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Comparing Buprenorphine and Nalbuphine as Adjuvants to Intrathecal Bupivacaine: Haemodynamic Effects in Infraumbilical Surgeries

Dr. Eleena John[1], Dr. M. Paul Wilson[2]

[1]Junior Resident, Department of Anaesthesiology, Dr Somervell Memorial CSI Medical College & Hospital, Karakonam – 695504, Kerala, India

[2]Professor & Head of the Department, Department of Anaesthesiology, Dr Somervell Memorial CSI Medical College & Hospital, Karakonam – 695504, Kerala, India
Corresponding Author Email: *paulwilson555[at]gmail.com*

Abstract: ***Background: To compare the haemodynamic effects and side effects of spinal anaesthesia when buprenorphine or nalbuphine is used as an adjuvant to intrathecal bupivacaine in patients undergoing infraumbilical surgeries. Methods: 40 patients were divided into two groups of 20 each. Group BBpatients were given 0.2ml 60 mcg buprenorphine along with 2.8 ml 0.5% hyperbaric bupivacaine. Group BNpatients were given 0.2ml 2 mg nalbuphine along with 2.8 ml 0.5% hyperbaric bupivacaine. Results: No significant differences in the haemodynamic effects and side effects between group BB and group BN. Conclusion: In elective infraumbilical surgeries, the addition of buprenorphine to intrathecal bupivacaine does not cause significant haemodynamic variations or side effects than the addition of nalbuphine to intrathecal bupivacaine.***

Keywords: Intrathecal, buprenorphine, nalbuphine, Spinal anaesthesia, infraumbilical surgeries, haemodynamic changes

1. Introduction

In infraumbilical surgeries, different types of anaesthesia could be given. But in majority of the patients, spinal anesthesia is given[1]. Advantages of spinal anaesthesia over general anaesthesia includes no airway instrumentation, adequate analgesia, stable haemodynamics, reduced blood loss and improved conditions for surgery[2].

Among the spinal anaesthetic agents, 0.5% hyperbaric bupivacaine is the most preferred one. Bupivacaine an amide local anaesthetic has high potency, slow onset (5 - 8 minutes) and has long duration of action. Currently hyperbaric bupivacaine is being used with opioids for almost all surgical cases. Addition of Opioids improves the quality of intraoperative anaesthesia[3].

Buprenorphine is a semi synthetic agonist – antagonist opioid derived from opium alkaloid thebaine. It was synthesised in late 1960s[4]. It has the greatest analgesic potency. It has 50 times greater affinity to μ - receptors than morphine and subsequent slow dissociation from these receptors accounts for its prolonged duration of action. It is effective in relieving moderate to severe pain as in postoperative period. It has higher lipid solubility than morphine[5].

Nalbuphine is a synthetic, mixed agonist - antagonist opioid analgesic with agonistic action at κ - receptor and antagonism at μ - receptor[6]. Its affinity to κ - opioid receptors results in analgesia, sedation, and cardiovascular stability with minimal respiratory depression[7]. In perioperative period, it provides analgesic benefits along with less respiratory depression compared to morphine[8].

In this study, we observe and evaluate the addition of Buprenorphine as an adjuvant with hyperbaric bupivacaine and nalbuphine hydrochloride as an adjuvant to hyperbaric bupivacaine in subarachnoid block to check whether intrathecal buprenorphine causes similar haemodynamic changeslike intrathecal nalbuphine as an adjuvant to intrathecal bupivacaine in infraumbilical surgeries. The following data were collected and compared:

- Systolic blood pressure
- Diastolic blood pressure
- Mean blood pressure
- Pulse rate
- Respiratory rate
- SpO_2
- Incidence of any side effects

2. Materials and methods

Aims and Objectives:
To compare the hemodynamic stability between intrathecal Buprenorphine or intrathecal Nalbuphine as adjuvants to intrathecal hyperbaric 0.5% Bupivacaine in patients undergoing infraumbilical surgeries.

