ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 09 | September - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A PROSPECTIVE RANDOMIZED DOUBLE-BLINDED CONTROL STUDY COMPARING THE EFFECT OF INTRATHECAL 0.5% HEAVY BUPIVACAINE AND 0.75% ISOBARIC ROPIVACAINE IN PERIANAL SURGERIES

Anaesthesiology

Dr Raju Bhukya Assistant Professor, Department of Anaesthesiology, Surabhi Institute of Medical Sciences, Siddipet, Telangana

Dr Dilip Meneni Assistant Professor, Department of Anaesthesiology, Surabhi Institute of Medical Sciences, Siddipet, Telangana

Dr Gowri Shankar B Assistant Professor, Department of Anaesthesiology, Surabhi Institute of Medical Sciences, Siddipet, Telangana

Dr R Srujan Goud* Assistant Professor, Department of Anaesthesiology, Surabhi Institute of Medical Sciences, Siddipet, Telangana *Corresponding Author

ABSTRACT

Background: Regional anaesthesia plays a crucial role in surgery by providing effective pain relief, reducing complications, improving patient outcomes, and enhancing patient satisfaction. Advancement in local anaesthesia drugs, USG-guided regional blocks, regional anaesthesia catheters, multimodal analgesia, enhanced recovery after surgery and personalized medicine. These advancements in local anaesthesia techniques and drugs have transformed the field of anaesthesia, enhancing patient comfort, safety, and outcomes. As technology and research continue to evolve, it is expected that further advancements will refine and improve local anaesthesia practices even further. **Methods:** Following the ethics committee and scientific committee approval, 60 consenting patients undergoing perianal surgery under neuraxial blockade were included in the study. **Results:** The mean value for the time of onset was 2.01± 0.58min and 1.24 ± 0.48 min, whereas the mean time taken for the maximum spread was 18.54 ± 5.54 and 12.56± 4.49minutes respectively in the ropivacaine group and bupivacaine group. The mean difference was statistically significant (p:0.00001, p:0.00002 respectively). The mean of onset of pain in the postoperative period was 295.68 ± 38.56 and 184.66 ± 22.08 in the ropivacaine and bupivacaine group respectively, which were statistically significant (p:<0.0000001). **Conclusion:** The mean onset of sensory, and motor block and the mean time taken for maximum spread for the sensory and motor block was lesser among the Bupivacaine group. Whereas ropivacaine had better sensory blockade and analgesia.

KEYWORDS

INTRODUCTION

Regional anesthesia, also known as neuraxial anesthesia, involves the injection of local anesthetics into particular areas of the body to block nerve transmission and provide pain relief during surgical procedures.[1-4] It is an important tool in modern surgery and offers numerous advantages compared to general anesthesia.[5-7]

1. Enhanced safety:
2. Decreased pain:
3. Reduced postoperative complications:
4. Early mobilization:
5. Cost-effective:
6. Reduced risk of nausea and vomiting:

Regional anaesthesia involves the administration of anaesthetics to numb a specific area of the body, providing pain relief during minor surgical procedures or certain diagnostic tests. Over the years, there have been several advancements in local anaesthesia techniques and drugs that have improved its effectiveness, safety, and patient experience.[5-7]

Newer local anaesthetic drugs have been developed that provide longer-lasting pain relief and have fewer side effects compared to traditional drugs. For example, liposomal bupivacaine is a long-acting local anaesthetic that can provide pain relief for up to 72 hours, reducing the need for additional analgesics after surgery. These newer drugs allow for prolonged pain control, improving patient comfort and satisfaction.[8]

These advancements in local anaesthesia techniques and drugs have transformed the field of anaesthesia, enhancing patient comfort, safety, and outcomes.[9] As technology and research continue to evolve, it is expected that further advancements will refine and improve local anaesthesia practices even further. In this randomized study, we aim to study the clinical spectrum of heavy bupivacaine 0.5% and isobaric ropivacaine 0.75%.

AIM & OBJECTIVES

AIM:

1. To compare the effect of 0.5% heavy bupivacaine versus 0.75% isobaric ropivacaine with respect to the extent of spread of the drug and duration of postoperative analgesia.

OBJECTIVES:

Primary Objective:

1. To study and compare the extent of the spread of the drug

Secondary Objective:

To study and compare the following:

1. Onset and duration of sensory block
2. Onset and duration of motor block
3. Duration of postoperative analgesia
4. Vitals , Haemodynamic variables intra operatively
5. Adverse effects and complications if any like,nausea, vomiting, shivering, hypersensitivity reaction for the study drug

MATERIALS AND METHODS

A randomised double-blinded study was conducted in the Department of Anaesthesiology, Surabhi Institute of Medical Science, Siddipet, Telangana, for the period June 2020 to June 2021. Patients admitted to the hospital for perianal surgeries were included.

Study Sample Size:

The sample size was calculated based on the prevalence of adverse drug reactions. There is no accurate data available for adverse drug reactions. According to World Health Organization, anticipated prevalence can be taken as 50% where there is no accurate data available.

The sample size was calculated using the following formula with the prevalence of 50%, confidence level of 95% and precision of 20%.

$$n = [Z^2 (P(1-P)] / d^2$$

Where,
n is the sample size,
Z is the Z statistic for the level of confidence (1.96),
P= expected prevalence (50%) and d is the precision (20%),
n=3.96(50*50)/20*20
n=3.96*25/4
n=25 + 10% excess = 27.5 rounded off to 30 in the Ropivacaine group
Similarly 30 patients were roped in the Bupivacaine group
Hence the minimum sample size required for the study is 60.

METHODOLOGY:

Patients who were undergoing perianal surgeries and satisfying the inclusion criteria were enrolled on the study after obtaining the written informed consent form.

Inclusion Criteria:
Patients with the following criteria were included in the study:
- Age between 18 years to 60 years
- ASA grade I, II.
- Willing to give informed consent.

