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Effects Of Bupivacaine And Buprenorphine On Postoperative Analgesia In A Nerve Stimulator-Guided Supraclavian Plexus Block: A Randomised, Double-Blind Comparison Study

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ABSTRACT

There have been several attempts to find an adjuvant that would increase the analgesic effectiveness of local anaesthetics in supraclavicular brachial plexus blocks. Previous research has shown that supraclavicular brachial plexus blocks that include opioids in addition to local anaesthetics provide analgesia that is equivalent to that of the two methods alone. As a result, I've contrasted two groups of patients in my study: one that got bupivacaine alone, and another that got a mix of the two.

The purpose of this research is to evaluate the efficacy of bupivacaine alone and bupivacaine with buprenorphine for postoperative pain management in nerve stimulator guided supraclavicular brachial plexus blocks.

Looking Forward to Sixty patients participated in the 18-month, randomised, double-blind control trial that took place from March 2021 to August 2022 at the Khaja Banda Nawaz Teaching and General Hospital in Kalaburagi. Thirty patients each were assigned to one of two groups.

The first group had 15 millilitres of 2% lignocaine with adrenaline, 20 millilitres of 0.5 percent bupivacaine, and 5 millilitres of normal saline.

Fluids administered to Group B consisted of 15 ml of Inj.2% Lignocaine with Adrenaline, 20 ml of Inj.0.5% Bupivacaine, and 3 mcg/kg of Inj. Buprenorphine diluted to 5 ml with Normal Saline.

The time it took for sensory blockage to begin in Group A was 9.70 minutes, whereas in Group B it was 9.26 minutes. The sensory blockage in Group A lasted 329.17 minutes, whereas in Group B it lasted 586.83 minutes. Both groups had comparable onset of motor blockage. Group B's time was 11.50 minutes, while Group A's was 11.67 minutes. Both Group A and Group B had motor block durations of 299.5 and 299.16 minutes, respectively. Group A's analgesia lasted 5.04 hours, whereas Group B's was 10.7 hours. Group A required rescue analgesics after 7.1 hours, whereas Group B required them after 13.1 hours. The hemodynamic parameters were similar across the two groups.

Patients having operations on their upper limbs might benefit from a supraclavicular brachial plexus block with bupivacaine and buprenorphine because the former increases and the latter prolongs the analgesic impact of the latter.

Keywords: Bupivacaine; Buprenorphine; Peripheral nerve stimulator; Postoperative analgesia; Supraclavicular brachial plexus block.

I.INTRODUCTION

Both general and regional anaesthesia are viable options for surgeries affecting the hand and forearm.1

The risks associated with general anaesthesia include airway manipulation, unstable hemodynamics, cognitive impairment, and postoperative vomiting and nausea.2-Overcoming all the difficulties associated with general anaesthesia is possible with anaesthesia using localised procedures. As an added bonus, it has a decreased risk of major complications, less mortality, better postoperative analgesia, and cheaper costs.2-4 When it comes to procedures involving the upper limbs, regional blocking at the brachial plexus is the way to go for dependable anaesthesia and pain relief.[5]

A common method for blocking nerves in the extremities is the brachial plexus block. Given initially by Professor Halsted in 1884 and later refined by Herschel, Kulenkampff, and Winnie, it quickly rose to prominence as the anaesthetic of choice for procedures involving the upper extremities. This was due to the fact that it had few side effects and was suitable for both routine and emergency surgery, as well as

for patients with full stomachs or those with severe illnesses for whom general anaesthesia was not an option. The supraclavicular approach is the most well-known and secure of the several methods mentioned.[6]

While a supraclavicular brachial plexus block with local anaesthetics alone improves surgical circumstances, the analgesia felt after the procedure lasts less time. Tramadol, butorphanol, buprenorphine, alpha 2 adrenergic agonists, and dexamethasone are some of the adjuvants used to speed up the block's onset and extend the duration of postoperative analgesia.

With strong binding affinity for both mu and kappa opiate receptors, buprenorphine is a narcotic that acts as both an agonist and an antagonist. It works as an analgesic in almost every medical setting. A brain alkaloid.[8]

This research aims to examine the effects of Bupivacaine alone and Bupivacaine with Inj on sensory and motor block, postoperative analgesia, and the time it takes to need rescue analgesia. The use of buprenorphine for orthopaedic operations involving the upper limbs involves a nerve stimulator-guided supraclavicular brachial plexus block.

II. AIMS & OBJECTIVES

Aim of the study:

In order to evaluate the effects of bupivacaine alone and bupivacaine combined with buprenorphine on postoperative pain relief after orthopaedic surgeries involving the upper limbs, this study compares the two methods.

Objectives:

1. The purpose of this research is to compare the effects of Buprenorphine with those of Bupivacaine alone and to determine the time required for sensory and motor blocking as well as the analgesic impact after surgery.
2. In order to learn about the hemodynamics during surgery.
3. With the aim of researching the drug's side effects.

III. REVIEW OF LITERATURE

HISTORY OF BRACHIAL PLEXUS BLOCKADE:

Carl Koller's[9] cocaine-induced ocular anaesthesia trials continue to be the pivotal moment in the development of regional blocking.

In 1884, William Halstead[10] and Alfred Hall[11] were the first to accomplish a brachial plexus block by exposing the nerve roots by direct dissection. In 1897, George Crile[12] also used a similar strategy.

The use of a tourniquet on a limb, as pointed out by Leonard Corning13, enhances the duration of anaesthesia by decreasing the drug's absorption. The addition of epinephrine, which Heinrich F. Braun[14] dubbed the "chemical tourniquet," produced the same result.

By using an axillary route, G. Hirschel[15] accomplished the first percutaneous procedure in 1911.

After Kulenkampff successfully self-injected procaine in 1911, he created the traditional supraclavicular technique. In 1964, Winnie and Collins detailed the subclavian perivascular method.[16], 17

In 1911, Bazy and Pauchet developed the infraclavicular technique; in 1973–1918, Raj popularised the method. In 1912, Kappis[19] detailed the posterior paravertebral technique, which, in contrast to the anterior methods, was characterised by a significant failure rate.

For procedures involving the upper arm and shoulder, Winnie[20] also popularised the interscalene technique in 1970.

HISTORY OF NERVE STIMULATORS:

- According to Galvani's 1780 description, electrical neuromuscular activation has certain consequences.
- In 1912, Von Perthes was the first to describe an electrical nerve stimulator.
- Pearson pioneered the use of insulated needles.
- In 1962, Greenblatt and Denson invented portable nerve stimulators.
- In 1984, Ford et al. proposed using nerve stimulators with a continuous current source.
- Only in the mid to late 1990s did nerve stimulators start to gain widespread use.

ANATOMICAL CONSIDERATIONS[25]

The brachial plexus is responsible for supplying the upper extremities with both motor and sensory nerves. The amount of anaesthesia felt in the upper limb after plexus blockage varies with the site of the block. What makes up the brachial plexus are:

a. Five roots,
b. Three trunks,
c. Six divisions,
d. Three cords and
e. Five major terminal nerves.

FORMATION

- Anterior primary rami of C5, C6, C7, C8 and T1.
- Occasional – contribution from C4 or T2 seen.
- Plexus may also be

PRE FIXED (C4 to C8) or POST FIXED (C6 to T2).

BRANCHES OF THE BRACHIAL PLEXUS

BRANCHES FROM ROOTS

- Receive Grey rami from cervical sympathetic chain
  a) C5 and C6 from the middle cervical ganglion;
  b) C7 and C8 from the inferior cervical ganglion;
  c) T1 from the ganglion of T1.
- To longus cervicis (C5 to C8)
- To scalene muscles (C5 to C8)
- To rhomboideus (C5)
- To serratus anterior (C5 to C7)
- To phrenic nerve (C5)

BRANCHES FROM TRUNK

- UPPER TRUNK

a) Nerve to subclavius (C5, C6)

b) Suprascapular nerve (C5, C6)

BRANCHES FROM DIVISIONS – NIL

BRANCHES FROM CORDS

- LATERAL CORD

a) Lateral pectoral (C5 to C7)

b) Musculocutaneous (C5 to C7)

c) Lateral root of median (C5 to C7)

- MEDIAL CORD

a) Medial root of median (C8,T1)

b) Medial cutaneous nerve of arm (C8,T1)

c) Medial cutaneous nerve of forearm (C8,T1)

d) Medial pectoral nerve (C8,T1)

e) Ulnar nerve (C7,C8,T1)

- POSTERIOR CORD

a) Upper subscapular nerve (C5, C6)

b) Lower subscapular nerve (C5, C6)

c) Nerve to lattisimus dorsi (C6, C7, C8)

d) Axillary nerve (C5, C6)

e) Radial nerve (C5 to C8, T1).

IV. MATERIALS & METHODS

Duration of the Study: 1st March 2021 to 31st August 2022.

Type of Study: Prospective Randomized Double Blind Control Study.

Place of the study: Department of Anaesthesiology, Khaja Banda Nawaz Teaching and General Hospital, Kalaburagi.