Design:
Comparative cross - sectional study

Sample size:
40 patients posted for elective infraumbilical surgeries were selected for the study. They were divided into two groups. Each group had 20 patients.

Methodology:
The study was started after the approval from the ethical and scientific committee of our institution. From all the patients, written informed consents were received.

Selection criteria:
Individuals giving informed written consent
Elective infraumbilical surgeries
Patients with ASA 1 and 2
Age 18 to 60 years
Male and female patients
Body Mass Index 18.5 – 24.9

Exclusion criteria:
Patient refusal
Patient with local site infection to give spinal anaesthesia
Allergic to local anaesthetic drugs
Neurologic or musculoskeletal disease
Bleeding disorders
Patients on anticoagulants
Psychiatric patients
Pregnancy and Lactation
Patients on Tranquilizers and sedatives

There were two groups of patients (Group BB and Group BN). Each group had 20 patients posted for infraumbilical surgeries. Group BB patients received 2.8 ml of 0.5% bupivacaine heavy with 0.2 ml 60 mcg buprenorphine. Group BN patients received 2.8 ml of 0.5% bupivacaine heavy with 0.2ml 2 mg nalbuphine. The final volume of the drug was 3 mlin both the groups, The drugs were injected intrathecally in both the groups.

All the patients were visited one day preoperatively, the procedure was explained, and a written informed consent was obtained. All routine investigations required for preoperative evaluation and the proposed surgery were done.

Patients were advised eight hours fasting for solid diet and two hours for clear fluids before giving anaesthesia. All patients were premedicated with Tablet Ranitidine 150 mg at night on the day before surgery and in the morning. Tablet Metoclopramide 10 mg was given in the morning.

On arrival to the operation theatre, following insertion of a wide bore venous cannula under sterile precautions, intravenous fluid was started. Standard monitoring was done which included non - invasive blood pressure (NIBP), Electrocardiography (ECG), Heart Rate (HR), Oxygen (O_2) Saturation and the baseline parameters were recorded. Patient was then positioned for the SAB. Under strict aseptic precaution, subarachnoid block was performedin L3 - L4 interspace using 25 G Quincke's spinal needle with patient in left lateral position.

Haemodynamic variables viz., systolic blood pressure, diastolic blood pressure, mean blood pressure, heart rate and SpO_2 were recorded.

Hypotension was considered as systolic BP<90 mmHg and it was treated with a bolus administration of 300ml of ringer lactate over 10 minutes and 6 mg IV Ephedrine. Heart rate less than 50 bpm if persisted, was treated with 0.6 mg of IV atropine.
Data were collected and analysed. After the proper validation, check for error was compiled and then analysed using the statistical programming software SPSS - 24. Analysis of the data was done using student's t - test. P value <0.05 was considered statistically significant.

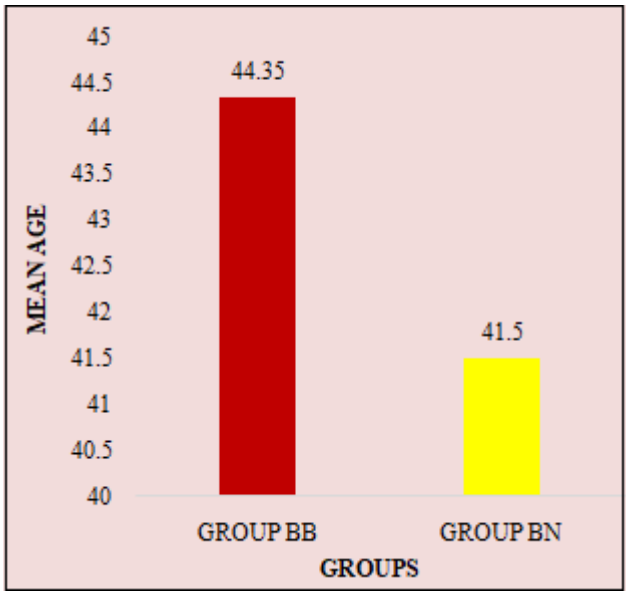
Statistical Analysis:
The collected data was entered and stored into Microsoft Excel. Appropriate SPSS version (Version 24.0) was used for the analysis. Qualitative variables were represented using frequencies and proportions. Quantitative variables were represented using mean and standard deviation. Appropriate tests of significance were used based on type of data collected; either Mann Whitney U or Student T - test. A p - value < 0.05 is considered statistically significant.