Exclusion criteria:
The following patients undergoing perianal surgeries were excluded from the study:
- Age >60 years.
- ASA grade III, IV.
- Patients hypersensitive to drugs.
- Patients on long-term analgesics.
- Patients with peripheral neuropathy.
- Patients with local skin infections and spine deformities.
- Patients with abnormal coagulation profile.
- Patients who were not willing to participate in the study.

Procedure:
After getting clearance from ethical committee and the preoperative assessment clinic (PAC), all patients included in the study were premedicated with tablet alprazolam 0.5 mg and ranitidine 150 mg orally at night before surgery and they were kept nil orally from 12 AM onwards. On arrival in the operating room, an intravenous line was secured using an 18/20 gauge cannula and an infusion of Ringer's lactate was started as per the calculation of perioperative fluid replacement therapy. The patients were monitored for heart rate (HR), non-invasive measurements of systolic blood pressure (SBP), diastolic blood pressure (DBP) at an interval of 5 min, continuous electrocardiographic (ECG) monitoring, and haemoglobin oxygen saturation (SPO2) throughout the perioperative period.

Patients were divided into two groups:
Group R(N=30): 0.75% Isobaric Ropivacaine (Total vol. – 2.5ml)
Group B (N=30): 0.5% Heavy Bupivacaine (Total vol.- 2.5ml).

Blinding:
Study medication was prepared in identical 5ml syringes by a person not involved in the care or monitoring of the patients, to ensure blinding of anaesthetist performing the block. All observations were carried out by a single investigator who was also blinded to the drugs administered.

Patients were placed in a lateral position. Intrathecal block under strict aseptic conditions performed at L3-L4 or L4-L5 interspinous space with 27 G Whitacre spinal needle. Immediately after completion of the block, patients were made to lie in the supine position.

The following parameters were observed:
Sensory blockade:
The level of the sensory block will be assessed by pinprick

Motor blockade:
The degree of motor block was assessed with the Modified Bromage scale every 5 min until the skin incision

Haemodynamic parameters:
Heart rate & blood pressure were monitored immediately after injection and then after every 2 minutes for the first 15 minutes and then every 5 minutes up to 30 min then every 15 min up to 90 min irrespective of duration of study. The anaesthesia records were maintained and changes in heart rate, and blood pressure were noted. Bradycardia is considered when heart rate is less than 60, and treated with 0.6 mg atropine when heart rate is less than 50. Similarly, any fall of systolic blood pressure of more than 20% of baseline was considered Hypotension and treated with 6 mg of ephedrine and crystalloids and oxygen as needed. The mean of all the parameters was considered for comparison.

Sedation:
Sedation will be graded according to Modified Ramsey Sedation Scale. Postoperatively, pain, sensory level, and motor block were evaluated every 30 min during the first 2 hours, every 60 min for the next 6 hours, and at 12 and 24 hours in the recovery room.

Pain intensity was assessed by visual analogue scale, initially for every 1 hr for 2 hr, every 2 hrs for the next 8 hrs and then every 4hrs till 24 hrs. Inj tramadol 2mg/kg iv (max 100mg) was given as a rescue analgesic.
Side-effects: Intra-operative side effects like sedation, nausea, vomiting, and shivering, requiring active treatment were noted.
The following variables was observed:
I Extent of the spread of the Drug.
II Sensory blockade – onset & duration.
III Motor blockade – onset & duration.
IV Maximum level of sensory block & time to reach maximum level.
V Haemodynamic parameters.
VI Duration of Analgesia.
VII Side effects.

All the parameters were recorded as per the proforma and statistically analyzed.

Data Entry and Analysis:
The data was entered in Microsoft Excel 2019 version. Data was analyzed using Microsoft Excel 2019 and Epi Info 7.2.0. Descriptive and inferential statistical analysis were used in the present study. Results on continuous measurements were presented on Mean±SD (Min-Max) and results on categorical measurements were presented in Number (%). Significance was assessed at a 5% level of significance. Student t-test is used to compare inter-group variation for continuous variables.

OBSERVARTIONS & RESULTS

The present randomized double-blinded study was conducted at the Department of Anaesthesiology, Surabhi Institute of Medical Science, Siddipet, Telangana.

The aim of the study was to compare the effect of 0.5% heavy bupivacaine versus 0.75% isobaric ropivacaine with respect to the extent of the spread of the drug and the duration of postoperative analgesia.

The results of the study are discussed below:
Age distribution of the Study Population:

Age distribution in years	0.75% Isobaric Ropivacaine	Percentage	0.5% Hyperbaric Bupivacaine	Percentage
Less than or equal to 20 years	3	10%	3	10%
20-29 years	9	30%	7	23.33%
30-39 years	10	33.33%	8	26.66%
40-49 years	8	26.66%	4	13.33%
50-59 years	0	0	5	16.66%
60 years	0	0	3	10%
Total	30	100%	30	100%
Mean ± Standard deviation	32.5 ± 8.80 years		38.1 ± 15.08 years	

Among the Ropivacaine study group, 33.33% belonged to the age group of 30-39 years, followed by 20-29 years (30%) and 40-49 years (26.66%). Less than or equal to 20 years contributed to 10%.

Among the Bupivacaine group, 26.66% belonged to the age group of 30-39 years, followed by 20-29 years (23.33%) and 50-59 years (16.66%). The 40-49 years age group contributed to 13.33%. Less than or equal to 20 years and 60 years contributed to 10% each.

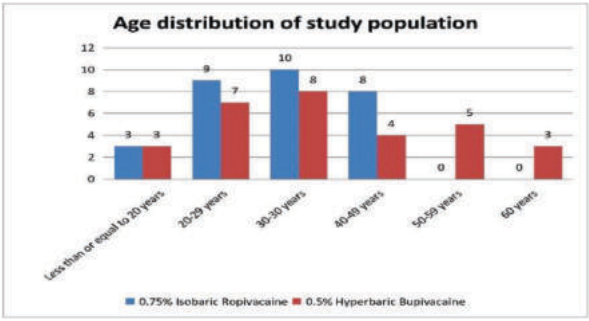


Figure showing the age distribution of study population:

Gender distribution of Study Population:

Gender	0.75% Isobaric Ropivacaine	Percentage	0.5% Hyperbaric Bupivacaine	Percentage
Male	16	53.33%	16	53.33%
Female	14	46.66%	14	46.66%
Total	30	100%	30	100%

Gender distribution was the same among both groups. 53.33% were males and 46.66% were females.