Sample size: 60

Sample size calculation for 2 different groups of equal sizes for a continuous outcome measure:

n = sample size per group

α = 0.05 The probability of rejecting the null hypothesis when it is true. A level of 0.05 or 95% is most commonly used. The value was 1.96

β = 0.2 The probability of failing to reject the null hypothesis if it is false. A level of 0.2 is most commonly used. This corresponds to a study power of 0.82 or 80%

σ 2 = population variance in mean duration of motor block in both the groups variance (standard deviation^2) the SD of the study was 2.1 in the reference study (Surekha Patil, Debasis Debata, Chaula Doshi, Varsha Vyas, Sapna Sinha. Effect of buprenorphine as an adjunct with plain local anesthetic solution in supraclavicular brachial plexus block on quality and duration of postoperative analgesia.)

μ_1 = Mean of motor onset in group A = 2.64 μ_2 = Mean of motor onset in group B = 4.08 $\mu_2 - \mu_1$ = minimum difference was 1.44

$$\text{Sample size} = (Z_{\alpha/2} + Z_{\beta})^2 \times 2\sigma^2/\mu_2-\mu_1$$

$$= (1.96 + 0.82)^2 \times 2 \times (1.92)^2/ 1.44$$

$$= 27.73 \text{ samples in each group}$$

$$= \text{Round figure 30 samples in each group}$$

Sample size = Total samples 60 (30 samples were taken in each group)

Inclusion criteria:

1. This patient falls under the ASA grades I and II.
2. Patients scheduled for 90-120 minute orthopaedic treatments on the upper limbs.
3. Patients of either sex, ranging in age from 18 to 60 years old.

Exclusion criteria:

1. Infection at local site
2. Patient with hypersensitivity to drug
3. Addiction to opioids
4. Inadequate block
5. Bleeding disorders, cardiovascular disorders
6. History of coagulopathy or on anticoagulant treatment
7. Pregnant patient
8. Patients with neuromuscular disorders or pre-existing neurological disease.

Methodology:

The research comprised patients who met the inclusion criteria and were prepared to provide written informed permission after the Institutional Ethical Committee gave its assent. Participants were sixty male and female patients (ranging in age from 18 to 60 years old) with an ASA grade of I or II who were set to have orthopaedic or general surgery on their upper limbs. Each of the two groups, A and B, consisted of thirty patients, and they were randomly assigned to their respective groups by selecting a marked card from an envelope. A senior anesthesiologist who was not associated with the research was responsible for randomising the participants and preparing the medication solutions. In order to ensure that no one knows which group had which therapy, the anesthesiologist who would be performing and observing the block features was blinded to them. The medication components in each category comprised:

Group A: 15 ml of Inj. 2% Lignocaine with Adrenaline + 20ml of Inj. 0.5% Bupivacaine + 5 ml of Normal Saline.

Group B:15 ml of Inj.2% Lignocaine with Adrenaline + 20 ml of Inj. 0.5% Bupivacaine + Inj. Buprenorphine 3mcg/kg diluted to 5 ml with Normal Saline.

PREOPERATIVE PERIOD:

The patient had a thorough medical history and physical examination the day before surgery as part of the preoperative appointment. The patient had a standard physical examination, which included taking their weight and height as well as checking their blood pressure, breathing, and neurological and cardiovascular systems. The ASA fasting rules were followed by all patients, who were maintained on a nil-per-oral basis. Comprehensive hemogram, bleeding and clotting times, random blood sugar, HIV, and HBsAg testing were among the routine laboratory evaluations conducted. It was necessary to get written informed permission after briefing the patient and their attendants about the treatment. We began the crystalloid infusion and inserted an 18-gauge cannula on the opposite upper arm to establish a peripheral intravenous line in the operating room.

INTRAOPERATIVE PERIOD:

It was common practice to connect non-invasive blood pressure (NIBP), electrocardiogram (ECG), and pulse oximeter (SpO2) monitors upon arrival in the operation room. Intravenous injection of Ondansetron at a dosage of 0.1 mg/kg. We measured and tracked the following vital signs: baseline pulse rate (PR), systolic and diastolic blood pressure, mean blood pressure, respiratory rate, and oxygen saturation (SpO2%).

PROCEDURE:

The patient was required to lay face down on a tiny cushion under their head and neck, with their arms folded over their chest and their head angled 45 degrees to one side. We used the traditional method to do the supraclavicular block. A 50 mm stimuplex needle was placed 1 cm above the midclavicular position on the side that needed to be blocked once asepsis was achieved. Under the supervision of the senior anaesthetist, the assistant attached the stimuplex needle to the nerve stimulator, adjusted the current output to 1.0mA, and chose the repeat twitch mode. When inserting a needle, if the patient's upper trunk (shoulder) twitched, it meant the needle was getting close to the brachial plexus. We considered a wrist flex and an extended finger to be acceptable responses, so we slowly decreased the current from 0.3 to 0.5mA while keeping the apparent twitches. Following the protocol for randomization, each group underwent negative aspiration before receiving an incremental dosage of 5 ml of anaesthetic solution.

Parameters measured:

1) **Hemodynamic parameters**: Prior to the block being applied and at1,5,10,15,30,60,90,120, and 240 minute intervals thereafter, vital signs such as pulse rate, systolic and diastolic blood pressure, mean blood pressure, respiratory rate, and oxygen saturation are recorded.
2) **Sensory block**: Using a 22-gauge hypodermic needle and the pinprick test, we compared the sensory block in one hand to the other and compared the results. Checked sensory block every minute till no longer feeling pinprick.
   Quality of sensory block was graded as:
   - 0- Sharp pain, that is normal sensation to pinprick.
   - 1- Analgesia, only touch felt, but not pinprick.
   - 2- Anaesthesia, no response to pinprick.
3) **Motor block**: Evaluation of upper-extremity motor block using the Modified Bromage scale.
   - 0- Movement of the hands and arms in flexion and extension against a resistance.
   - 1- Using the arms and hands in a flexed or extended position in opposition to gravity rather than resistance.
   - 2- Flexion &/or extension movement in the hand but not in the arm.
   - 3- No movement of upper limb against gravity

   Assessed at 1 minute interval until complete motor blockade occurred.

4) After surgery, the analgesic's efficacy was monitored using a visual analogue scale (VAS) every hour until the VAS score reached 1. Mild discomfort (VAS-1) over the length of time after surgery is what this term refers to.
5) **First analgesic requirement time** (minute): As the term implies, rescue analgesia is the amount of time that passes between the insertion of a block and the patient's first request for analgesics. Emergence injection of analgesic Analgesic initiation time post-operatively was defined as the time it took to go from a VAS score of 4 to the first rescue dose of 75 mg administered intramuscularly. There was a visual analogue score system in place to record postoperative pain levels, with 0 indicating no pain and 10 indicating the most severe pain.

STATISTICAL DATA ANALYSIS:

The IBM SPSS 25.0 version software was used for data analysis. We built a master chart and distributed the collected data out on an Excel page. I used the master chart to build my tables and graphs. To begin analysing quantitative data, we calculated means and standard deviations using descriptive statistics. To compare means between two variables, we used an independent samples t-test, and to check for statistical significance between several variables, we used an ANOVA test. In order to analyse quantitative data, we used chi-square and Fisher exact probability tests to see whether there were any significant results. A statistically significant result was defined for all comparisons when the p-value was less than or equal to 0.05.

V. RESULTS AND OBSERVATION

Table No.1: Age wise distribution of cases

Age in years	**Group A**		**Group B**		**Total**	
	No.	**%**	**No.**	**%**	**No.**	**%**
21—30	4	13.3	2	6.7	6	10.0
31—40	10	33.4	12	40.0	22	36.7
41—50	12	40.0	12	40.0	24	40.0
51—60	4	13.3	4	13.3	8	13.3
Total	30	100.0	30	100.0	60	100.0
Mean ± SD	**42.10 ± 1.81**		**42.56 ± 1.52**		**42.34 ± 1.66**	
t-test value P-value	**t = 0.202 P = 0.841 NS**					

NS= not significant, S=significant, HS=highly significant

The study found that the age groups of 41–50 years accounted for the highest number of cases (24 out of 50), while the age groups of 31–40 years accounted for 22 cases (36.7%). The ages of the patients in both groups ranged from 24 to 60. However, the age difference between group A and group B was not statistically significant (P>0.05).