3. Results

For comparability of data in both the groups, the demographic variables were analysed.

Table 1: Comparison of Mean Age

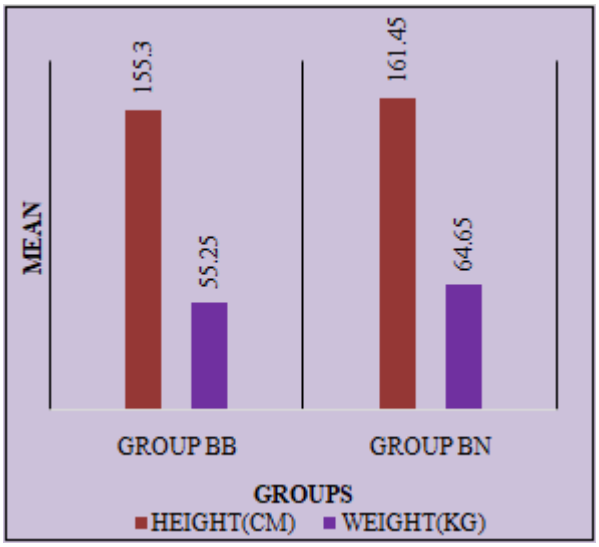
Variable	Group BB (n=20)				Group BN (n=20)				P
	Mean	SD	Min	Max	Mean	SD	Min	Max	
Age	44.35	13.01	18.0	60.0	41.50	12.10	20.0	60.0	0.478



The mean age for group BB is 44.35years and mean age for group BN is 41.50 years. Between the two groups, the difference of age was found to be not significant with p value=0.478.

Table 2: Comparison of Height and Weight

Variable	Group BB (n=20)				Group BN (n=20)				P
	Mean	SD	Min	Max	Mean	SD	Min	Max	
Height	155.30	11.30	140.0	178.0	161.45	9.37	141.0	179.0	0.069
Weight	55.25	12.34	38.0	80.0	64.65	7.53	50.0	80.0	0.060



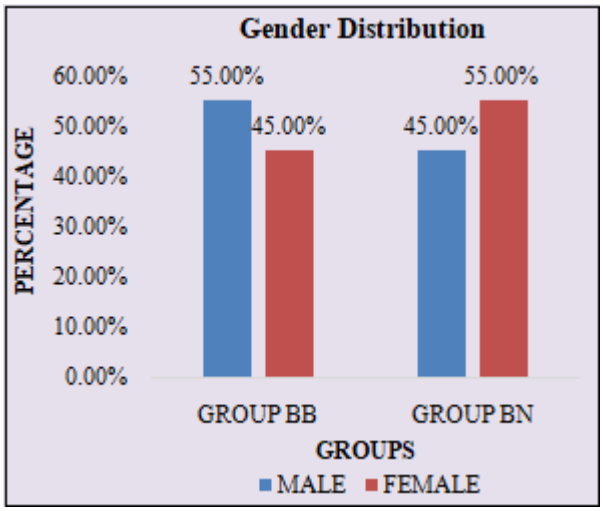
Mean height of group BB is 155.30 cm and group BN is 161.45cm. Between the two groups height is not statistically significant with p value of 0.069

Mean weight of group BB is 55.25 kg and group BN is 64.65. Between the two groups weight is not statistically significant with p value of 0.06

Table 3: Comparison of Gender based on Groups

Gender	Group BB (n=20)		Group BN (n=20)		P value
	N	%	N	%	
Male	11	55.0%	9	45.0%	0.752
Female	9	45.0%	11	55.0%	