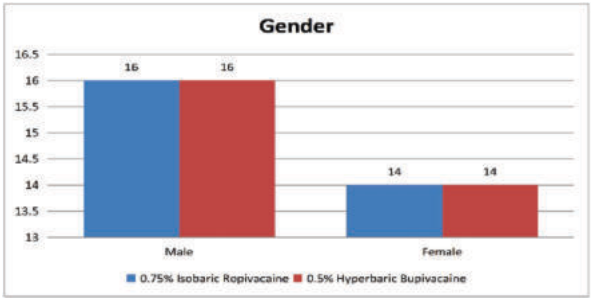


Figure showing the gender distribution among study population:

The weight distribution of the Study Population:

Weight in kgs	0.75% Isobaric Ropivacaine	Percentage	0.5% Hyperbaric Bupivacaine	Percentage
Less than or equal to 60kgs	7	23.33%	13	43.33%
61-69 kgs	7	23.33%	6	20%
70-79 kgs	13	43.33%	10	33.33%
Greater than or equal to 80 kg	3	10%	1	3.33%
Total	30	100%	30	100%

Among the Ropivacaine group, 43.33% were weighing between 70-79 kgs, followed by 60-69 kgs and less than or equal to 60 kgs (23.33%) each. 10% weighed more than 80 kg.Among the Bupivacaine group, 43.33% were weighing less than or equal to 60 kgs, followed by 70-79 kgs and (33.33%). 20% were weighing between 61-69kgs. 3.33% weighed more than 80 kg.

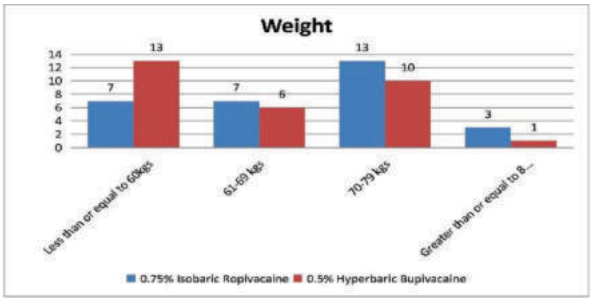


Figure showing the weight distribution of the study population:

Height distribution of Study Population:

Height in cms	0.75% Isobaric Ropivacaine	Percentage	0.5% Hyperbaric Bupivacaine	Percentage
Less than or equal to 150cms	3	10%	1	3.33%
151-159 cms	4	13.33%	11	36.66%
161-169 cms	11	36.66%	9	30%
Greater than or equal to 170 cms	12	40%	9	30%
Total	30	100%	30	100%

Among the Ropivacaine group, 40% had their height greater than or equal to 170 cm, followed by 161-169 cm and 151-159 cm (13.33%) each. 10% had their height less than or equal to 150 cm.

Among the Bupivacaine group, 36.6% had their height between 151-159 cm, followed by greater than or equal to 170 cm, and 161-169cms (30%) each. 3.33% had their height less than or equal to 150 cm.

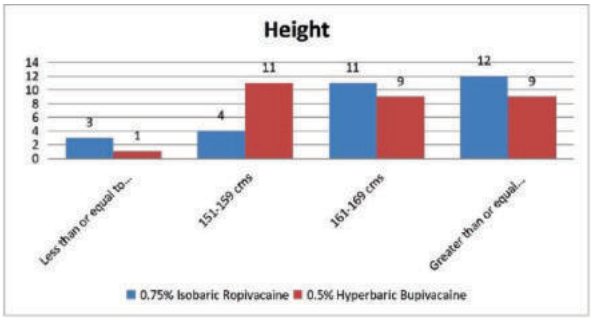


Figure showing the distribution of height:

Characteristics of sensory blockade:

Sensory block characteristics	0.75% Isobaric Ropivacaine	0.5% Hyperbaric Bupivacaine	T-test	P value
Onset in minutes	2.01±0.58	1.24±0.68	4.71	0.00001
Time for max. Spread in minutes	18.54±5.54	12.56±4.49	4.59	0.00002

Among the Ropivacaine group, the mean onset of sensory block was 2.01 minutes and the mean time taken for maximum spread was 18.54 minutes.

Among the Bupivacaine group, the mean onset of sensory block was 1.24 minutes and the mean time taken for maximum spread was 12.56 minutes.

The difference between the means for onset and time for maximum spread is statistically significant with a p-value of 0.00001, and 0.00002 respectively.

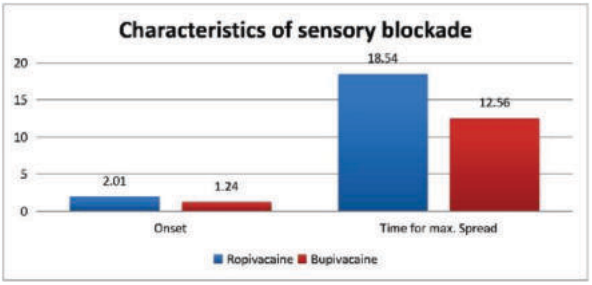


Figure showing the characteristics of sensory blockade:

Characteristics of motor blockade:

Motor block characteristics	0.75% Isobaric Ropivacaine	0.5% Hyperbaric Bupivacaine	T-test	P value
Onset in minutes	2.95±0.48	1.64±0.58	9.53	<0.0000001
Time for max. Spread in min	20.25±7.56	15.46±3.64	3.12	0.003

Among the Ropivacaine group, the mean of onset of motor block was 2.95 minutes and the mean time taken for maximum spread was 20.25 minutes.Among the Bupivacaine group, the mean onset of sensory block was 1.64 minutes and the mean time taken for maximum spread was 15.46 minutes.

