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Comparative Study of Low Doses of Intrathecal Bupivacaine Admixed With Fentanyl Citrate in Caesarean Section Deliveries

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Abstract
Introduction: *Spinal anaesthesia using hyperbaric bupivacaine is the technique of choice for caesarean section. Use of higher dose of local anaesthetics can cause haemodynamic instability, maternal and neonatal side effects. We hypothesized that use of lower dose of bupivacaine with fentanyl will improve the quality of analgesia and minimize the complications. Aim is to compare the haemodynamics and duration of analgesia using different lower doses of hyperbaric bupivacaine admixed with fentanyl citrate 12.5mcg.*
Methods*: Seventy five parturients, scheduled for elective caesarean section were randomly allocated into three groups. Group B (n=25) received bupivacaine 10mg (2ml), group BF1 (n=25) received bupivacaine 7.5 mg and fentanyl 12.5 mcg plus NS (to make 2ml), group BF2 (n=25) received bupivacaine 5 mg and fentanyl 12.5 mcg plus NS (to make 2ml). Maternal haemodynamics, sensory and motor block, duration of analgesia and the apgar score of the newborn were compared between the groups.*
Results: *The time required for sensory block was significantly fastest in group BF1($p<0.001$). The haemodynamic trend was significantly different in 4^{th}, 6^{th} and 20^{th} minute of intraoperative period and statistically significant but clinically not significant among the groups. Duration of analgesia was significantly longest (116.72±18.80) in group BF1 $p<0.001$. Analgesic supplement was maximum in group BF2 (10%) followed by group BF1 (4%), group B (0%) respectively. The analgesic quality was excellent in group BF1 (76%) followed by group B (64%), group BF2 (44%).*
Conclusion*: Bupivacaine 7.5mg admixed with fentanyl 12.5 mcg is a better option to produce haemodynamically stable and prolonged duration of analgesia for caesarean section.*
Key Words*: Caesarean section, fentanyl, hyperbaric bupivacaine, low dose, spinal anaesthesia.*

I. Introduction

Spinal anaesthesia (SA) with bupivacaine has been widely used for caesarean section (CS) deliveries because of multiple advantages.[1] Bupivacaine causes many undesirable effects like hypotension, bradycardia, shivering, nausea, vomiting etc. However, these effects are dose dependent and can be reduced by using lower dose of bupivacaine with adjuvant. Several adjuvant like morphine, butorphenol, ketamine, alfentanyl, sufentanyl have been exhaustively studied in the population undergoing CS delivery with many side effects.[(2-7)] Considering the previous studies and results, intrathecal bupivacaine with fentanyl proves most suited combination of SA.[(8)] Addition of fentanyl to intrathecal bupivacaine reduces the incidence of haemodynamic instabilities and requirement of anaesthetic doses. It is a preferred adjuvant in spinal anaesthesia because of its rapid onset and short duration of action with lesser incidence of respiratory depression.[(9)] Because of its synergistic effect, it improves intra-operative analgesia and increases duration of post operative analgesia with negligible incidence of pruritus, shivering or respiratory depression. However this intrathecal bupivacaine and fentanyl combination is not always free from the undesired adversities or toxicities of cardiovascular system and central nervous system on both maternal and neonatal due to unwanted cephalad extension of blockade. Several studies in an attempt to prevent spinal induced hypotension, including low dose bupivacaine in combination of fentanyl are being conducted. There is report where fentanyl addition to bupivacaine does not cause any change in the sedation. Further, negligible incidences of pruritus, shivering or respiratory depression were observed.

Hence we conducted the present study to evaluate the lowest effective dose of intrathecal bupivacaine admixed with safe dose of fentanyl citrate in CS delivery without any untoward effects to mother and newborns against the standard bupivacaine alone as control.

II. Materials And Methods

After obtaining institutional ethical committee approval and written informed consent from all the patients. This study was conducted during 2014 to 2016 as a prospective randomized double blinded controlled study at a tertiary teaching hospital at Imphal on 75 patients of ASA I and II, aged between 18 and 38 years of full term singleton pregnant women undergoing elective CS delivery. Patients with severe anaemia, pregnancy induced hypertension (PIH), placenta previa, foetal distress, other systemic diseases, contraindication to neuraxial block, any other medications, extreme of height and weights were excluded from the study.