Graph 1: Multiple bar diagram represents age wise distribution of cases

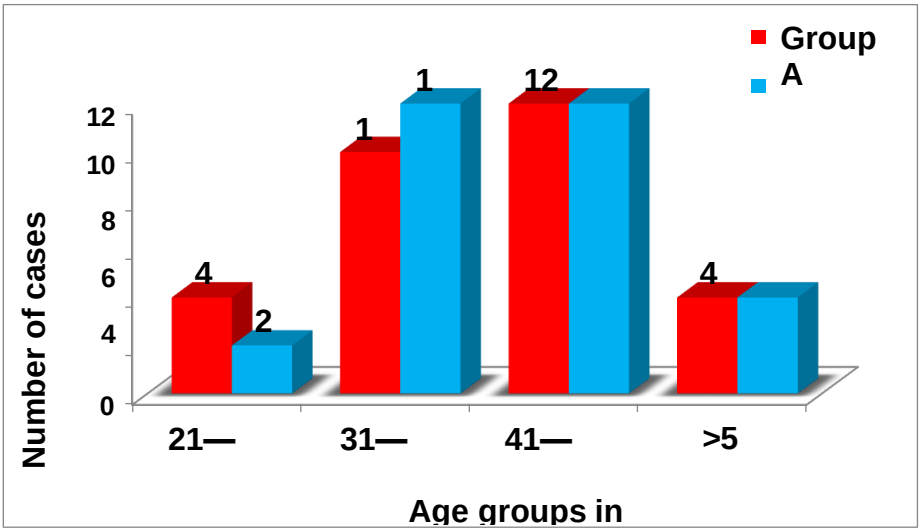


Table No.2: Gender wise distribution of cases in the groups

Gender	Group-A		Group-B	
	No.	%	No.	%
Males	22	73.3	14	46.7
Females	8	26.7	16	53.3
Total	30	100.0	30	100.0
$\chi 2$ –Test value, P- value	$\chi 2 = 1.263$, P = 0.482, NS			

NS= not significant, S=significant, HS=highly significant

Study observed that; in the group-A male cases were 22 (73.3%) and in Group-B male cases were 14 (46.7%) and female cases in Group-A 8 (26.7%) and Group-B 16 (53.3%). There was no statistical significance difference of distribution of gender between the Groups A and Group B (P>0.05).

Graph 2: Multiple bars represent gender wise distribution of cases in the groups

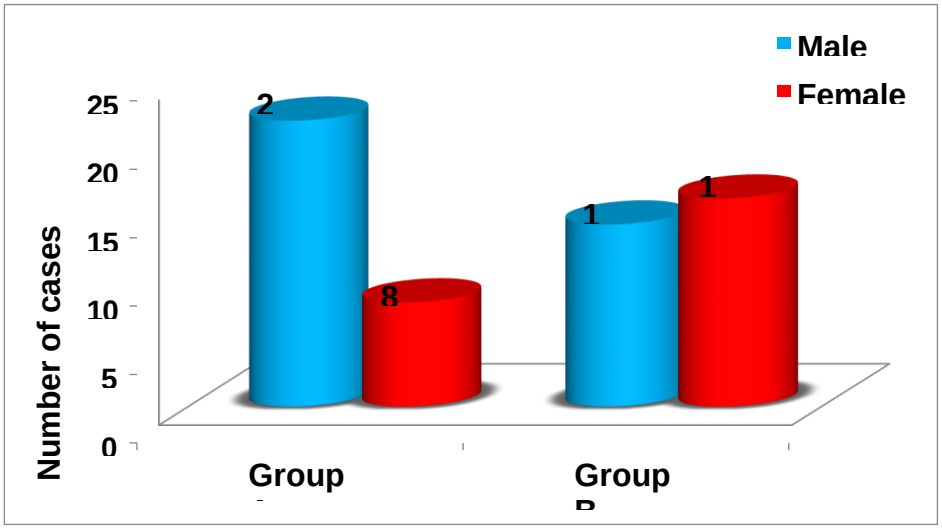


Table No.3: Body weight wise distribution of cases in the groups

Weight in Kg	Group-A		Group-B	
	No.	%	No.	%
50—59	19	63.3	16	53.3
60—69	10	33.3	11	36.7
≥ 70	1	3.4	3	10.0
Total	30	100.0	30	100.0
Mean ± SD	57.67 ± 5.88		59.86 ± 6.23	
t-test value, P-value	t = 1.406, P = 1.65, NS			

NS= not significant, S=significant, HS=highly significant

The mean weight of Group-A was 57.67 and Group-B was 59.86, mean weight was not statistically significant difference between Group-A and Group-B.

Graph 3: Bar diagram represents body weight wise distribution of cases in the groups

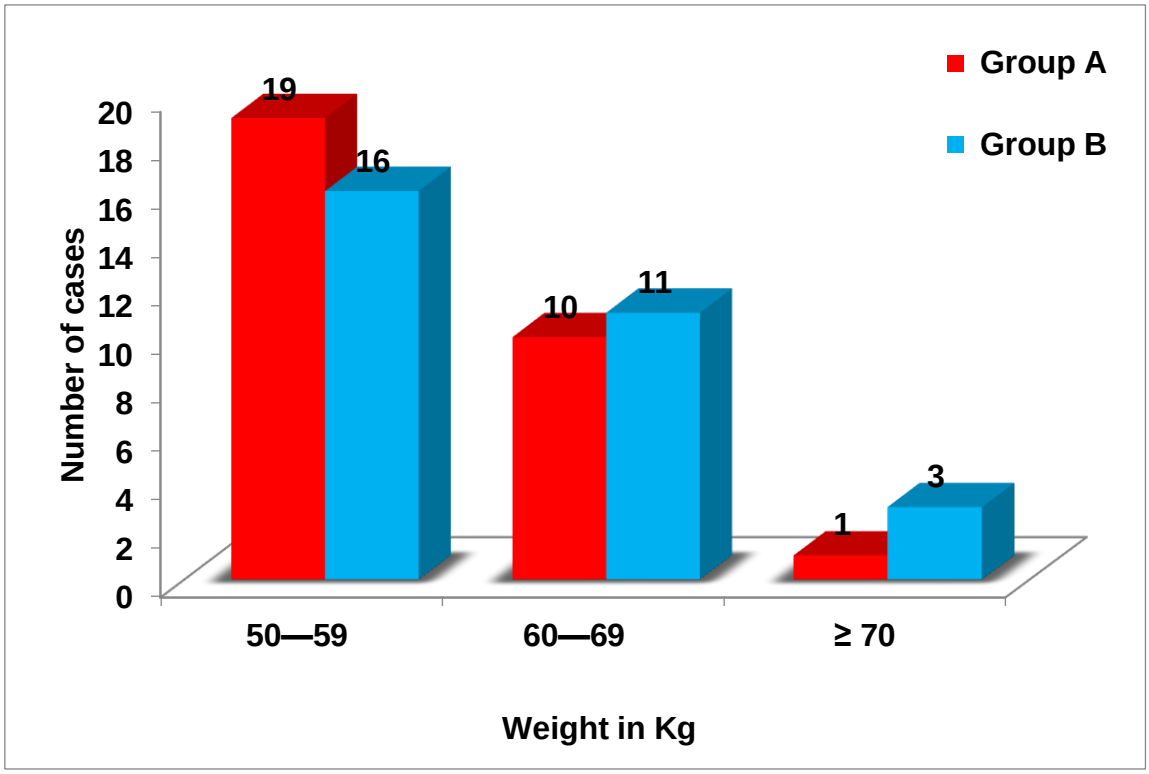


Table No.4: ASA status wise distribution of cases in the groups

ASA Status	Group-A		Group-B	
	No.	%	No.	%
I	22	73.3	24	80.0
II	8	26.7	6	20.0
Total	30	100.0	30	100.0
χ2 –Test value, P-value	χ2 = 0.375, P = 0.823, NS			

NS= not significant, S=significant, HS=highly significant

ASA status I in Group-A were 22 (73.3%) cases in Group-B were 24 (80.0%) cases. There was no statistically significant difference in the distribution of ASA status between Group-A and Group-B.

Graph 4: Multiple bars represent ASA status wise distribution of cases in the groups