The difference between the means for onset and time for maximum spread is statistically significant with a p-value of <0.0000001, and 0.003 respectively.

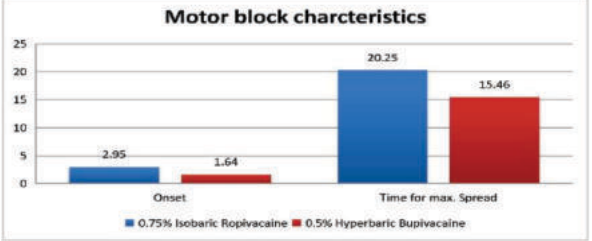


Figure showing the motor block characteristics:

The sensory level attained:

Sensory level attained	0.75% Isobaric Ropivacaine	Percentage	0.5% Hyperbaric Bupivacaine	Percentage	P value
T6	11	36.66%	2	6.66%	Chi-square value is 17.98. DOF = 2 P=0.0001
T8	17	56.66%	12	40%	
T10	2	6.66%	16	53.33%	
Total	30	100%	30	100%	

Among the Ropivacaine group, 56.66% attained sensory level till T8, followed by T6 (36.66%). Only 6.66% attained anaesthesia at the T-10 level.

Among the Bupivacaine group, 53.33% attained sensory level till T10, followed by T8 (40%). Only 6.66% attained anaesthesia at the T6 level.

The difference between the sensory level attainment is statistically significant with a p- value of 0.0001

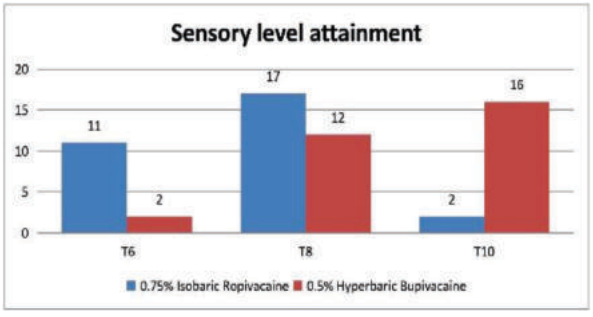


Figure showing the sensory level attained:

Mean heart rate among study groups:

Heart rate in beats/min	0.75% Isobaric Ropivacaine	Percentage	0.5% Hyperbaric Bupivacaine	Percentage
61-69	9	30%	6	20%
70-79	13	43.33%	10	33.33%
80-89	6	20%	10	33.33%
Greater than or equal to 90	2	6.66%	4	13.33%
Total	30	100%	30	100%

Among the Ropivacaine group,43.33% maintained a heart rate between 70-79 beats/min, followed by 61-69 beats/min(30%), 80-89 beats/min(20%), and greater than or equal to 90 (6.66%).

Among the Bupivacaine group,33.33% maintained a heart rate between 70-79 beats/min and 80-89 beats/min, followed by 61-69 beats/min(20%), and greater than or equal to 90 (13.33%).

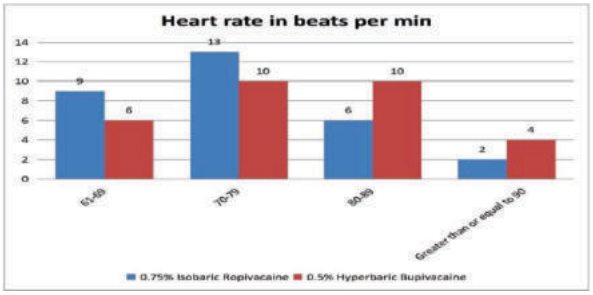


Figure showing the heart rate of the study groups.

Systolic blood pressure among the study groups:

Systolic Blood Pressure in mmHg	0.75% Isobaric Ropivacaine	Percentage	0.5% Hyperbaric Bupivacaine	Percentage
110-120	21	70%	25	83.33%
121-129	6	20%	0	0
130 and above	3	10%	5	16.66%
Total	30	100%	30	100%

Among the Ropivacaine group, 70% had systolic blood pressure levels between 110- 120 mmHg, followed by 121-129 mmHg (20%) and 130 mmHg and above (10%).

Among the Bupivacaine group, 83.3% had systolic blood pressure levels between 110- 120 mmHg followed by 130 mmHg and above (16.66%).

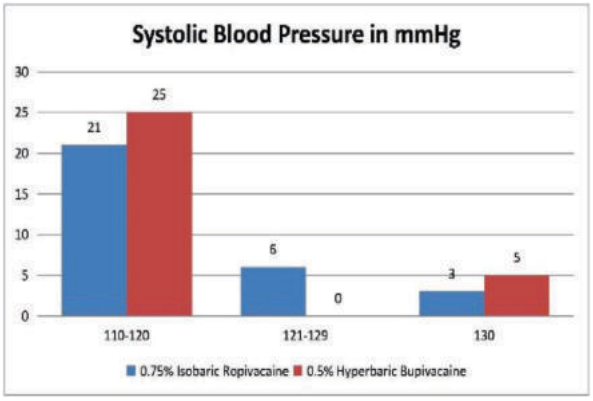


Figure showing the Systolic blood pressure level among the study groups.

Diastolic blood pressure among the study groups

Diastolic Blood Pressure in mmHg	0.75% Isobaric Ropivacaine	Percentage	0.5% Hyperbaric Bupivacaine	Percentage
70-80	20	66.66%	12	40%
81-89	9	30%	11	36.66%
90 and above	1	3.33%	7	23.33%
Total	30	100%	30	100%

Among the Ropivacaine group, 66.66% had diastolic blood pressure levels between 70- 80 mmHg, followed by 81-89 mmHg (30%) and 90 mmHg and above (3.33%).

Among the Bupivacaine group, 40% had diastolic blood pressure levels between 70-80 mmHg followed by 81-89 mmHg (36.66%) and 90 mmHg and above (23.33%).