One day before the surgery, pre anaesthetic check up was done and assuming found fit for surgery, all the patients were premedicated at night with tablet pantoprazol 40mg and tablet alprazolam 0.5mg orally, thereafter kept overnight fasting. On arrival at operation theatre, intravenous access was secured with 18G cannula and ringers lactate infusion was started at 15ml/kg, 15 minutes before SA. Pre medication was done with injection ranitidine 50mg iv and injection metoclopramde 10mg iv. Standard monitors were applied and baseline values were recorded.

Using computer generated code; patients were divided into three groups of 25 patients each: group (B) received bupivacaine 2ml, group (BF1) received bupivacaine 1.5ml+12.5 mcg of fentanyl+NS to make volume of 2ml, group (BF2) received bupivacaine 1ml+12.5mcg of fentanyl+NS to make a volume of 2ml. Under aseptic precaution, SA was performed at L3-4 intervertebral space using 25G Quincke needle and either of the study drugs was injected intrathecally in double blind fashion.

Heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP) and oxygen saturation (SPO2) were recorded every 2 minutes for the first 10 minutes followed by every 5 minutes till 30th minutes then 15 minutes till the end of surgery.

Sensory level of block was assessed bilaterally by pinprick method along the mid-clavicular line and assessed every 30 seconds till complete loss of cutaneous sensation at T8-T6 at which point surgery was started, then every 2 minute until the highest level has been stabilized for four consecutive tests. Once the peak sensory block level had attained no further sensory check was done. The incidence of adverse effects, such as nausea, vomiting, shivering, pruritus, respiratory depression, sedation, hypotension and bradycardia were recorded.
Motor blockade was assessed (time from the injection of drug in subarachnoid space till the patient was unable to raise the extended legs) by Modified Bromage scale.[10]

Score	Criteria
1.	Complete block (unable to move feet or knees)
2.	Almost complete block (able to move feet only)
3.	Partial block (just able to move knees)
4.	Detectable weakness of hip flexion while supine (full flexion of knees)
5.	No detectable weakness of hip flexion while supine
6.	Able to perform partial knee bend

Fall in SBP >30% of baseline or <95 mmHg was considered hypotension and treated with Inj Ringer's lactate (200mL bolus) and/or Inj. Mephentermine 3mg intravenous as needed. Pulse rate <50 beats per min was considered Bradycardia and treated with inj Atropine. Respiratory depression was defined as respiratory rate less than 10 per min to be treated with inj. Naloxone.

An intra and post operative pain assessment was done using pain grading as fair, poor, good and excellent. Foetal outcome was assessed by apgar score at 1 and 5 minutes. Side effects such as hypotension, bradycardia, respiratory depression, nausea, vomiting, pruritus, shivering and sedation were noted till the end of surgery. Duration of post operative analgesia was taken as time from the end of surgery up to the patient's first analgesia requirement. Rescue analgesia (intra-operative) was provided with inj Ketamine Sulfate 10mg intravenously or Inj Pentazocin 15mg and Midazolam 1.5mg slow intravenously.

Statistical Analysis: Based on a study,[11] a sample size of 22 in each group was determined with an alpha value of 0.05 and a power of 0.95 and rounded to 25 patients in each group. The data were tabulated and analysed by the software SPSS for windows version 20.0. Tables and figures were drawn using Microsoft word and excel. Numerical /continuous variables were presented as Mean ± SD (standard deviation) and for qualitative/categorical variables were again described as number of cases and percentages. The three means for each parameter were compared by ANOVA test (F-test) and for multiple comparisons of means Post Hoc Tests of Bonferroni was advocated whenever applicable. For categorical variables, the information was exhibited in terms of number of cases along with percentages and χ^2-test was applied if data permit. The p value of <0.05 was considered statistically significant.

III. Results

The demographic profiles (age, weight and height) of the three groups were comparable and found statistically not significant Table 1. Figure-1 shows the comparison of Mean ± SD of heart rate at different stages of pre and intra operative period amongst the three groups were found statistically not significant (P>0.05). Table -2 shows the comparison pattern of mean haemodynamic changes among the three study groups .The mean systolic blood pressure in Group B, Group BF1 and Group BF2 over the stages starting from pre-operative to 75th minute of intra-operative and the variation of means were found to be statistically significant only at 4^{th} , 6^{th} and 20^{th} minutes (P<0.05). However mean DBP and MAP were statistically significant only at 4^{th} and 6^{th} (P<0.05)