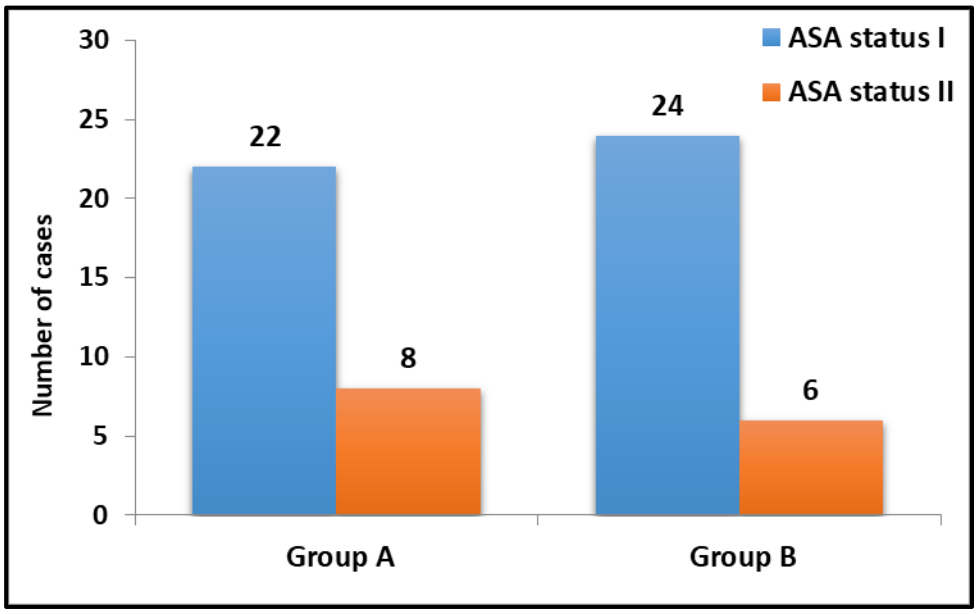
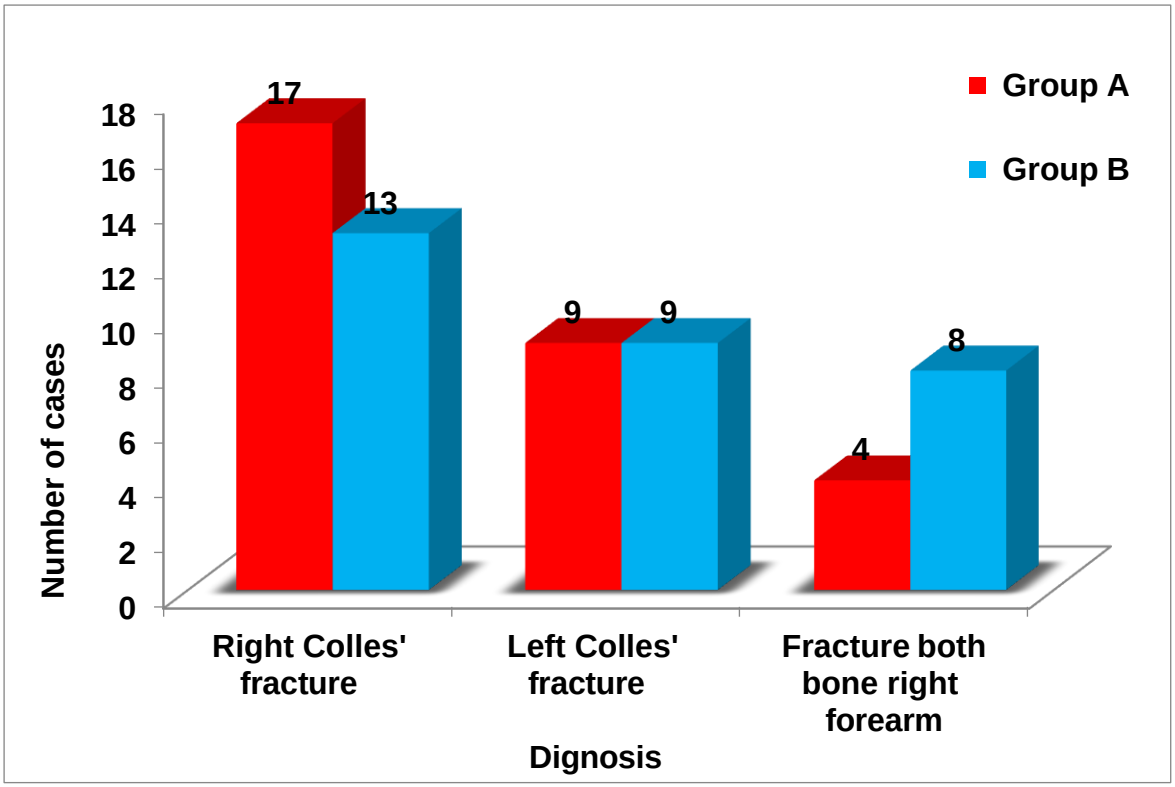


Table No.5: Diagnosis wise distribution of cases in the groups

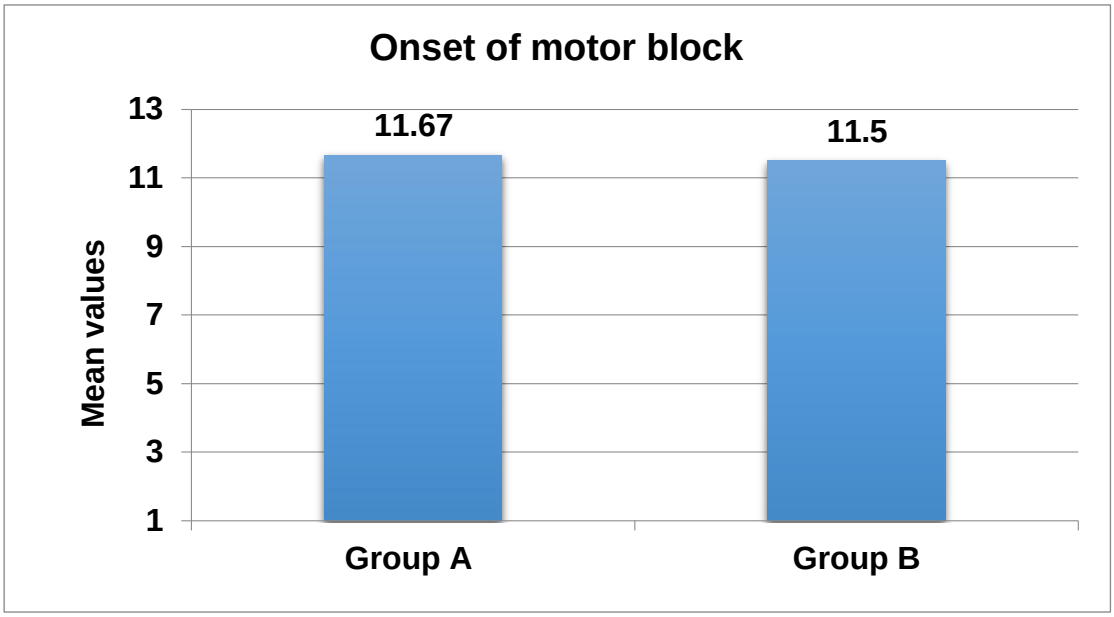
Diagnosis	Group-A		Group-B	
	No.	%	No.	%
Right Colles' Fracture	17	56.7	13	53.3
Left Colles' fracture	9	30.0	9	36.7
Fracture both bone right forearm	4	13.3	8	10.0
Total	30	100.0	30	100.0
Fisher exact test	P = 0.713, NS			

NS= not significant, S=significant, HS=highly significant

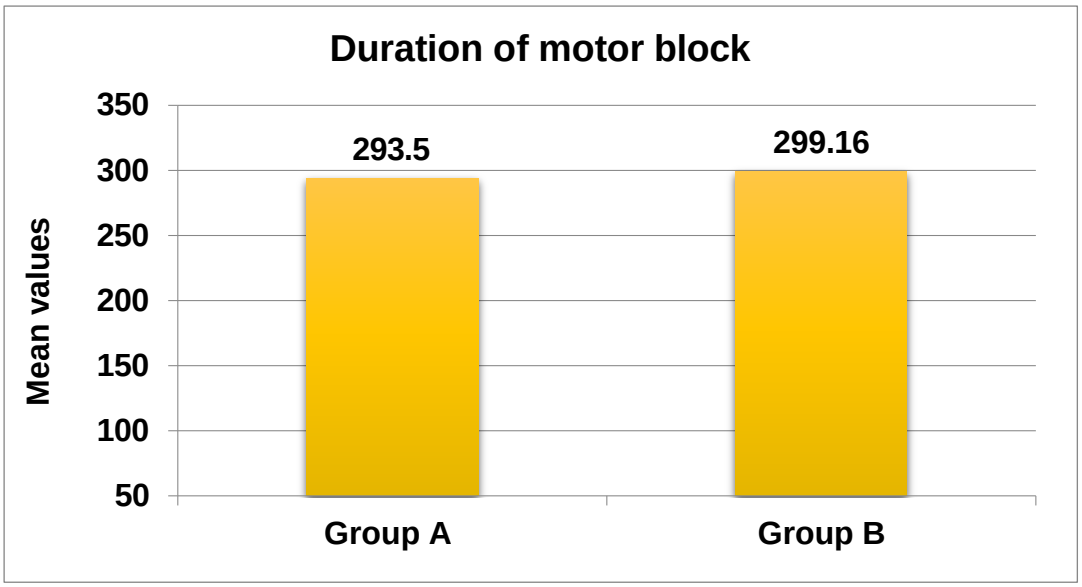
There was no statistical significant difference of diagnosis between Group-A and Group-B