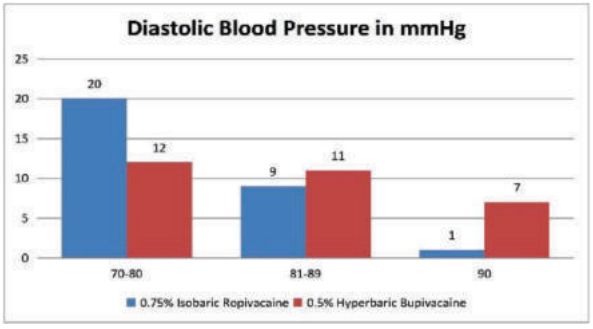


Figure showing the Diastolic blood pressure level among the study groups:

SpO2 in % among the study groups:

SpO2 in %	0.75% Isobaric Ropivacaine	Percentage	0.5% Hyperbaric Bupivacaine	Percentage
96	8	26.66%	5	16.66%
97	5	16.66%	5	16.66%
98	7	23.33%	4	13.33%
99	6	20%	7	23.33%
100	4	13.33%	9	20%
Total	30	100%	30	100%

Among the Ropivacaine group, 26.66% maintained SpO2 of 96%, 16.66% maintained it at 97%, 23.33% at 98%, 20% at 99% and 13.33% at 100%.

Among Bupivacaine group, 16.66% maintained SpO2 of 96%, 16.66% maintained it at 97%, 13.33% at 98%, 23.33% at 99% and 20% at 100%.

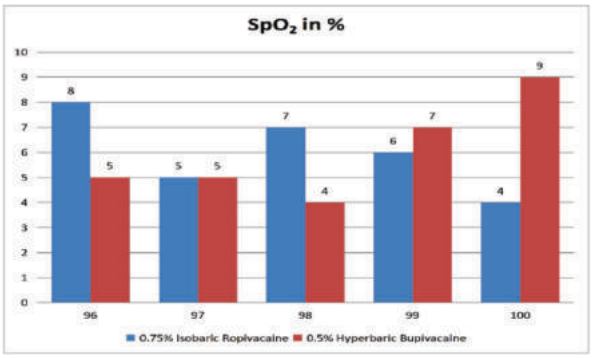


Figure showing the SpO2 in % among the study groups:

The onset of pain in minutes for 0.75% Isobaric Ropivacaine:

The onset of pain in minutes for 0.75% Isobaric Ropivacaine	Frequency	Percentage
240	5	16.66%
260	3	10%
280	7	23.33%
300	3	10%
320	5	16.66%
340	4	13.33%
350	1	3.33%
360	2	6.66%
Total	30	100%

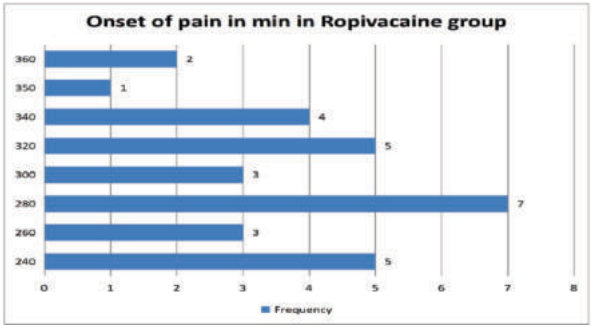


Figure showing onset of pain in minutes for 0.75% Isobaric Ropivacaine:

The onset of pain in minutes for 0.5% Hyperbaric Bupivacaine:

The onset of pain in minutes for 0.5% Hyperbaric Bupivacaine	Frequency	Percentage
150	1	3.33%
160	7	23.33%
170	3	10%
180	5	16.66%
190	4	13.33%
200	4	13.33%
210	4	13.33%
220	1	3.33%
240	1	3.33%
Total	30	100%

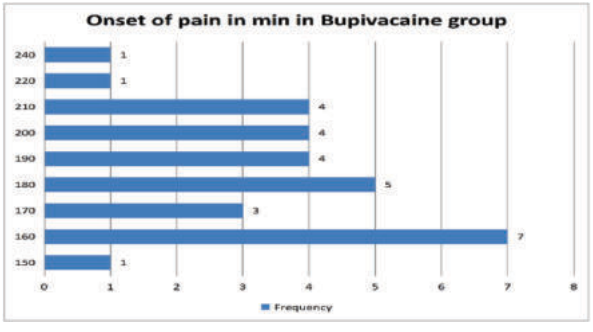
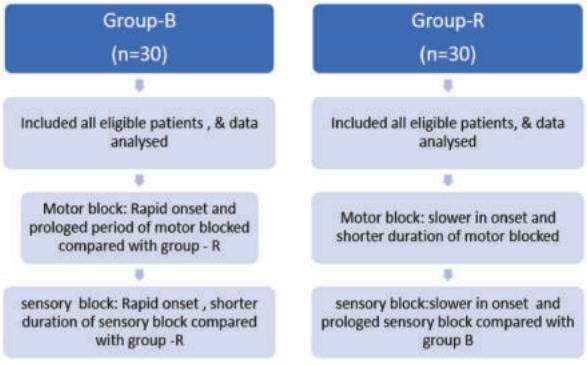


Figure showing the onset of pain in minutes for 0.5% Hyperbaric Bupivacain

Means of various parameters of both the study groups:

Parameter	0.5% Isobaric Ropivacaine	0.5% Heavy Bupivacaine	p-value
Age in years	32.5 ± 8.80 years	38.1 ± 15.08 years	0.08
Weight in kgs	69.16 ± 8.92 kgs	65.1 ± 9.26 kgs	0.08
Height in cms	165.9 ± 7.75 cms	163.56 ± 7.87 cms	0.25
Heart rate in bpm	76.3 ± 8.88 bpm	78.63 ± 9.37 bpm	0.32
Systolic Blood Pressure in mmHg	119.2 ± 7.07	117.66 ± 7.27	0.39
Diastolic Blood Pressure in mmHg	78.9 ± 6.20	78.5 ± 8	0.82
SpO2 in %	97.76 ± 1.40	98.3 ± 1.49	0.15
Motor Onset of time	2.95 ± 0.48	1.64 ± 0.58	<0. 0000001
Motor Maximum time Spread	20.25 ± 7.56	15.46 ± 3.64	<0. 003
Sensory Onset time	2.01 ± 0.58	1.24 ± 0.68	<0. 00001
Sensory Maximum time spread	18.54 ± 5.54	12.56 ± 4.49	<0. 00001
The onset of pain in minutes	295.66 ± 38.56	184.66 ± 22.08	<0.0000001**

**Significant p-value Among both the study groups,
The onset of pain after anaesthesia was significantly lower in the Bupivacaine group with a p-value of <0.0000001



DISCUSSION

The present randomized double-blinded study was conducted at the Department of Anaesthesiology, Surabhi Institute of Medical Science, Siddipet, Telangana.