The time required for the onset of sensory block to reach T6 was fastest in group BF1, followed by group B and group BF2. The mean difference among the three groups was highly significant (p<0.001), Table-3. There was no failed cases in all the groups. The duration of analgesia was highest in group BF1 and lowest in BF2. And the mean variation of the three groups was highly significant (P=0.008). There was no significant difference in APGAR score (P>0.05) Table-4. Table-5 shows no analgesic supplement was required in group B, whereas 1/25 patient in group BF1 and 2/25 patients in group BF2 were given pentazocine and 3/25 patients in group BF2 received ketamine. There was highest percentage (76%) of analgesic quality (excellent) in group BF1, followed by group B (64%) and group BF2 (44%) respectively. On contrary both group B and group BF2 had similar percentage (24%) of good, followed by group BF1(20%). There was no case of poor in group BF1 whereas Group B had one. Group BF2 had highest percentage (24.0%) of poor score. In group B and BF2 had two cases each having fair analgesic quality against one case in group BF1. Incidence of nausea and vomiting were absent in group BF1 and group BF2 however 3/25 patients of nausea and 2/25 patients of vomiting were evidenced in group B.

IV. Discussion

This study was carried out to find out whether the average bupivacaine dose of 6-12.5 mg intrathecal for caesarean section can still be reduced to less than 6 mg. It was also to check whether the reduction in dose of intrathecal fentanyl can be possible less than the average 15-25 mcg in previous study. We also tried to keep the level intrathecal injection at the lower site at L3-4 intervertebral space to avoid accentuation of hemodynamic responses. In this study we compared the effectiveness of the three drug doses to give adequate surgical anesthesia for lower caesarean section delivery. Two drug doses group BF1 (0.5% bupivacaine 7.5mg + fentanyl 12.5 mcg) & group BF2 (bupivacaine 5mg + fentanyl 12.5 mcg) were compared with the standard 10mg 0.5% bupivacaine (heavy). In our result, there was a wide variation of intraoperative maternal HR in all the groups. Though none of the difference was found to be significant. No case of bradycardia requiring injection atropine was observed during intraoperative period in the study.

It has been observed that the trend of fall in systolic blood pressure was significantly different in 4^{th}, 6^{th} and 20^{th} minute of intraoperative period. It is in congruence with the earlier studies.[11-13] There was decrease in all the systolic, diastolic and mean arterial pressure following intrathecal injection. However, the decrements in blood pressures were not significant (P> 0.05) amongst the three groups except in the 4^{th} and 6^{th} minutes. The fall was greatest in group B (mean SBP 103.56±17.12), followed by group BF2 (mean SBP 106.12±16.15) and least in group BF1 (mean SBP 115.72±17.22). The diastolic blood pressure also had similar trend of reduction at 4^{th} and 6^{th} minutes intra-operative. Here too, the lowest mean diastolic reading belonged to group-B (60.16±14.22) followed by group-BF2 (63.64±14.46) and group-BF1 (70.96±14.39) respectively. A p-value of 0.030 and 0.025 in both the 4^{th} and 6^{th} minutes reading further asserted the significant differences amongst the three groups. Similar pattern of decrease was also visible in MAP too. Further in the post-hoc analysis this fall in blood pressure was significant in group B and group BF1 but insignificant between group BF1 and group BF2. In the study by Jaishree Bogra et.al[13] the decrease in blood pressure was more with increasing dose of bupivacaine, this was in congruence with our present result. K. Jain et.al[14] also found that addition of 10μg of fentanyl to 7.5 mg of intrathecal bupivacaine could significantly differ the fall in MAP from 7.5 mg alone bupivacaine.

Himabindu G.V. et.al found that addition of 25 μg fentanyl to7.5 mg of hyperbaric bupivacaine could significantly increase the rate of onset of sensory block than 10mg bupivacaine alone. The results of our study have shown that onset to peak of sensory block (loss of pin prick sensation) to T6 (Table-3) following intrathecal injection was faster in the group BF1 (218 ± 49.20 sec). Onset of sensory block was slower in group BF2 (357.83 ± 119.35 sec) which is still slower than the control group B (323.04 ± 81.22). Bogra J. et. al [15] found the similar result of faster sensory onset with increasing bupivacaine alone doses < combination groups with fentanyl. Dhumal P. R. et.al [16] and Sheikh F. et.al[11] also found the faster onset of the sensory block in fentanyl combination groups than their bupivacaine alone counterparts. The highest peak sensory block level was not different in group B and group BF1 (highest T2- 4% prevalence) but none of the group BF2 could reach the T2 level. The prevalence of lowest block level (T8) attained in group B & BF1 were same (4%). The

