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Research Article

Efficacy of Intrathecal Dexmedetomidine with Bupivacaine versus Fentanyl with Bupivacaine in Spinal Anaesthesia for Elective Caesarean Sections

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Abstract: **Background**: post-operative pain management in caesarean cases is major challenge to the anaesthesiologists. Bupivacaine is the preferable choice which prolong sensory and motor block. But adding intrathecal adjuvants to this helps in reducing hemodynamic effects and provide prolonged satisfactory block. This study aimed to assess efficacy of intrathecal 0.5 ml 5µg Dexmedetomidine with 0.5% Hyperbaric Bupivacaine 7.5mg (1.5ml) and 0.5ml 25µg fentanyl with 1.5ml 0.5% hyperbaric bupivacaine in spinal anaesthesia for elective caesareans. **Materials and methods:** A total 120 primigravida and multigravida cases between 20 to 35 years, undergoing Caesarean section under subarachnoid block belong to ASA grade I & II were included. Cases were randomly divided in to two groups. Group 1 administered with 0.5 ml 5µg Dexmedetomidine & 0.5% Hyperbaric Bupivacaine 7.5mg (1.5ml) intrathecally and group 2 with 0.5ml 25µg fentanyl & 1.5ml of 0.5% hyperbaric bupivacaine intrathecally. **Results**: Onset of motor blockade (p=0.021) was statistically significant whereas complete motor blockade (p=0.089), onset of sensory blockade (0.734), Two segment regression time (0.254) and duration for maximum sensory blockade (0.648) were not statistically significant. Mean sedation rate was not statistically significant. **Conclusion**: Dexmedetomidine group had prolonged duration of post-operative analgesia and had no associated clinical complications. Dexmedetomidine group had better haemodynamic stability and sedation scores.

Keywords: Spinal anaesthesia, Efficacy, Dexmedetomidine, bupivacaine, Fentanyl, sedation score.

INTRODUCTION

Intrathecal adjuvants are crucial in postoperative pain management. In recent years, the rate of caesarean sections were increased among worldwide. Post-operative pain management in caesarean cases is important to avoid the adverse events of pain in mother and it helps to early recovery and better nursing of the baby (Gizzo, S. *et al.,* 2014; Eisenach, J.C. *et al.,* 2008; Samal, S. *et al.,* 2014).

In anaesthesia practice, bupivacaine is commonly used local anaesthetic agent which has remarkable ability to produce prolonged sensory and motor block. But bupivacaine had a drawback in producing side effects. This reason encourages the concept and choice of adding adjuvants to local anaesthetic agents in spinal anaesthesia. Adding intrathecal adjuvants to the local anaesthetic agents helps in reducing hemodynamic effects and provide satisfactory block (Hunt, C. O. *et al.,* 1989; Combic, C.R., & Wong, C.A. 2010).

Dexmedetomidine is a α2 agonist, has ability to extend the duration of analgesia, maintains haemodynamic stability and has minimal neonatal and maternal complications (Meitei, A.J. *et al.,* 2016). Fentanyl is a lipophilic µ receptor opioid agonist. As an adjuvant to local anaesthetic agents it helps to reduce visceral and somatic pain (Canan, U. *et al.,* 2013). The present study was designed to assess the efficacy of intrathecal 0.5 ml 5µg Dexmedetomidine with 0.5% Hyperbaric Bupivacaine 7.5mg (1.5ml) and 0.5ml 25µg fentanyl with 1.5ml 0.5% hyperbaric bupivacaine in spinal anaesthesia for elective caesareans.

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MATERIALS AND METHODS

The present prospective study was conducted in Department of Anaesthesiology, Maheshwara Medical College & Hospital, Patancheru and MNR Medical College & Hospital, Sangareddy during December 2017 to March 2019. A total 120 primigravida and multigravida cases between 20 to 35 years, undergoing Caesarean section under subarachnoid block belong to ASA grade I & II were included. Cases with psychiatric complications, renal complications, seizures, cardiovascular complications, gestational hypertension, sensitive to the study drugs were excluded from the study. Informed consent was obtained from all the cases and study protocol was approved by institutional ethics committee.

All the study participants were randomly divided in to two groups. Group 1 cases administered with 0.5 ml 5µg Dexmedetomidine and 0.5% Hyperbaric Bupivacaine 7.5mg (1.5ml) intrathecally and group 2 cases administered with 0.5ml 25µg fentanyl with 1.5ml 0.5% hyperbaric bupivacaine intrathecally. All patients received Inj. Ranitidine 50mg IV and Inj. metoclopramide 10mg IV for aspiration prophylaxis 30 minutes before surgery.