The aim of the study was to compare the effect of 0.5% heavy bupivacaine versus 0.75% isobaric ropivacaine with respect to the extent of the spread of the drug and the duration of postoperative analgesia.

The results of the study are discussed below:

Age distribution:

In the present study, among the Ropivacaine study group, 33.33% belonged to the age group of 30-39 years, followed by 20-29 years (30%) and 40-49 years (26.66%). Less than or equal to 20 years contributed to 10%. Among the Bupivacaine group, 26.66% belonged to the age group of 30-39 years, followed by 20-29 years (23.33%) and 50-59 years (16.66%). The 40-49 years age group contributed to 13.33%. Less than or equal to 20 years and 60 years contributed to 10% each.

The findings of the present study can be compared with the following studies:

Author	Ropivacaine group	Bupivacaine group	p-value
Present study	32.5 ± 8.80 years	38.1 ± 15.08 years	Not significant
Mehta A et al [10]	42.52 years	43.44 years	Not significant
Gonuguntla S B [11]	The majority (53.3%) of the study population belonged to the age group of 20-30 years		Not compared
Mansour N A et al [12]	23.04 years	23.4 years	Not compared
Sharma J et al [13]	3.78 ± 3.02	4.48 ± 3.24	Not Significant
Sule PM et al [14]	35.8±12.47	33.73±9.02	Not Significant
Shah UD et al 15]	Age groups were comparable with a p-value of >0.05		

Gender distribution:
In the present study, Gender distribution was the same among both groups. 53.33% were males and 46.66% were females.

The findings of the present study can be compared with the following studies:

Author	Ropivacaine group	Bupivacaine group	P value
Present study	53.33% of males, 46.66% females	53.33% of males, 46.66% females	Not significant
Mehta A et al10]	Males:16, Females: 9	Males:17, Females:8	Not compared
Gonugunt la SB[11]	80% were males, 20% were females		Not compared
Mansour NA et al[12]	11 females and 14 males	13 females and 12 males	Not compared
Sharma J et al [13]	Distribution was the same among both groups		Not significant
Shah UD et al[15]	Distribution was comparable with P>0.05		

Weight:
In the present study, among the Ropivacaine group, 43.33% were weighing between 70-79 kgs, followed by 60-69 kgs and less than or equal to 60 kgs (23.33%) each. 10% weighed more than 80 kg. Among the Bupivacaine group, 43.33% were weighing less than or equal to 60 kgs, followed by 70-79 kgs and (33.33%). 20% were weighing between 61-69kgs. 3.33% weighed more than 80 kg.

The findings of the present study can be compared with the following studies:

Author	Ropivacaine group	Bupivacaine group	P value
Present study	69.16 ± 8.92 kgs	65.1 ± 9.26 kgs	Not significant
Mehta A et al[10]	60.36 kgs	59.76 kgs	Not significant
Sharma J et al[13]	12.33 ± 5.66 kgs	12.56 ± 5.39 kgs	Not significant
Sule PM et al[14]	58.83±6.39 kgs	58.40±0.30 kgs	Not significant

Height:
In the present study, among the Ropivacaine group, 40% had their height greater than or equal to 170 cm, followed by 161-169 cm and 151-159 cm (13.33%) each.

10% had their height less than or equal to 150 cm. Among the Bupivacaine group, 36.6% had their height between 151-159 cm, followed by greater than or equal to 170 cm, and 161-169cms (30%) each. 3.33% had their height less than or equal to 150 cm.

The findings of the present study can be compared with the following studies:

Author	Ropivacaine group	Bupivacaine group	P value
Present study	165.9 ± 7.75 cms	163.56 ± 7.87cms	Not significant
Mehta A et al10]	172.24 cms	173.36 cms	Not significant

Sensory Characteristics:
In the present study, Among the Ropivacaine group, the mean of onset of sensory block was 2.01 minutes and the mean time taken for maximum spread was 18.54 minutes.

Among the Bupivacaine group, the mean onset of sensory block was 1.24 minutes and the mean time taken for maximum spread was 12.56 minutes.

The difference between the means for onset and time for maximum spread is statistically significant with p values of 0.00001, and 0.00002 respectively.

The findings of the present study can be compared with the following studies:

Author	The onset of sensory block	Time is taken for maximum spread
Present study	Bupivacaine faster onset of action, P=0.00001	The mean time taken for the maximum spread was less among the bupivacaine group P=0.00002.
Mehta A et al [10]	Bupivacaine faster onset of action, P=0.016	Not calculated
Gonuguntla S B [11]	Bupivacaine faster onset of action, P>0.05	Not calculated
Sule PM et al [14]	Bupivacaine faster onset of action, P=0.001	The mean time taken for the maximum spread was less among the bupivacaine group P=0.001
Shah UD et al [15]	Ropivacaine had faster onset of action	Ropivacaine had reached to the peak before Bupivacaine

Motor characteristics:
In the present study, among the Ropivacaine group, the mean onset of motor block was 2.95 minutes and the mean time taken for maximum spread was 20.25 minutes. Among the Bupivacaine group, the mean onset of sensory block was 1.64 minutes and the mean time taken for the maximum spread was 15.46 minutes. The difference between the means for onset and time for maximum spread is statistically significant with p values of <0.0000001, and 0.003 respectively.