highest level attained in group BF2 was T4. Rao.V et.al[17] in their study found that 6 mg of bupivacaine with 25 µg fentanyl was effective for cesarean section delivery and could attained T4 dermatome block level in 40% of cases. But in our study the maximum sensory block level was T4. It is in congruence with our present study. Gupta A et.al[18] during spinal anesthesia for ambulatory inguinal hernia studied the effectiveness of 6mg &7.5 mg hyperbaric bupivacaine admixed with 25µg fentanyl. They found greater number of patients in 6 mg group required supplementary analgesics intra-operatively. Most of the earlier studies[2,3,14,19,20] were conducted in higher doses of bupivacaine (≥7 mg) and fentanyl. Goel S et.al[21] conducted a study in 45 adult males undergoing day care urological procedure with 5mg hyperbaric bupivacaine plus varying doses of fentanyl 7.5/ 10/ 12.5 µg. Fentanyl 7.5 µg with bupivacaine 5 mg had a significantly higher (four out of 15) block failure rate. Ben-David B et.al[8] in their study, however, could complete the surgical anesthesia with 4 mg bupivacaine (minidose) plus 20 µg fentanyl: a much lower dose. This might be due to the lower dermatomal level of surgical field in their study. In our study, there was no case of block failure, which was in agreement with previous studies. But in 20% of the cases in Group-BF2 required additional analgesic supplementation during surgery which indicated the poorer adequacy of surgical anesthesia in Group-BF2. However, in a study by Dhumal P.R et.al[16] 5mg bupivacaine with 25 µg fentanyl was found to be effective and superior to bupivacaine 7.5 mg alone. The difference in the fentanyl dose might be the reason for less failure rate in their study. From this we could infer that bupivacaine 5mg could be effective for LSCS if the fentanyl dose be increased > 12.5 µg. Our study found 20% cases of nausea and vomiting (table-9) in the Group B whereas; there were no cases in Group BF1 & BF2. The increased incidence of nausea and vomiting was found mostly in bupivacaine alone groups in various studies[11,13,16]. Most of the events of nausea or vomiting were found to be in relation to hypotensive episodes. Bupivacaine 10mg was adequate for intraoperative analgesia. But one case in Group BF1 needed analgesic call during intraoperative period. Supplementary analgesia requirement was higher in Group-BF2 (20%). Similar results were also observed in Gupta A.et.al.[18] Unlike previous studies in which higher doses of fentanyl were used, in our study there were no cases of pruritus, respiratory depression. The highest mean duration of analgesia was witnessed in group-BF1 (116.72±18.80 min) followed by group-BF2 (98.91± 17.38 min) and lowest in group-B (105.24±22.09 min). Again insignificant P- value i.e., P=0.008 indicates that the variation is very highly significant statistically. Bogra J et.al[15] and Dhumal P.R et.al[16] had also observed the similar result of synergistic actions of opioids with local anaesthetics. However, the 1st min and 5th min APGAR score were not different significantly in all the groups (table-4). In fact the intrathecal fentanyl was found to have better neonatal outcome than general anesthesia.[12, 22] The table-5 shows percentage of analgesic quality viz., highest excellent (76.0%) was found to exist in group-BF1, followed by group-B (64.0) and group-BF2 (44%) respectively. On the contrary group-BF2 & B had highest number of good (24%), followed by group-BF1 (20%). There was no case of poor in group-BF1 and 2 cases (8%) of fair in group-BF2.

V. Conclusion

From this study it could be concluded that use of intrathecal bupivacaine (heavy) 7.5mg with 12.5µg fentanyl could still be a better option than the standard 10-12.5mg bupivacaine alone regime with improved haemodynamic stability, quality of anaesthesia and better post operative analgesia without significant side effects to neonatal outcome. Further reduction in dose of bupivacaine to 5 mg may be working with 12.5µg fentanyl for cesarean delivery but may require additional analgesia supplementation intra-operatively.