During procedure, time to onset and complete motor blockade and sensory blocked was observed. Systolic blood pressure, diastolic blood pressure, Mean heart rate and Oxygen saturation rates were recorded at the beginning, 5, 10, 15 and thereafter every 15 min until 60 minutes. Sedation scores were recorded based on Ramsay sedation score. Associated clinical complications were noted and neonatal APGAR scores 1 and 5 minutes. The data was collected in to Microsoft excel sheet and was analysed by SPSS 16.0 statistical software by using student‘t’ test.

RESULTS

Table 1: Demographic values of present study groups

Demographic parameters	Group 1		Group 2		
	Mean	SD	Mean	SD	P-value
Age (In years)	25.82	4.02	26.14	3.67	0.728
Height (In cm)	151.05	4.64	151.8	4.48	0.236
Weight (In kg)	56.12	6.45	56.28	7.35	0.456
Duration of surgery	51.26	6.83	51.56	7.01	0.524

Table 2: Details of motor and sensory blockade among two drug groups

Demographic parameters	Group 1		Group 2		
	Mean	SD	Mean	SD	P-value
Motor block					
Onset of motor blockade	2.12	1.04	2.49	0.99	0.021
Complete motor blockade	5.66	2.24	6.23	2.05	0.089
Sensory block					
Onset of sensory blockade	4.52	2.01	4.63	1.85	0.734
Time for maximum sensory blockade	12.34	3.57	12.28	3.54	0.648
Two segment regression time	89.4	11.08	88.82	11.02	0.254

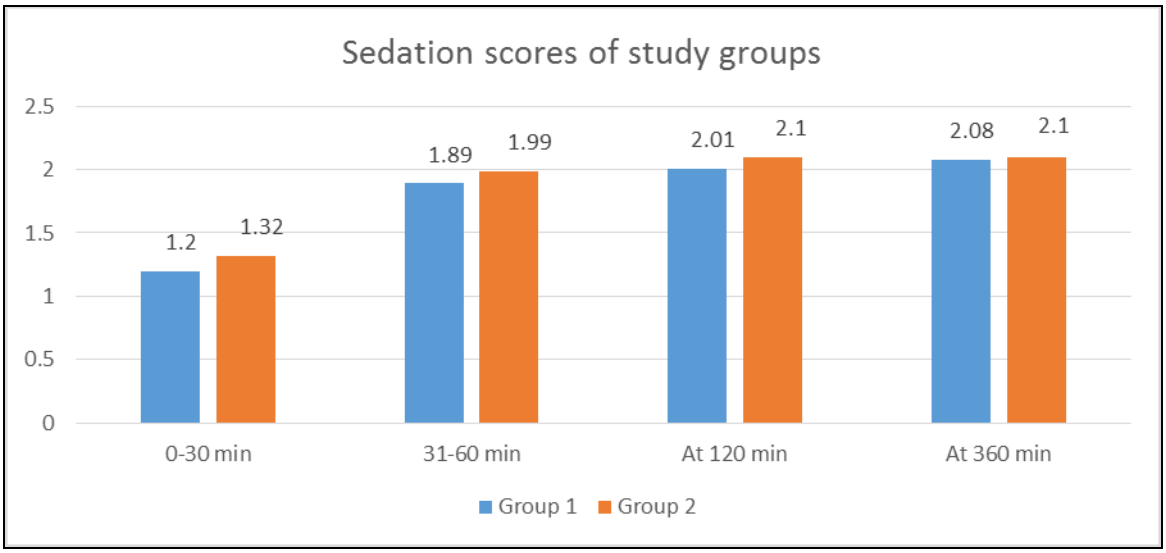

Figure 1: Sedation scores of the two study groups.