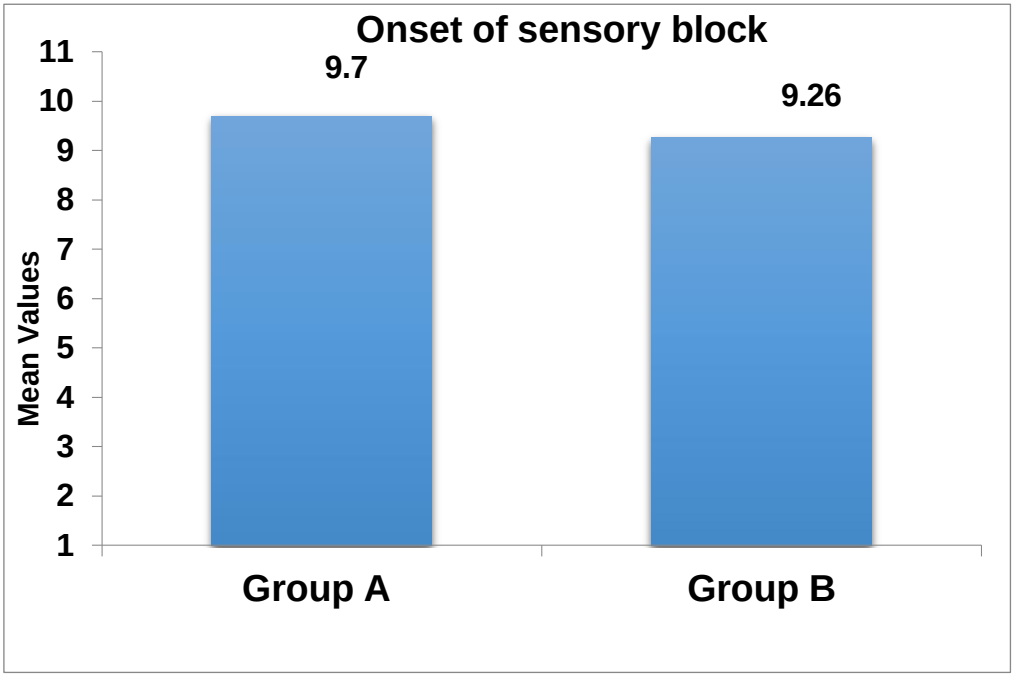
raph 6: Bar diagram represents comparison of onset of motor blockade between Groups



Graph 7: Bar diagram represents comparison of duration of motor block between the Groups



Graph 8: Bar diagram represents comparison of onset of sensory blockade between Groups



Graph 9: Bar diagram represents comparison of duration of sensory block between the Groups

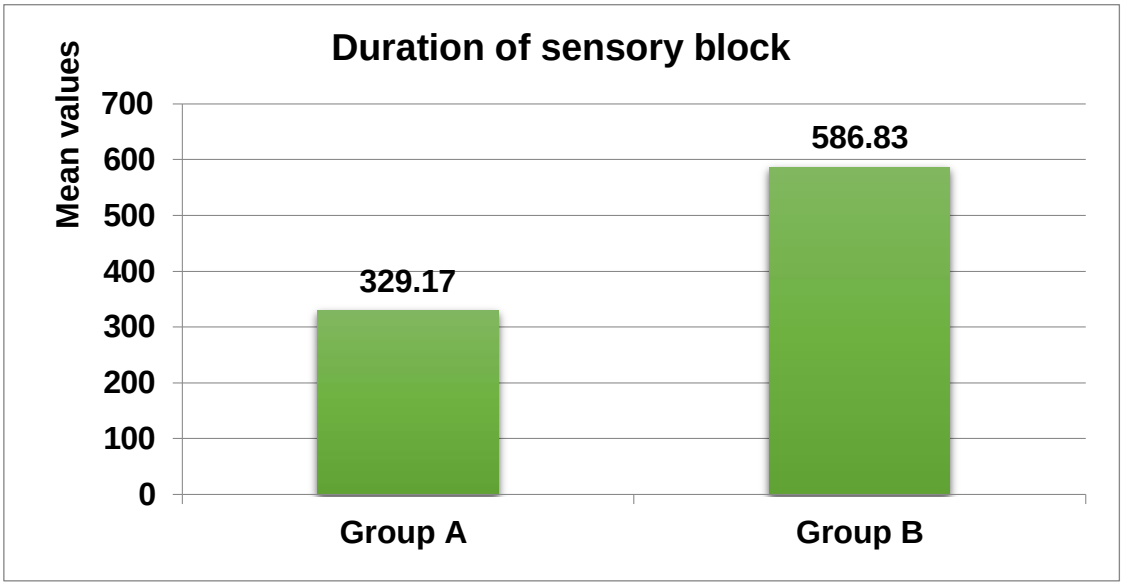


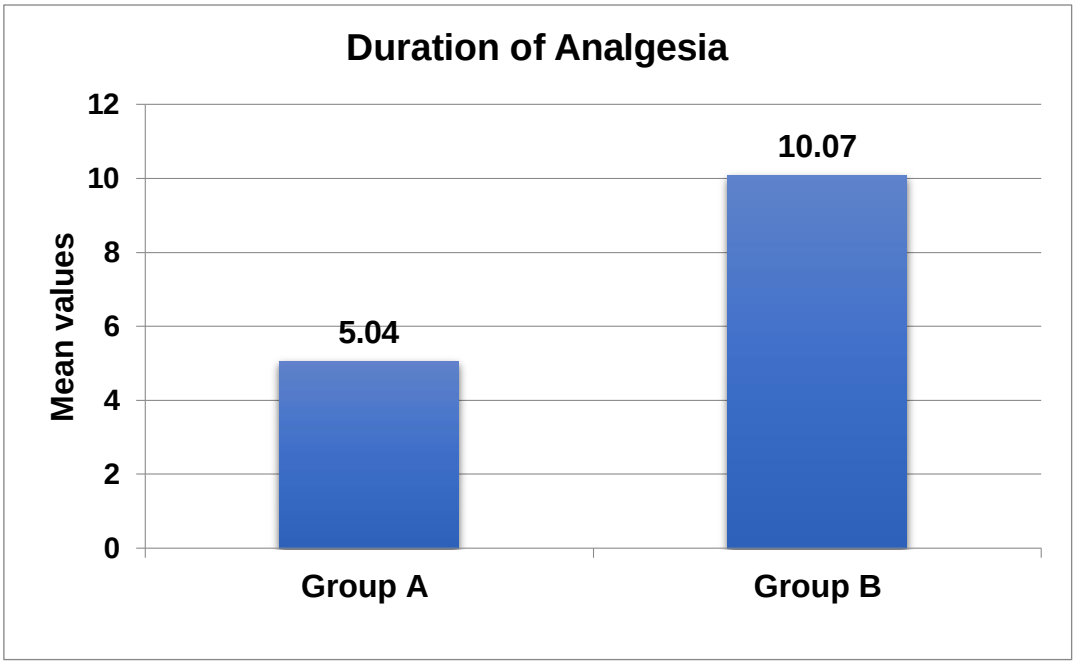
Table No.6: Comparison of duration of analgesia in hours between the Groups

Groups	Number of cases	Mean ± SD
Group A	30	5.04 ± 0.27
Group B	30	10.07 ± 0.43
Total	60	-----
t-test value, P-value & significance	**t = 53.245, P = 0.000, HS**	

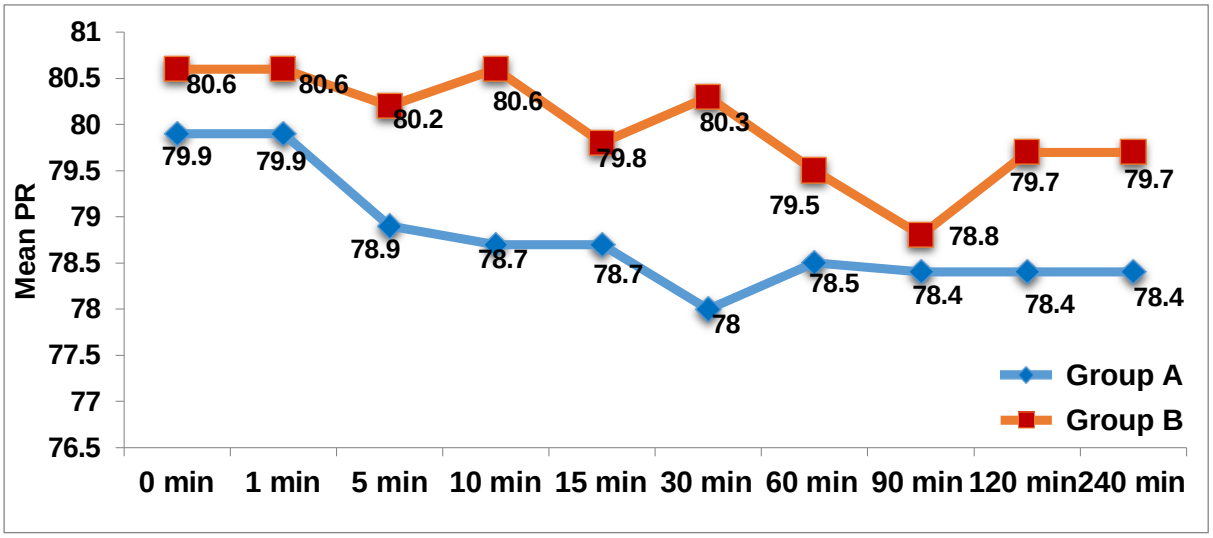
NS= not significant, S=significant, **HS=highly significant**

The mean time duration of analgesia in Group A was 5.04 hours with standard deviation of 0.27. The mean time in Group B was 10.07 hours with standard deviation of 0.43. The association between the intervention groups and duration of analgesia was statistically highly significant (P < 0.001). The mean duration of analgesia was significantly high in Group-B as compare to Group-A.

