperature in both groups. No significant difference in the mean core body temperature of the participants in both groups as observed at any time interval. Figure 3 and Table 4 shows the mean± SD of the participants systolic blood pressure in both groups. A significant difference in the mean systolic blood pressure of the participants in both groups as observed at 15-, 45- and 60-minutes interval (p=0.000). Table 5 Shows the percentage of shivering observed in the participants in both groups. The mean time interval from blocks to shivering occurrence in the participants in both study groups were 57.08±3.8 and 81.03±2.8minutes. A significant difference (P=0.000) in the mean time interval from blocks to shivering occurrence in the participants in both study groups was observed. 49% participants in the groups experienced shivering while 24% in group B.

Table 3: Comparison of body temperature of the participants in both study groups

Core Body Temperature (^{0} C)	Bupivacaine (n=136)	Bupivacaine + dex (n=136)	P Value
0 min	37.46±1.03	37.53±1.00	0.423
15 min	37.52±1.06	37.6±1.06	0.475
30 min	37.59±0.97	37.5±1.1	0.696
45 min	37.66±1.02	37.7±1.08	0.758
60 min	37.55±1.07	37.71±1.08	0.228

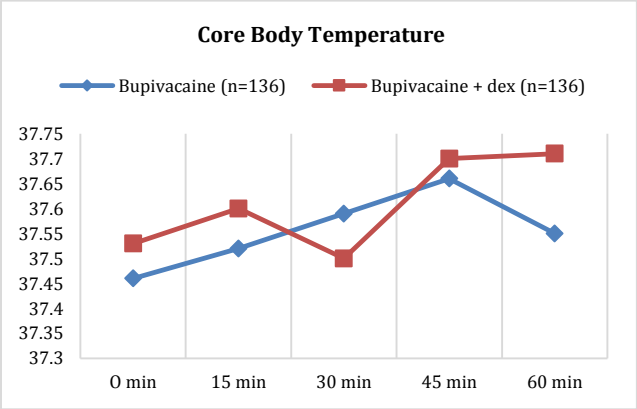

Figure 2: Core body temperatures were similar in the two group

Table 4: Comparison of systolic blood pressure of the participants in both study groups

Systolic Blood Pressure (mmHg)	Bupivacaine (n=136)	Bupivacaine + dex (n=136)	P Value
0 min	129.8±4.1	129.9±4.2	0.716
15 min	107.9±15.9	98.7±10.8	0.000
30 min	118.6±15.3	117.3±18.7	0.46
45 min	118.8±15.2	107.2±17.7	0.000
60 min	116±15.4	107.3±18.3	0.000

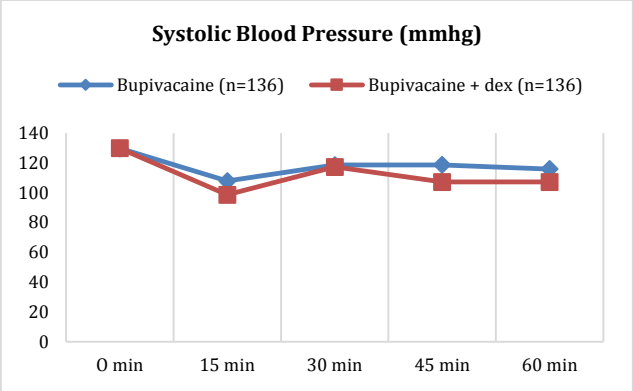

Figure 3: Systolic blood pressure during the study showed significant differences between two groups

Table 5: Shivering incidence, intensity, and time of occurrence in the two groups

Shivering intensity	Bupivacaine (n=136)	Bupivacaine + dex (n=136)	P Value
0	69	104	
1	32	18	
2	25	11	
3	10	3	
4	0	0	
Time interval from blocks to shivering occurrence (minutes)	57.08±3.8	81.03±2.8	0.000
Shivering Incidence	67 (49%)	32 (24%)	0.000