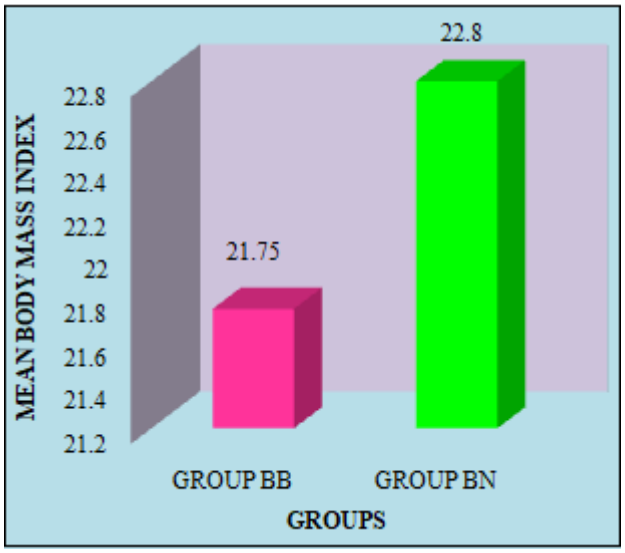
$X^2 = 0.400$, DF = 1



Gender distribution is comparable in both the groups with a p value of 0.752

Table 4: Comparison of Body Mass Index

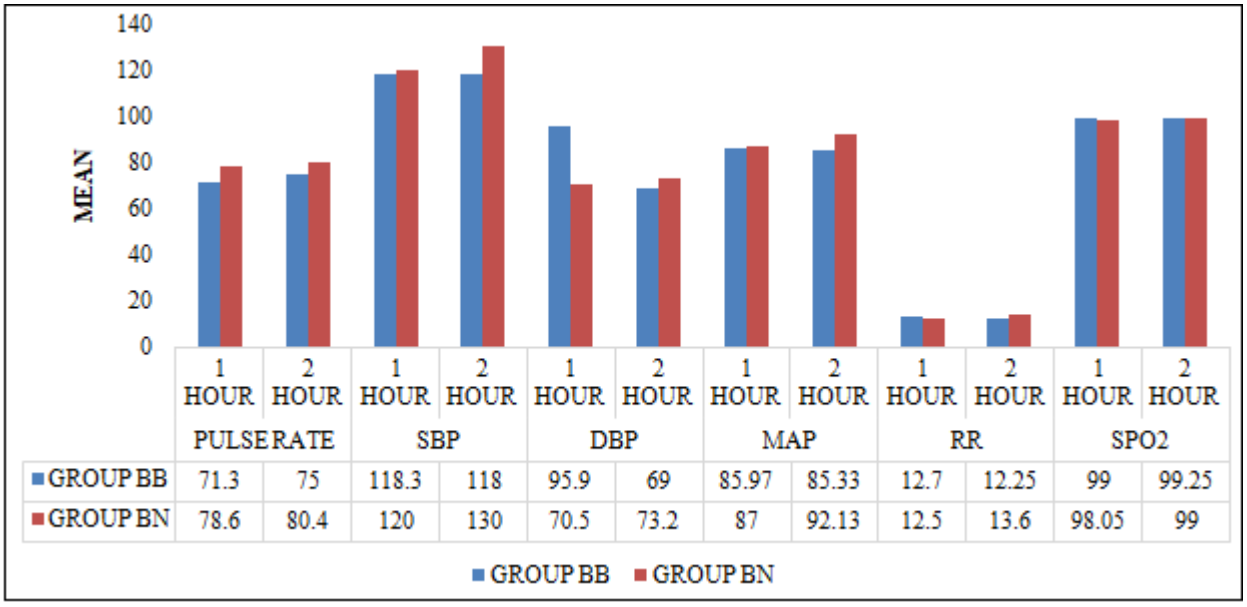
Variable	Group BB (n=20)				Group BN (n=20)				P
BMI	Mean	SD	Min	Max	Mean	SD	Min	Max	0.050
	21.75	2.08	18.0	24.0	22.80	0.89	21.0	24.0	



The statistical difference between the BMI in both groups was comparable (p = 0.050).