Graph 10: Bar diagram represents comparison of duration of analgesia between the Groups



Graph 11: Line diagram represents comparison of pulse rate between the Groups



Graph 12: Line diagram shows comparison of Systolic blood pressure between the Groups

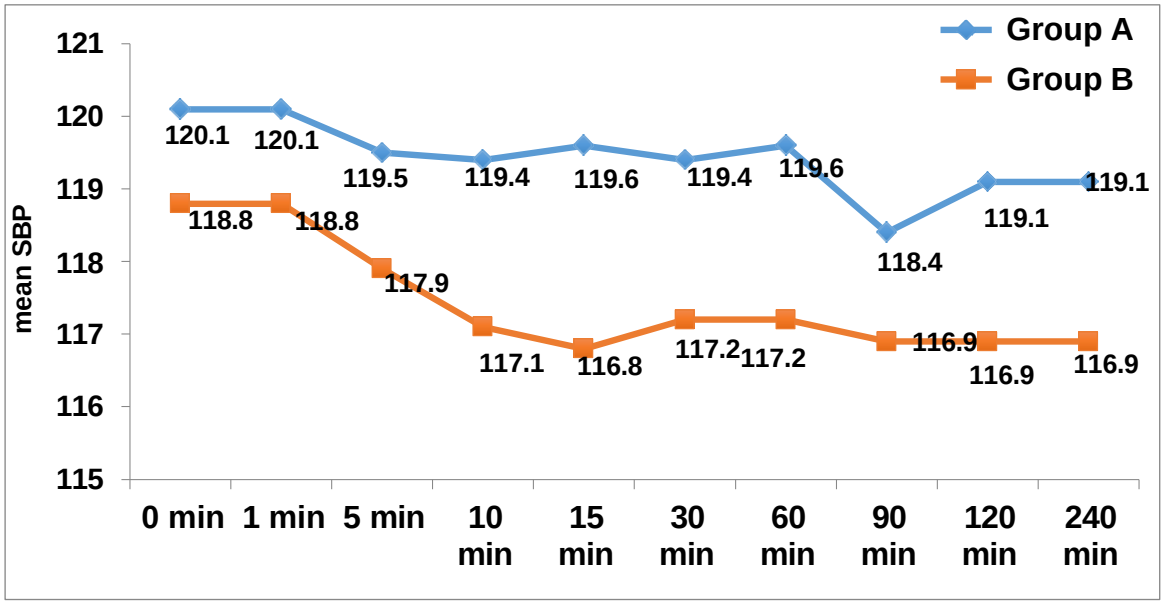


Table No.7: Comparison of Diastolic blood pressure between the Groups

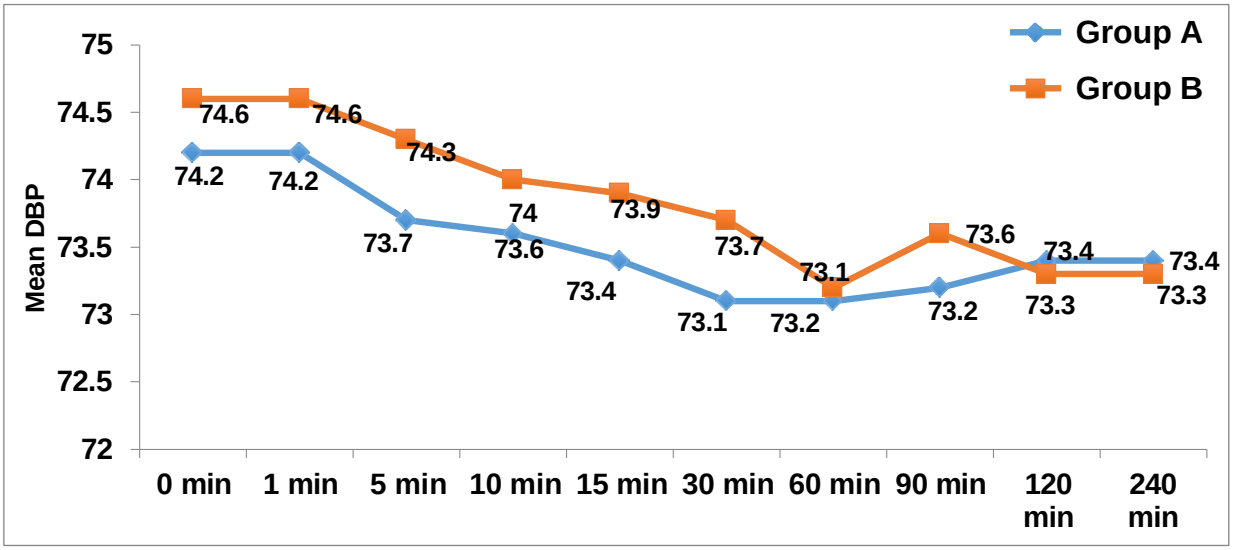
Time Interval	Group-A		Group-B		t-test value, P-value & Significance
	Mean ± SD		Mean ± SD		
Baseline 0	74.20	4.61	74.66	3.25	t = 0.452 P = 0.653 NS

1 Minute	74.20	4.61	74.66	3.25	t = 0.452 P = 0.653 NS
5 Minutes	73.73	5.03	74.26	3.74	t = 0.446 P = 0.443 NS
10 Minutes	73.60	5.97	74.00	3.32	t = 0.320 P = 0.750 NS
15 Minutes	73.40	6.08	73.90	2.92	t = 0.403 P = 0.687 NS
30 Minutes	73.13	4.77	73.70	2.40	t = 0.649 P = 0.519 NS
60 Minutes	73.13	4.50	73.26	1.33	t = 0.155 P = 0.877 NS
90 Minutes	73.20	4.18	73.60	1.42	t = 0.495 P = 0.622 NS
120 Minutes	73.46	4.63	73.26	1.99	t = 0.217 P = 0.829 NS
240 Minutes	73.46	4.63	73.26	1.99	t = 0.217 P = 0.829 NS

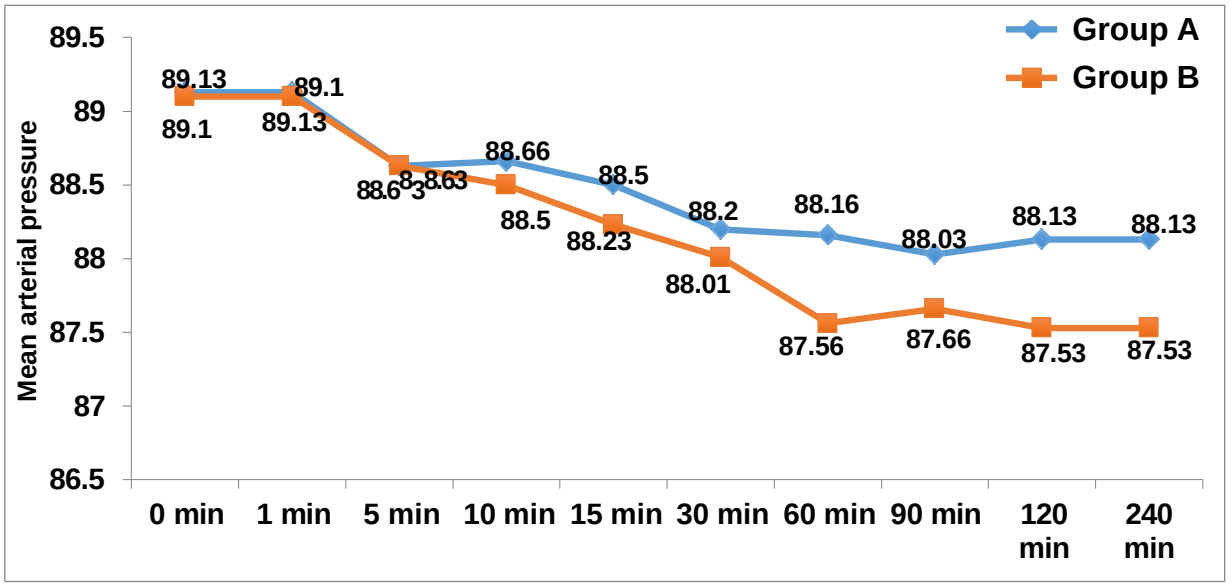
NS= not significant, S=significant, HS=highly significant

Most of the patients in Group-A had the diastolic blood pressure ranging from 73.13 mmHg to 74.20 mmHg between 0 minutes and 240 minutes. Similarly, patients in Group-B had the mean DBP ranging from 73.26 mmHg to 74.66 mmHg between 0 minutes and 240 minutes. The association between the intervention groups and DBP were at all time intervals considered to be statistically not significant (P >0.05).