DISCUSSION

Both groups exhibited similar changes in core body temperature both during and after surgery, as shown by the present research. Shivering, on the other hand, was less common and less severe in the B group. Patients in the B group were less likely to suffer shivering than those in the A group (24% vs. 49%). In addition to pain and postoperative nausea and vomiting, patients often have uncomfortable episodes of shivering during and after surgery. Though several pharmaceutical approaches have been explored for treating or preventing postoperative trembling, no one approach or medicine has yet emerged as superior than the others (14). Dexmedetomidine has been studied extensively due to its analgesic, sedative, anesthetic-sparing, perioperative sympatholytic, and hemodynamic-stabilizing effects (15-17). 9,12,13 The effectiveness of dexmedetomidine as an antishivering agent, however, has not been well studied. Usta et al. studied the impact of intravenous dexmedetomidine vs normal saline on shivering in 60 individuals undergoing SA. In each instance, 18mg of hyperbaric bupivacaine was used to create a subarachnoid block. Shivering was reported to be greatly reduced in both frequency and intensity with the administration of dexmedetomidine in the perioperative phase for patients undergoing SA (16). Patients who had laparoscopic surgery under general anaesthesia were investigated by Bajwa et al. (15) to determine whether or not dexmedetomidine was useful in reducing postoperative shivering. During the preoperative phase, 1 microgram per kilogramme of body weight of dexmedetomidine was injected intravenously. Shivering was seen to occur far less often in the dexmedetomidine group, leading the researchers to infer that intravenous dexmedetomidine had antishivering effects (15). It seems that intravenous dexmedetomidine lowers vasoconstriction and shivering thresholds, making it need a larger level of hypothermia to elicit shivering than was the case before treatment with the medication, as shown in the aforementioned investigations. The effects of intrathecal dexmedetomidine on shivering are less well studied than those of systemic dexmedetomidine. Subarachnoid dexmedetomidine was studied by Moawad and Elawdy (17), who conducted a randomised controlled experiment with 80 patients who got SA for transurethral resection of the prostate, to determine its efficacy in reducing and preventing shivering. 12.5 mg of hyperbaric bupivacaine in combination with 0.5 mL of isotonic saline or 12.5 mg of hyperbaric bupivacaine in combination with 10 g of dexmedetomidine in 0.5 mL of isotonic saline was used to produce a subarachnoid block. In comparison to the saline group, the dexmedetomidine group had a much-reduced incidence of shivering at 15%. According to their findings, shivering during transurethral resection of the prostate might be reduced by adding 10 g of dexmedetomidine to the hyperbaric bupivacaine. The findings of the present research are consistent with those of a study conducted by Moawad and Elawdy (17) on the topic of shivering. One possible explanation for the lower rate of shivering in that research compared to ours is that they used a greater dosage of dexmedetomidine (10 g vs. 5 g). In a study including 120 women having elective CSs with SA, Qi et al. (18) examined the effects of 5 g intrathecal dexmedetomidine against 100 g morphine as add-ons to 10 mg bupivacaine. Shivering occurred in just 7.7% of patients in the dexmedetomidine group, compared to 30% and 35.9% of patients in the morphine and bupivacaine groups, respectively. Even though these findings corroborate our research's findings, the incidence of shivering was much lower in the former study than in the latter. Abdelhamid and El-Lakany (19) found that SA with strong bupivacaine 0.5% + 5 g intrathecal dexmedetomidine for lower abdominal procedures resulted in a significantly reduced incidence of shivering than the control group (12 of 31). One of the most important elements that may explain these variations is the presence of substances that promote shivering during SA. Among them are the patient's age, the degree of sensory block, the temperature of the intrathecal local anaesthetic, the temperature of the intravenous fluids, and the temperature of the operating room.

CONCLUSION

The results of this study indicate that the addition of 10µg of dexmedetomidine to strong bupivacaine in SA significantly reduces the frequency and severity of shivering with no appreciable side effects.

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