The findings of the present study can be compared with the following studies:

Author	The onset of sensory block	Time is taken for maximum spread
Present study	Bupivacaine faster onset of action, P=<0.0000001	The mean time taken for the maximum spread was less among the bupivacaine group P=0.003.
Mehta A et al [10]	Bupivacaine faster onset of action, P=0.05(NS)	Not calculated
Gonuguntla S B [11]	Bupivacaine faster onset of action, P=>0.05(NS)	Not calculated
Sule PM et al [14]	Bupivacaine faster onset of action, P=0.01	The mean time taken for the maximum spread was less among the bupivacaine group P=0.03
Shah UD et al [15]	Bupivacaine faster onset of action.	The mean time taken for the maximum spread was less among the bupivacaine group.

The sensory level attained:
In the present study, among the Ropivacaine group, 56.66% attained sensory level till T8, followed by T6 (36.66%). Only 6.66% attained anaesthesia at the T-10 level.

Among the Bupivacaine group, 53.33% attained sensory level till T10, followed by T8 (40%). Only 6.66% attained anaesthesia at the T6

level. The difference between the sensory level attainment is statistically significant with a p-value of 0.0001

The findings of the present study can be compared with the following studies:

Author	Ropivacaine group	Bupivacaine group	P value
Present study	56.66% attained sensory level till T8, followed by T6 (36.66%). Only 6.66% attained anaesthesia at T 10 level.	53.33% attained sensory level till T10, followed by T8 (40%). Only 6.66% attained anaesthesia at the T6 level.	Significant
Shah UD et al [15]	28 patients achieved level T10	29 patients achieved level T10	Not significant/ comparable

Hemodynamic parameters:

In the present study, among both the study groups, all the hemodynamic parameters were comparable with a p-value of P>0.05.

The findings of the present study can be compared with the following studies:

Author	Findings
Present study	SBP, DBP, and HR were comparable (P>0.05)
Mehta A et al [10]	Not calculated
Gonuguntla SB [11]	Not calculated
Mansour NA et al [12]	Not calculated
Sharma J et al [13]	All the hemodynamic parameters were comparable with P >0.05
Sule PM et al [14]	All the hemodynamic parameters were comparable with P >0.05

The onset of pain after anaesthesia:

In the present study, the time of onset of pain after anaesthesia was significantly lower in the Bupivacaine group with a p-value of <0.0000001.

The findings of the present study can be compared with the following studies:

Author	Findings
Present study	The time of onset of pain was significantly higher in the Ropivacaine group. Ropivacaine provided better analgesia than Bupivacaine.
Mehta A et al [10]	Bupivacaine was associated with a significantly superior success rate to that observed in the ropivacaine group (P<0.05). It also provided a longer duration of analgesia and motor block (P<0.05) vs levobupivacaine and ropivacaine).
Gonuguntla S B [11]	There were not many clinical differences in onset, duration and analgesia among 0.5% bupivacaine and 0.75% ropivacaine.
Mansour NA et al [12]	Bupivacaine provided analgesia for 10.3 hours while ropivacaine provided analgesia during the first 9.6 hours which is the period of maximum pain.
Sharma J et al [13]	The difference in duration of postoperative analgesia was statistically highly significant P<0.0001. Bupivacaine provided a longer duration of analgesia than levobupivacaine and ropivacaine.
Shah UD et al [15]	The mean duration of analgesia was 375 ± 45.77 min in Group R as compared to 312±35.76 min in Group B, thus it was prolonged in Group R, the difference being statistically highly significant.

SUMMARY

- Among the Ropivacaine study group, 33.33% belonged to age group of 30-39 years, followed by 20-29 years (30%) and 40-49 years (26.66%). Less than or equal to 20 years contributed to 10%.
- Among the Bupivacaine group, 26.66% belonged to age group of 30-39 years, followed by 20-29 years (23.33%) and 50-59 years (16.66%). 40-49 years age group contributed to 13.33%. Less than or equal to 20 years and 60 years contributed to 10% each.
- Gender distribution was same among both the groups. 53.33% were males and 46.66% were females.
- Among the Ropivacaine group, 43.33% were weighing between 70-79 kgs, followed by 60-69 kgs and less than or equal to 60 kgs (23.33%) each. 10% weighed more than 80 kgs.
- Among the Bupivacaine group, 43.33% were weighing less than or equal to 60 kgs, followed by 70-79 kgs and (33.33%). 20% were weighing between 61-69kgs. 3.33% weighed more than 80 kgs.
- Among the Ropivacaine group, 40% had their height greater than or equal to 170cms, followed by 161-169cms and 151-159 cms (13.33%) each. 10% had their height less than or equal to 150 cms.
- Among the Bupivacaine group, 36.6% were had their height between 151-159 cms, followed by greater than or equal to 170cms, 161-169cms (30%) each. 3.33% had their height less than or equal to 150 cms.
- Among the Ropivacaine group, the mean of onset of sensory block was 2.01 minutes and the mean time taken for maximum spread was 18.54 minutes.
- Among the Bupivacaine group, the mean of onset of sensory block was 1.24 minutes and the mean time taken for maximum spread was 12.56 minutes .
- The difference between the means for onset and time for maximum spread is statistically significant with P value of 0.00001, 0.00002 respectively.
- Among the Ropivacaine group, the mean of onset of motor block was 2.95 minutes and the mean time taken for maximum spread was 20.25 minutes.
- Among the Bupivacaine group, the mean onset of sensory block was 1.64 minutes and the mean time taken for the maximum spread was 15.46 minutes.
- The difference between the means for onset and time for maximum spread is statistically significant with p values of <0.0000001, 0.003 respectively.
- Among the Ropivacaine group, 56.66% attained sensory level till T8, followed by T6 (36.66%). Only 6.66% attained anaesthesia at the T-10 level.
- Among the Bupivacaine group, 53.33% attained sensory level till T10, followed by T8 (40%). Only 6.66% attained anaesthesia at the T6 level.
- The difference between the sensory level attainment is statistically significant with a p-value of 0.0001
- Among both the study groups, all the hemodynamic parameters were comparable with a p-value of P>0.05. The onset of pain after anaesthesia was significantly lower in the Bupivacaine group with a p-value of <0.0000001