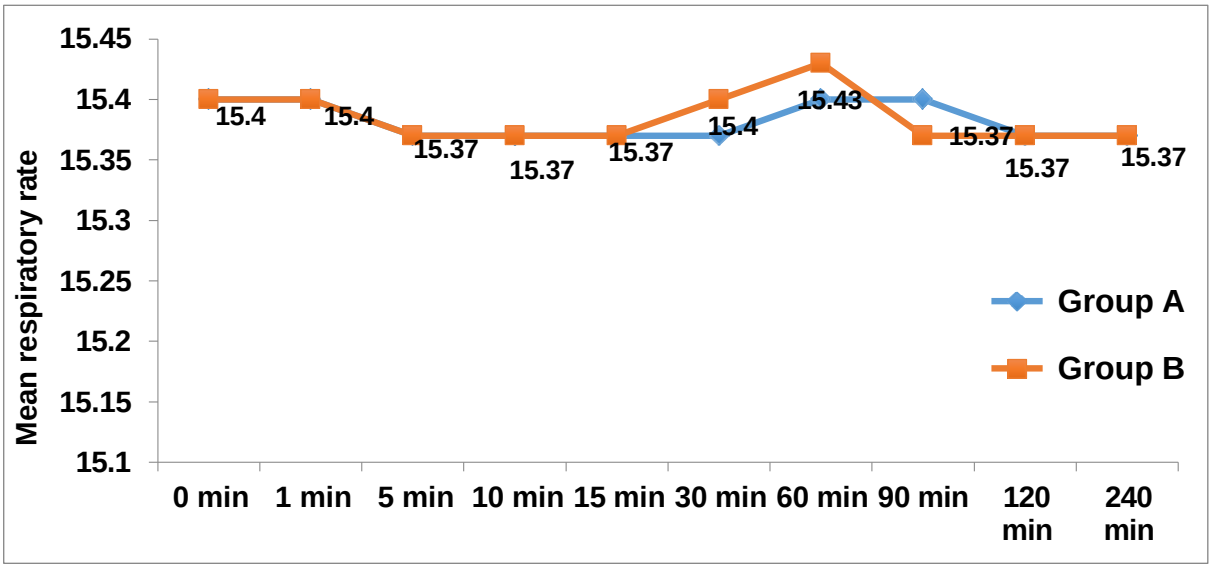
Graph 13: Line diagram shows comparison of Diastolic blood pressure between the Groups



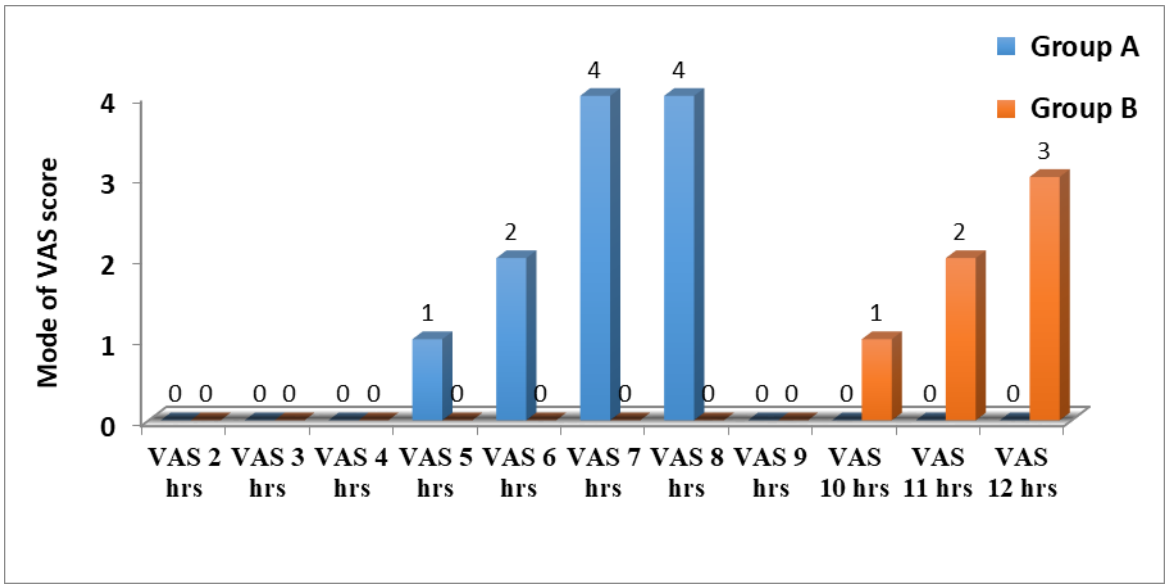
Graph 14: Line diagram shows comparison of Mean Arterial Pressure between the Groups



Graph 15: Line diagram shows comparison of Respiratory Rate in min. between the Groups



Graph 16: Bar diagram shows comparison of Visual Analogue Scale between the Groups



Graph 17: Line diagram shows comparison of RAMSAY Sedation Score between the Groups

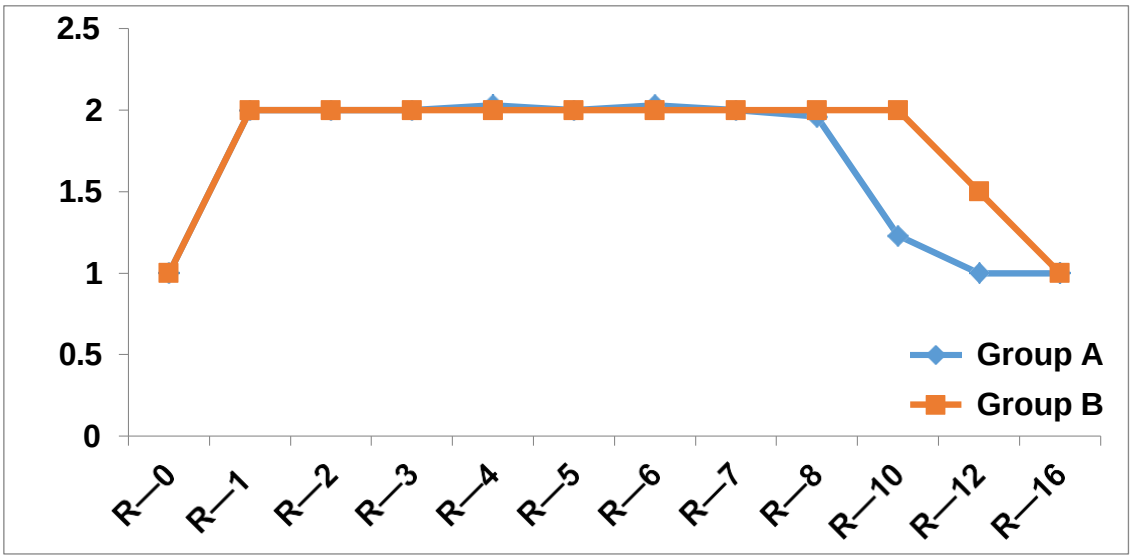


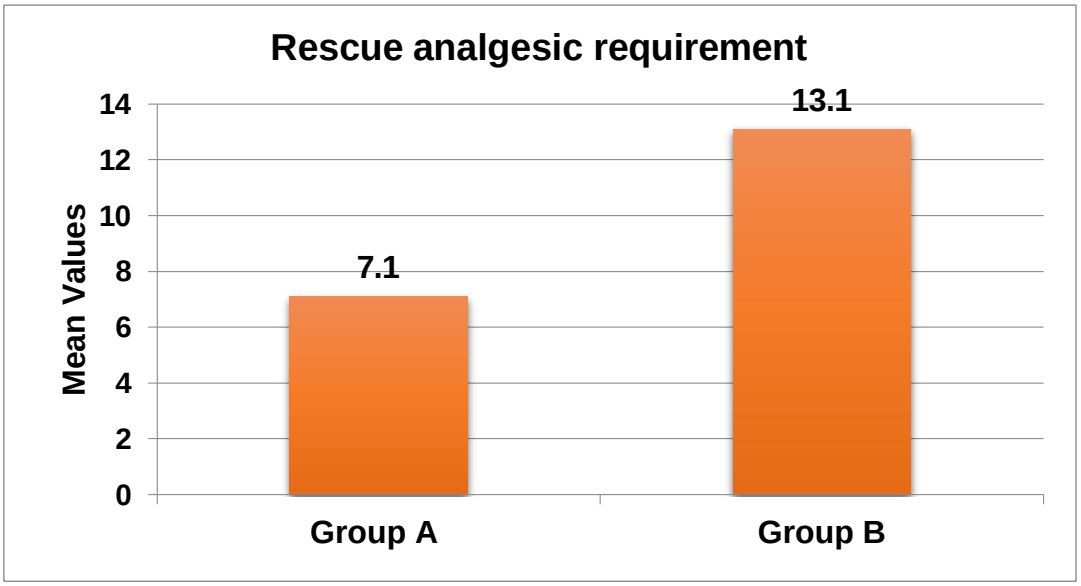
Table No.8: Comparison of Rescue analgesic requirement between the Groups

Groups	**Number of cases**	**Mean ± SD**
Group A	30	7.10 ± 0.40
Group B	30	13.10 ± 0.96
Total	60	-----
t-test value, P-value & significance	**t = 31.582, P = 0.000, HS**	

NS= not significant, S=significant, **HS=highly significant**

The mean time at which first rescue analgesic given in Group-A was 7.10 hours while in Group-B, the mean time is 13.10 hours. The association between the intervention groups and the first rescue analgesic time was considered to be statistically highly significant since (P<0.001).