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Table-1. Demographic profile of the three study groups

Parameters	Mean±SD				*P value*
	Group B (n=25)	**Group BF1 (n=25)**	**Group BF2 (n=25)**	**Total (n=75)**	
Age (years)	28.92±5.40	30.72±5.97	27.36±6.72	29.00±6.13	.153
Weight (Kg)	66.04±11.47	64.28±8.86	59.12±10.48	63.15±10.61	.055
Height (cm)	150.96±6.81	152.08±5.26	148.84±6.95	150.63±6.44	.198

Table-2. Haemodynamic parameters of three study groups

SBP (mmHg)	**Group B (n=25)**		**Group BF1 (n=25)**		**Group BF2 (n=25)**		**Total (n=75)**		**P-value**
	n	**Mean±SD**	**n**	**Mean±SD**	**n**	**Mean±SD**	**n**	**Mean±SD**	
0-min	25	123.28±10.56	25	126.36±17.78	25	125.88±13.05	75	128.51±15.05	.404
2-min	25	106.04±13.12	25	118.00±17.62	25	108.52±16.74	75	110.85±16.56	.054
4-min	**25**	**103.56±17.12**	**25**	**115.72±17.22**	**25**	**106.12±16.15**	**75**	**108.47±17.42**	**.032**
6-min	**25**	**111.40±12.49**	**25**	**115.96±17.58**	**25**	**110.44±11.94**	**75**	**112.60±14.25**	**.027**
8-min	25	110.44±9.26	25	118.92±17.84	25	113.44±12.85	75	114.27±14.04	.095
10-min	25	111.72±14.07	25	117.12±17.78	25	110.63±12.73	75	113.19±15.11	.273
15-min	25	106.36±13.53	25	111.48±13.65	25	111.09±11.28	75	109.60±12.94	.306
20-min	**25**	**103.76±11.06**	**25**	**111.60±13.28**	**25**	**111.43±9.99**	**75**	**108.86±11.99**	**.030**
25-min	25	104.92±12.32	25	109.00±13.76	25	110.96±9.94	75	108.22±12.26	.219
30-min	25	105.21±9.57	25	108.75±13.92	25	109.73±9.09	75	107.84±11.14	.350
35-min	24	107.71±10.06	22	110.36±13.15	20	109.65±11.13	66	109.18±11.37	.720
40-min	19	107.74±9.90	15	115.00±15.78	14	115.00±9.92	48	112.13±12.32	.136
45-min	12	106.67±10.84	9	117.89±16.84	12	117.58±10.22	33	113.70±13.28	.067
60-min	6	108.00±8.07	3	115.67±4.04	5	119.40±9.09	14	113.71±9.02	.095
75-min	2	110.00±9.89	2	119.00±8.48	1	126.00±0	5	116.80±9.44	.476
DBP (mmHg)	**Group B**		**Group BF1**		**Group BF2**		**Total**		**P-value**
	n	**Mean±SD**	**n**	**Mean±SD**	**n**	**Mean±SD**	**n**	**Mean±SD**	
0-min	25	79.32±7.76	25	82.00±13.87	25	80.92±10.61	75	82.08±11.25	.289
2-min	25	62.04±11.04	25	76.32±15.46	25	66.20±15.76	75	68.19±15.30	.052
4-min	**25**	**60.16±14.22**	**25**	**70.96±14.39**	**25**	**63.64±14.46**	**75**	**64.92±14.87**	**.030**
6-min	**25**	**63.68±10.11**	**25**	**69.60±14.20**	**25**	**66.16±11.44**	**75**	**66.48±12.12**	**.025**
8-min	25	64.16±8.31	25	70.00±12.60	25	65.21±11.06	75	66.47±10.95	.134
10-min	25	63.24±14.37	25	68.28±12.82	25	64.04±12.02	75	65.22±13.15	.354
15-min	25	59.60±10.81	25	66.04±11.04	25	62.87±13.70	75	62.84±12.00	.166
20-min	25	59.00±11.55	25	62.64±12.57	25	62.09±12.07	75	61.22±12.01	.523
25-min	25	56.80±9.24	25	62.36±17.76	25	61.96±11.17	75	60.33±13.35	.267
30-min	25	55.50±8.90	25	62.29±17.25	25	61.59±9.94	75	59.74±12.86	.135
35-min	24	56.88±8.23	22	64.82±18.42	20	60.00±11.58	66	60.47±13.56	.137
40-min	19	58.63±7.13	16	65.50±13.05	16	64.63±10.31	51	62.67±10.55	.105
45-min	12	59.25±11.03	9	70.67±13.49	12	66.00±9.38	33	64.82±11.80	.078