CONCLUSION

- The present randomized double-blinded study was conducted at the Department of Anaesthesiology, Surabhi Institute medical science,siddipet, Telangana.
- The aim of the study was to compare the effect of 0.5% heavy bupivacaine versus 0.75% isobaric Ropivacaine with respect to the extent of spread of the drug and duration of postoperative analgesia.
- The mean onset of sensory and motor block was significantly lesser among the Bupivacaine group with p-values of 0.00001 and <0.0000001 respectively.
- The mean time taken for maximum spread for the sensory and motor block was significantly lesser among the Bupivacaine group with p-values of 0.00002 and 0.003 respectively.
- There was no significant difference between the hemodynamic parameters.
- Time of onset of pain after anaesthesia was significantly higher in the Ropivacaine group with a p-value of <0.0000001. Ropivacaine provided better analgesia than Bupivacaine.
- Side effects were not observed in any of the study groups.
- 2.5 ml of Ropivacaine was not equally efficacious as 2ml of Bupivacaine. The quantity of the drug to be given for Ropivacaine should be increased to 3ml to obtain a similar effect as Bupivacaine

REFERENCES

1. Albrecht, E. and Chin, K.J. (2020), Advances in regional anaesthesia and acute pain management: a narrative review. Anaesthesia, 75: e101-e110. https://doi.org/10.1111/anae.14868

2. Myles PS, Weitkamp B, Jones K, Melick J, Hensen S. Validity and reliability of a postoperative quality of recovery score: the QoR-40. Br J Anaesth. 2000 Jan;84(1):11-5. doi 10.1093/oxfordjournals.bja.a013366. PMID: 10740540.
3. Wiederhold BD, Garmon EH, Peterson E, et al. Nerve Block Anesthesia. [Updated 2023 Apr 29]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK431109/
4. Klein, Jeffrey A. M.D.. Tumescent Technique for Local Anesthesia Improves Safety in Large-Volume Liposuction. Plastic and Reconstructive Surgery 92(6):p 1085-1098, November 1993.
5. Neal JM, Brull R, Chan VW, Grant SA, Horn JL, Liu SS, McCartney CJ, Narouze SN, Perlas A, Salinas FV, Sites BD, Tsui BC. The ASRA evidence-based medicine assessment of ultrasound-guided regional anaesthesia and pain medicine: Executive summary. Reg Anesth Pain Med. 2010 Mar-Apr;35(2 Suppl): S1-9. doi 10.1097/AAP.0b013e3181d22fe0. Erratum in: Reg Anesth Pain Med. 2010 May-Jun;35(2):325. PMID: 20216019.
6. O'Donnell BD, Iohom G. An estimation of the minimum effective anaesthetic volume of 2% lidocaine in ultrasound-guided axillary brachial plexus block. Anesthesiology. 2009 Jul;111(1):25-9. doi: 10.1097/ALN.0b013e3181a915c7. PMID: 19512869.
7. Prabhakar A, Lambert T, Kaye RJ, Gaignard SM, Ragusa J, Wheat S, Moll V, Cornett EM, Urman RD, Kaye AD. Adjuvants in clinical regional anaesthesia practice: A comprehensive review. Best Pract Res Clin Anaesthesiol. 2019 Dec;33(4):415-423. doi 10.1016/j.bpa.2019.06.001. Epub 2019 Jul 2. Erratum in: Best Pract Res Clin Anaesthesiol. 2021 Dec;35(4):E3-E4. PMID: 31791560.
8. Malik O, Kaye AD, Kaye A, Belani K, Urman RD. Emerging roles of liposomal bupivacaine in anaesthesia practice. J Anaesthesiol Clin Pharmacol. 2017 Apr-Jun;33(2):151-156. doi 10.4103/joacp.JOACP_375_15. PMID: 28781438; PMCID: PMC5520585.
9. Yamak Altinpulluk E, Turan A. Future in regional anaesthesia: new techniques and technological advancements. Minerva Anestesiol. 2021 Jan;87(1):85-100. doi 10.23736/S0375-9393.20.14791-6. Epub 2020 Sep 22. PMID: 32959636.
10. Mehta A, GuptaV, Wakhloo R, Gupta N, Gupta A, Bakshi R, Kapoor B, Gupta S. Comparative evaluation of intrathecal administration of newer local anaesthetic agents Ropivacaine and Levobupivacaine with Bupivacaine in patients undergoing lower limb surgery. The Internet Journal of Anesthesiology. 2007 Volume 17 Number 1.
11. Gonuguntla S B. Effect of 0.5% Bupivacaine Versus 0.75% Ropivacaine - Onset, Duration and Quality of Brachial Plexus Block through Supraclavicular Approach. Int J Sci Stud 2016;3(11):244-248.
12. Mansour N A, Al-Mahdy Al-Belasy F, Abdel-Monem MT, Marzook HA (2012) Ropivacaine versus Bupivacaine in Postoperative Pain Control. J Biotechnol Biomater 2:137.
13. Sharma J, Gupta R, Kumari A, Mahajan L, Singh J. A Comparative Study of 0.25% Levobupivacaine, 0.25% Ropivacaine, and 0.25% Bupivacaine in Paediatric Single Shot Caudal Block. Anesthesiology Research and Practice. 2018.
14. Sule P M, Basantwani S. A double-blind prospective study of the effect of intrathecal ropivacaine 0.75% and bupivacaine 0.5% for lower limb orthopaedic surgery in young patients. Int J Basic Clin Pharmacol 2016;5:1798-1802.
15. Shah UD, Dudhwala KN, Vakil MS. Comparison of 0.5% Bupivacaine and 0.5% Ropivacaine epidurally in lower limb orthopaedic surgeries. Int J Basic Clin Pharmacol 2017;6:271-4.