Graph 18: Bar diagram represents comparison of Rescue analgesic requirement between the Groups



DISCUSSION

By lowering the body's stress reaction and interfering with physiological processes to a minimum, peripheral nerve blocks provide an optimum operating environment for surgery. Peripheral nerve blocks, which use fewer medicines, provide great intraoperative and postoperative analgesia, keeping the patient aware, attentive, and cooperative, in contrast to general anaesthesia, which needs polypharmacy. The main issue with local anaesthetics is their inability to provide long-term postoperative pain relief. There have been several attempts to extend the duration of postoperative analgesia by combining local anaesthetics with adjuvants; however, these methods have either caused systemic adverse effects or prolonged motor blockage.

The purpose of this research was to evaluate the effects of bupivacaine alone and bupivacaine plus buprenorphine on postoperative pain management after orthopaedic surgeries involving the upper limbs, specifically looking at the following variables:

1. How long does the sensory and motor blockage last?
2. Postoperative analgesic impact.
3. Managing blood pressure during surgery.
4. Adverse effects of the medication.

This study compares the following parameters: time to sensory and motor blockage onset, time to analgesia duration, heart rate during and after surgery, systolic and diastolic blood pressure, mean blood pressure, saturation of oxygen levels, respiratory rate, visual analogue scale, Ramsay sedation scale, and time to first rescue analgesic.

ONSET OF SENSORY BLOCKADE:

With a standard deviation of 0.79, the average duration before sensory blockage began in Group A was 9.70 minutes in this investigation. With a standard deviation of 0.74, Group B had an average onset time of 9.26 minutes. Sensory blockage onset was significantly associated with the intervention groups. ($P < 0.05$).

DURATION OF SENSORY BLOCKADE:

The sensory blockage duration in Group A averaged 329.17 minutes and varied by 35.23 minutes in this investigation. With a standard variation of 81.18 minutes, Group B's average sensory blockage duration was 586.83 minutes. P < 0.05 indicated a significantly significant statistical connection between the intervention groups and duration of sensory suppression. Comparing patients in Group C who received Bupivacaine (322.16 ± 31.80 min) to those in Group B who received 0.3mg Buprenorphine (647.83 ± 55.70 min), our research confirms the findings of the previous study by Singam et al (2012)61.

ONSET OF MOTOR BLOCKADE:

With a standard deviation of 0.76, the average time it took for motor blockage to begin in Group A was 11.67 minutes in this investigation. Onset times in Group B ranged from 11.50 to 0.90 minutes on average. Since the p-value is greater than 0.05, we conclude that there is no statistically significant relationship between the categories and the start of motor blockage. Consistent with the findings of Bharat et al. (2013), our investigation also found no statistically significant difference in the time it took for motor blockage to set in for the two groups.[58]

DURATION OF MOTOR BLOCKADE:

The average length of motor blockage in Group A was 239.5 minutes, with a standard deviation of 37.11 minutes, in this investigation. With a standard variation of 30.25 minutes, Group B's motor blockage duration averaged 299.16 minutes. Since the p-value is greater than 0.05, we may conclude that there is no statistically significant relationship between the categories and motor blockade duration. Group B receiving 0.3 mg Buprenorphine had a longer average motor block duration (306.33 ± 20.12 min) compared to Group C receiving Bupivacaine (297.66 ± 28.21 min), however, this difference was not statistically significant (P > 0.05), as our study confirms with the study by Singam et al (2012)61.

DURATION OF ANALGESIA:

With a standard deviation of 0.27, Group A's average analgesic duration was 5.04 hours. With a standard deviation of 0.43, Group B's mean time was 10.07 hours. With a p-value of less than 0.001, there was a very significant statistical connection between the intervention groups and relief duration. In comparison to Group-A, Group-B had a much longer mean duration of analgesia. According to the research by Kenneth D. Candido and colleagues (2002), adding buprenorphine significantly prolongs the analgesic effect.56 In comparison to 6.6 hours with only the local anaesthetic, the addition of 0.3 mg of buprenorphine produced analgesia for 22.3 hours in their trial. This lines up with what Bharat et al. found (2013) as well.58 The researchers in this study discovered that the two groups' analgesic durations were significantly different.

PULSE RATE:

Between 0 and 240 minutes, the majority of Group-A patients' mean pulse rates were between 78.00 and 79.93 bpm. In a similar vein, between 0 and 240 minutes, the mean pulse rate of Group-B patients ranged from 78.86 to 80.63 bpm. Bharat et al. (2013)58 and J.E. Bazin et al. (1997) noted that the correlation between the intervention groups and pulse rates was not statistically significant (P >0.05) at all time periods.[60]

SYSTOLIC BLOOD PRESSURE:

Among individuals in Group-A, the majority reported a mean systolic blood pressure reading between 119.13 and 120.13 mm Hg from 0 to 240 minutes. Similarly, between 0 and 240 minutes, the mean systolic blood pressure (SBP) of Group-B patients was 116.93 to 118.80 mm Hg. According to the research by J.E. Bazin et al. (1997), there was no statistically significant relationship between the intervention groups and SBP at any of the time points examined (P>0.05).[60]

DIASTOLIC BLOOD PRESSURE:

Diastolic blood pressure for the majority of Group-A patients ranged from 0 to 240 minutes with a range of 73.13 to 74.20 mm Hg. The mean diastolic blood pressure (DBP) of Group-B patients was similarly variable, falling between 73.26 and 74.66 mm Hg from 0 to 240 minutes. Statistical analysis by J.E. Bazin et al. (1997) showed that there was no statistically significant connection between the intervention groups and DBP at any time period ($P > 0.05$).[60]

MEAN ARTERIAL BLOOD PRESSURE:

The mean arterial pressure of the majority of Group-A patients ranged from 0 minutes to 240 minutes, falling somewhere between 88.13 and 89.13 minutes. The mean arterial pressure of patients in Group-B varied between 0 and 240 minutes, ranging from 87.53 to 89.10 minutes. According to Bharat and colleagues (2013), there was no statistically significant relationship between the intervention groups and mean arterial pressure at any of the time points tested ($P > 0.05$). [58]

SPO2:

Between 0 and 240 minutes, the mean SpO2 of all Group-A patients was 99.0 to 99.0. Similarly, between 0 and 240 minutes, the SpO2 of patients in Group-B ranged from 99.0 to 99.0. According to Bharat et al. (2013), there was no statistically significant connection between the intervention groups and mean SpO2 at any of the time periods tested ($P > 0.05$).[58]

RESPIRATORY RATE:

Between 0 and 240 minutes, the majority of Group-A patients' respiration rates ranged from 15.37 to 15.40 minutes. Consistent with this, the respiratory rate of Group-B patients varied between 0 and 240 minutes, falling somewhere between 15.37 and 15.40 minutes. According to Bharat et al. (2013), there was no statistically significant connection between the intervention groups and mean arterial pressure at any of the time periods tested ($P > 0.05$).[58]

VISUAL ANALOGUE SCORE:

In Group A, the majority of patients had VAS scores of 4 or higher at 7 and 8 hours post-op, while in Group B, the majority of cases had VAS scores of 3 or higher at 12 hours post-op. There is a statistically significant connection ($P<0.01$) between the intervention groups and VAS. In line with this finding, Bharat et al. (2013) found that, with the exception of the first 24 hours, the buprenorphine group had a lower visual analogue score than the ordinary bupivacaine group throughout the whole trial.[58]

VI. CONCLUSION

It may be concluded from this research that bupivacaine with buprenorphine significantly doubled the duration of analgesia compared to bupivacaine alone.

Finally, compared to plain bupivacaine, the nerve stimulator guided supraclavicular brachial plexus block that includes 3µg/kg of buprenorphine has a much longer duration of analgesia and requires less rescue analgesia.

SUMMARY

One group got bupivacaine alone, whereas the other got bupivacaine with buprenorphine for a nerve stimulator-guided supraclavicular brachial plexus block. Researchers observed that the buprenorphine group had sensory blockage sooner than the bupivacaine group when comparing the two groups.

Both groups experienced motor obstruction at around the same time.

The group that got buprenorphine had considerably longer duration of analgesia compared to the group that received just bupivacaine.

Compared to the group that got just bupivacaine, the one that received buprenorphine had a much longer delay before they needed a rescue analgesic. The hemodynamic parameters were similar across the two groups. In neither group were any adverse effects associated with opioids noted. Both groups did not experience any additional problems.

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