Table 3: Comparative values of mean heart rate and mean arterial pressure among study groups

Time	Mean heart rate			Mean arterial pressure		
	Group 1 (Mean±SD)	Group 2 (Mean±SD)	p-value	Group 1 (Mean±SD)	Group 2 (Mean±SD)	p-value
At 0 min	94.7±12.28	93.9±10.2	0.672	90.98±8.54	93.76±6.58	0.054
At 5 min	89.1±14.22	79.2±10.5	0.005*	80.45±9.26	81.25±4.94	0.266
At 10 min	84.7±13.98	75.6±9.54	0.003*	74.21±7.10	76.32±5.28	0.582
At 15 min	81.7±12.36	77.3±12.2	0.784	72.06±6.65	71.22±6.64	0.668
At 30 min	84.1±12.04	80.2±9.74	0.609	70.28±6.42	67.18±8.02	0.021
At 45 min	80.74±10.1	79.5±8.89	0.561	73.86±5.58	73.54±8.66	0.628
At 60 min	78.54±9.82	78.6±7.23	0.477	76.44±5.12	77.28±6.82	0.437

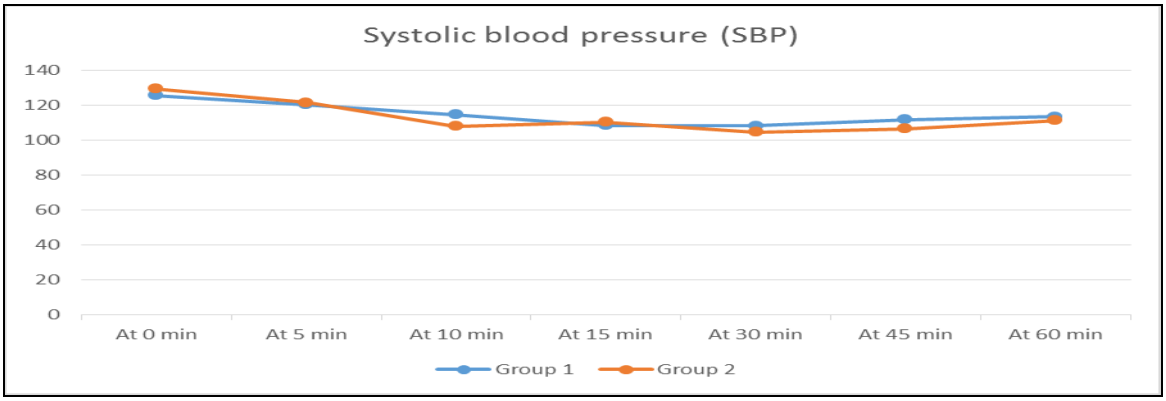

Figure 2: Comparison of mean values of systolic blood pressure (SBP) among study groups.

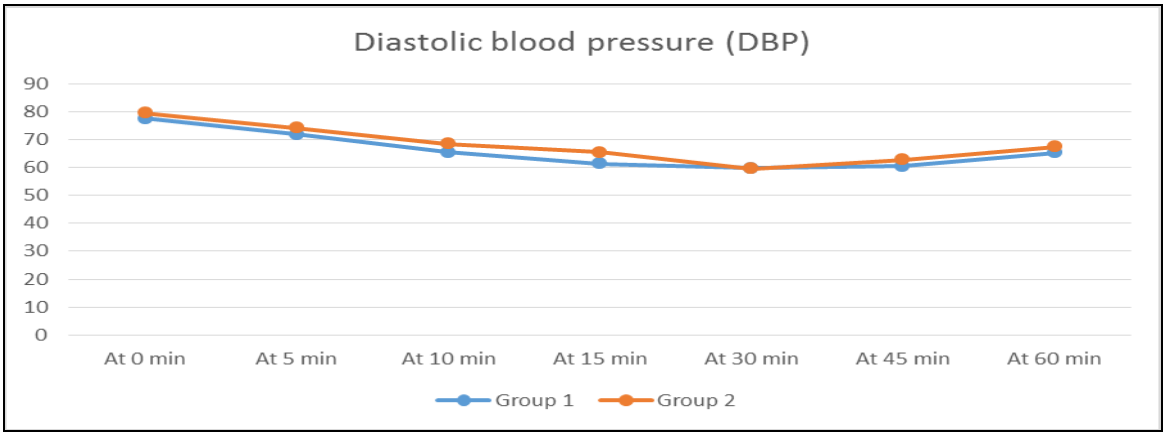

Figure 3: Comparison of mean values of diastolic blood pressure (DBP) among study groups.

Table 4: Details of neonatal outcome and time period for rescue analgesia among study groups.

	Group 1 (Mean±SD)	Group 2(Mean±SD)	p-value
APGAR score			
APGAR score at 1 min	7.62±2.04	7.54±1.18	0.542
APGAR score at 5 min	9.55±1.08	9.66±0.98	0.848
Time period for rescue analgesia (In sec)			
	228±24.5	156.2±18.78	0.002*

Time period of rescue analgesia was statistically significant between two study groups (P=0.002). The associated side effects was nausea and vomiting in two groups but pruritis was seen in group 2.