Table 5: Comparison of Hemodynamic Stability

Variables		Group BB (n=20)		Group BN (n=20)		P
		Mean	SD	Mean	SD	
Pulse Rate	1 Hour	71.30	7.00	78.60	8.85	**0.006**
	2 Hour	75.00	4.76	80.40	6.06	0.190
SBP	1 Hour	118.30	8.08	120.00	7.34	0.491
	2 Hour	118.00	4.89	130.00	4.47	**0.006**
DBP	1 Hour	95.90	5.15	70.50	6.64	0.327
	2 Hour	69.00	2.01	73.20	3.63	0.079
Mean Arterial Pressure	1 Hour	85.97	6.29	87.00	5.32	0.289
	2 Hour	85.33	2.11	92.13	2.23	**0.001**
Respiratory Rate	1 Hour	12.70	1.38	12.50	1.19	0.627
	2 Hour	12.25	0.95	13.60	0.54	**0.032**
SPO_2	1 Hour	99.00	0.79	98.05	1.23	**0.006**
	2 Hour	99.25	0.95	99.00	0.70	0.665



The statistical comparison between the hemodynamic stability in both groups was comparable.

Table 6: Comparison of side effects

Side Effects	Group BB (n=20)		Group BN (n=20)	
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Nausea	2	5.0%	4	20.0%
Vomiting	1	10.0%	1	5.0%
Nil	17	85.0%	15	75.0%

The side effects in both groups were minimal.

4. Discussion

This study was conducted at Dr. S. M. C. S. I. Medical College among a total of 40 participants. The participants were allocated into two groups of twenty in each based on whether patient received intrathecal buprenorphine with 0.5% hyperbaric bupivacaine (Group BB) or intrathecal nalbuphine with 0.5% hyperbaric bupivacaine (Group BN) in elective infraumbilical surgeries.

In this study, age of participants was between 18 - 60 years of age. The mean age for group BB is 44.35 years and mean age for group BN is 41.50 years. Between the two groups, the difference of age was found to be not significant. Hence the distribution of age between two groups was comparable. There is no statistically significant finding based on gender grouping, height grouping, weight grouping ASA PS grouping, BMI grouping, and duration of surgery grouping compared with both groups in the conducted study. In a similar study conducted by R. Krishna Prabu, Manchireddy Manish[9] randomized double blinded study on 60 patients to compare 15 mg of 0.5% of injection bupivacaine heavy along with either 60 mcg of buprenorphine (Group B) or 0.8 mg nalbuphine (Group N) reported that the groups were not statistically significant in demographic data in terms of age, gender, weight, ASA class and duration of surgery.

The statistical comparisons between the hemodynamic stability in both groups were comparable. Similar findings were made by R. Krishna Prabu, Manchireddy Manish[9].

Both groups showed minimal side effects. Three patients in buprenorphine and five patients in Nalbuphine showed post - operative nausea and vomiting. Postoperative nausea and vomiting were more in buprenorphine group patients in studies done by by R. Krishna Prabu, Manchireddy Manish[16]Sankalp Kaushal et al[10].

5. Results

The study found no significant differences in the haemodynamic effects and side effects between the buprenorphine and nalbuphine groups.

6. Conclusion

This study is a comparison of buprenorphine versus nalbuphine as an adjuvant to intrathecal bupivacaine in infraumbilical surgeries in our hospital.

The addition of buprenorphine to intrathecal bupivacaine does not cause any significant haemodynamic variations and side effects than addition of Nalbuphine with intrathecal bupivacaine in elective infraumbilical surgeries.

Declaration of interest
None declared.

Funding
None declared.

Ethical approval
The study was approved by the Institutional Ethics Committee.

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