60-min	6	60.83±9.10	3	66.00±4.35	5	72.20±6.94	14	66.00±8.76	.091
75-min	2	62.50±4.95	2	61.50±13.43	1	74.00±0	5	64.40±8.96	.638
MAP (mmHg)	**Group B**		**Group BF1**		**Group BF2**		**Total**		**P-value**
	n	**Mean±SD**	**n**	**Mean±SD**	**n**	**Mean±SD**	**n**	**Mean±SD**	
0-min	25	94.12±8.59	25	100.08±15.03	25	96.88±11.76	75	97.64±12.32	.171
2-min	25	75.52±11.43	25	88.38±17.14	25	83.12±17.19	75	82.26±16.15	.057
4-min	**25**	**74.24±14.01**	**25**	**87.72±17.69**	**25**	**79.24±14.05**	**75**	**80.40±16.14**	**.010**
6-min	**25**	**79.00±10.31**	**25**	**86.24±12.88**	**25**	**82.72±11.11**	**75**	**82.65±11.71**	**.041**
8-min	25	80.32±7.40	25	87.04±15.17	25	82.63±10.98	75	83.34±11.82	.124
10-min	25	79.96±13.96	25	84.76±14.38	25	78.96±12.76	75	81.29±13.79	.294
15-min	25	75.72±11.60	25	81.48±12.07	25	81.74±14.06	75	79.59±12.72	173
20-min	25	75.12±8.97	25	79.44±13.01	25	78.70±12.61	75	77.73±11.64	.382
25-min	25	72.52±8.92	25	76.56±15.38	25	79.04±10.45	75	75.96±12.08	.167
30-min	25	72.96±7.33	25	76.79±14.27	25	78.86±9.15	75	76.13±10.83	.171
35-min	24	74.96±7.59	22	79.64±15.11	20	79.30±11.82	66	77.83±11.82	.332
40-min	19	75.68±6.31	14	84.07±13.22	16	83.00±9.49	49	80.47±10.26	.059
45-min	11	74.27±4.19	8	87.38±15.25	12	83.67±8.86	31	81.29±10.91	.058
60-min	6	77.67±7.28	3	81.00±9.64	4	90.25±4.57	143	82.31±8.66	.061
75-min	2	79.00±4.24	2	83.00±7.07	1	98.00±0	5	84.40±8.87	.216

Table-3. Time to onset of sensory block to reach T6 and peak sensory block level

Parameters		**Group B (n=25) Mean±SD**	**GroupBF1 (n=25) Mean±SD**	**Group BF2 (n=25) Mean±SD**	**Total (n=75) Mean±SD**	**P value**
Time of sensory blockade at Thoracic dermatome level-6		323.04±81.22	218.16±49.20	357.83±119.35	298.08±104.56	<.001
Peak sensory block level	T2	1(4.0%)	1(4.0%)	-	2(2.7%)	---
	T3	3(12.0%)	1(4.0%)	-	4(5.3%)	
	T4	15(60.0%)	13(52.0%)	11(44.0%)	39(52.0%)	
	T5	5(20.0%)	9(36.0%)	13(52.0%)	27(36.0%)	
	T6	1(4.0%)	1(4.0%)	1(4.0%)	3(4.0%)	
	Total	25(100.0%)	25(100.0%)	25(100.0%)	75(100.0%)	

Table-4. Duration of analgesia and APGAR score in the three study groups.

Parameters	**Gr B**		**Gr BF1**		**Gr BF2**		**Total**		**P value**
	n	(mean±SD)	n	(mean±SD)	n	(mean±SD)	n	(mean±SD)	
Duration of analgesia	25	105.24±22.09	25	116.72±18.80	25	98.91± 17.38	75	107.18±20.67	.008
APGAR score	25	8.24±.77	25	8.32±.74	25	8.28±.79	75	8.28±.76	.935

Table-5. Comparison of analgesic supplementation and analgesic quality in 3 study groups.

Parameters	**Group B**	**Group BF1**	**Group BF2**	**Total**
Analgesic Supplement	(n=25)	(n=25)	(n=25)	(n=75)
None	25(100.0%)	24(96.0%)	20(80.0%)	69(92.0%)
Ketamine	-	-	3(12.0%)	3(4.0%)
Pentazocin	-	1(4.0%)	2(8.0%)	3(4.0%)
Total	25(100.0%)	25(100.0%)	25(100.0%)	75(100.0%)
Analgesic Quality	(n=25)	(n=25)	(n=25)	(n=25)
Excellent	16(64.0%)	19(76.0%)	11(44.0%)	46(61.3%)
Good	6(24.0%)	5(20.0%)	6(24.0%)	17(22.7%)
Poor	1(4.0%)	-	6(24.0%)	7(9.3%)
Fair	2(8.0%)	1(4.0%)	2(8.0%)	5(6.1%)
Total	25(100.0%)	25(100.0%)	25(100.0%)	75(100.0%)

Figure-1: Heart rate at different stages among the three study groups