DISCUSSION

Spinal anaesthesia technique is a preferable choice for caesarean section (Veena, A. *et al.*, 2010). Hyperbaric bupivacaine is a desired alternative for spinal anaesthesia but has less duration of analgesia post operatively which needs analgesic backup. Combination of bupivacaine along with other drugs in spinal anaesthesia is helpful to improve intra operative and postoperative analgesia with minimal neonatal and maternal adverse effects (Dahlgren, G. *et al.*, 1997). This study was conducted to assess the efficacy of adding Dexmedetomidine and fentanyl with 0.5%

hyperbaric bupivacaine in spinal anaesthesia in caesarean section. In this study age (p=0.728), height (p=0.236), weight (p=0.456) and duration of surgery (0.524) was statistically not significant between two drug groups (Table 1). Study by Xia *et al.,* found no significant difference among demographic data and duration of surgery between two studies groups (Xia, F. *et al.,* 2018).

In this study onset of motor blockade (p=0.021) was statistically significant whereas complete motor blockade (p=0.089), onset of sensory blockade (0.734), Two segment regression time (0.254) and duration for maximum sensory blockade (0.648) were not statistically significant (Table 2). Study by Xia *et al.,*. found no significant difference in the onset time of motor block and highest level of motor block. Mean duration of sensory block was statistically significantly (Xia, F. *et al.,* 2018).

The mean Sedation score of group 1 was slightly more than group 2 which was statistically significant whereas at other time intervals sedation scores was statistically not significant (Figure 1). The mean sedation scores was high in Dexmedetomidine group than fentanyl group (Mahdy, W.R., & Abdullah, S.I. 2011). Study by Gupta *et al.,* stated mean sedation score was more in Dexmedetomidine group and was statistically significant (Gupta, R. *et al.,* 2011)

The mean heart rate at 5 min and 10 min was statistically significant whereas at other time intervals it was not statistically significant. At the beginning, 5min, 10min, 15min, 30 min the mean heart rate of group 1 was higher than group 2 whereas at 45 min & 60 min values are comparatively similar in both groups (Table 3). Study by Anjan das *et al.,*. tested different doses Dexmedetomidine along with bupivacaine noticed bradycardia in cases undergoing abdominal hysterectomy (Das, A. *et al.,* 2015). In this study mean heart rate was significantly lower in group 2 and no bradycardia was noticed in cases.

The mean arterial pressure at the beginning, 5min, 10 min and at 60 min was less in group 1 than group 2 and statistically significant at 30 min (Table 3). The mean systolic blood pressure was less in group 1 at the beginning, 5min, 10 min and at 15min and SBP become more at 30 min, 45 min and 60 min in group 1. The mean SBP at 10 min and 30 min was statistically significant among two study groups (figure 2). The mean diastolic blood pressure in entire duration of procedure was more in group 2 than group 1 except at 30 min. The mean DBP at 10 min, 15min and 30 min was statistically significant among two study groups (figure 3).

The mean APGAR scores in group 1 & 2 was statistically not significant at 1 min and 5 min. APGAR score was more in group 1 at 1 min and more in group 2 at 5 min. Study by Neuman *et al.,*. on cases undergoing caesarean section found no adverse effects on neonatal APGAR scores in Dexmedetomidine drug group (Neumann, M.M. *et al.,* 2009). Palanisamy *et al.,* in their study found no adverse events on APGAR score and maternal symptoms associated with Dexmedetomidine in caesarean cases (Palanisamy, A. *et al.,* 2009). Sun *et al.,* in their study stated that effects of Dexmedetomidine with bupivacaine and bupivacaine with fentanyl were similar and there was no significant difference in Apgar score among two groups (Sun, Y. *et al.,* 2014). Time period of rescue analgesia was statistically significant in both groups (Table 4). Gupta *et al.,* noticed similar findings and time period of rescue analgesia was statistically significant (Gupta, R. *et al.,* 2011).

CONCLUSION

The results of this study concluded that, Dexmedetomidine group has haemodynamic stability but fentanyl group need backup with ephedrine more often than Dexmedetomidine group. The rates of motor blockade and mean sedation scores were better in Dexmedetomidine group the fentanyl group. Dexmedetomidine group had prolonged duration of post-operative analgesia and had no associated clinical complications.

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