How to Cite:
Parthasarathy, P., Kumar, T. A., Satyanarayana, P., Kumar, A. K., & Sreedevi, P. (2022). Comparison of onset and duration of sensory and motor blockade with intrathecal isobaric bupivacaine versus isobaric levobupivacaine for infraumblical surgeries. *International Journal of Health Sciences*, *6*(S5), 7338–7350. https://doi.org/10.53730/ijhs.v6nS5.10458

Comparison of onset and duration of sensory and motor blockade with intrathecal isobaric bupivacaine versus isobaric levobupivacaine for infraumblical surgeries

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***Abstract*---**Background: Spinal anaesthesia remains a popular technique of choice for performing surgeries on abdomen, pelvis and lower limbs. It has fast onset of action and provides effective sensory and motor blockade. Spinal anaesthesia is routinely performed by administration of 0.5% bupivacaine. Aims: Aim of the study was to compare onset and duration of sensory and motor blockade between intrathecal isobaric 0.5% bupivacaine and isobaric 0.5% levobupivacaine. Materials and methods: 80 patients between the age group of 18-65 years of either gender, belonging to ASA Grade I and II scheduled for elective infraumbilical surgeries were enrolled in the study. They were randomised into 2 groups. Group B received intrathecal 3.2 ml of 0.5 % isobaric bupivacaine and Group L received intrathecal 3.2 ml of 0.5% isobaric levobupivacaine. Onset and

duration of sensory and motor blockage were compared between the two groups. Results: It was found that bupivacaine group had faster onset of sensory block (5.53 +/- 1.18 minutes versus 6.50 ± 1.13 with p<0.001); longer duration of sensory block (300.43 ± 30.15 minutes versus 260.13 ± 19.38 with p<0.001); faster onset for motor block (9.05+/-1.26 minutes versus 11.35+/-1.37 with p<0.001); longer duration of motor block (260.20 ± 28.29 minutes versus 212.75+/-20.86 with p<0.001) compared to levobupivacaine group. The two groups showed no difference in terms of hemodynamic parameters measured. Conclusion: 0.5% isobaric bupivacaine had longer duration of sensory & motor blockade compared to 0.5% isobaric levobupivacaine. However the haemodynamic parameters with both the drugs were found to be similar.

***Keywords*---**Infraumbilical surgeries, isobaric bupivacaine, isobaric levobupivacaine.

Introduction

In this present scenario regional anaesthesia is preferred over general anaesthesia for most of the infraumbilical surgeries. Reducing the risk of airway manipulation, lesser systemic side effects and easy usage led to the increasing popularity of regional anaesthesia. Availability of newer local anaesthetics and adjuvants has further increased the effectiveness of regional anaesthesia. Spinal anaesthesia remains the most popular technique for providing regional anaesthesia in cases of most of the lower abdominal and lower limb surgeries. It provides fast onset and effective sensory and motor blockade. Spinal anesthesia is a safe, reliable and inexpensive technique with the advantage of providing surgical anesthesia and also extended pain relief in postoperative period.

The major advantages are an increased duration of action, favorable potency to toxicity ratio, easy availability and low cost It has been used extensively in spinal anaesthesia because of its ability to produce long duration of sensory and motor blockade. It is available in two forms, an isobaric form with equal density to the spinal fluid and a denser hyperbaric form. Both forms have been widely used intrathecally.[1]

The structure of bupivacaine has a chiral centre and as a result it exhibits stereoisomerism. It is available commercially as a racemic mixture (50:50) of its two enantiomers, dextrobupivacaine (R(+)bupivacaine) and levobupivacaine (S(-)bupivacaine). The two molecules are non-superimposable mirror images of each other and while they have identical physicochemical properties, they have distinct pharmacological and toxicological effects.[2]

Bupivacaine is associated with significant cardiac and CNS toxicity. This toxicity has been attributed mainly to its R isomer. And hence levobupivacaine, the pure S (−) enantiomer of bupivacaine, is a safer alternative for regional anesthesia than

its racemic parent. It demonstrated less affinity and strength of depressant effects onto myocardial and central nervous vital centers.[3]
Levobupivacaine is a preferred local anaesthetic due to its longer sensory block, lower cardiac and central nervous system toxicity and shorter motor block. It produces localized anesthesia by blocking the transmission of action potential in sensory, motor and sympathetic nerve fibers, by inhibiting the passage of sodium through voltage sensitive ion channels in the neuronal membrane.[4]

There have been fewer studies done in the past comparing isobaric levobupivacaine with isobaric bupivacaine. The purpose of this study was to compare onset and duration of sensory and motor blockade, intraoperative haemodynamic changes following the administration of intrathecal isobaric bupivacaine (0.5%) bupivacaine vs intrathecal isobaric levobupivacaine (0.5%) for infraumbilical surgeries.

Methods and Materials

This study is a prospective, randomized, double blinded clinical study conducted in the Department of Anaesthesiology and Critical Care, Gandhi Medical College, Secunderabad attached to KNRUHS, Warangal over a period of one and half years from January 2018 to June 2019. Prior to the commencement, the ethical clearance was obtained from L IIIrd Institutional Ethics Committee, Gandhi Medical College, Secunderabad. Patients aged between 18 to 65 years of either gender, belonging to ASA Grade I and II, scheduled for elective infraumbilical surgeries under spinal anaesthesia were studied. A total of 80 patients distributed into two groups of 40 each undergoing elective infraumbilical surgeries under spinal anaesthesia were enrolled.

Inclusion criteria: ASA Grade I and II patients, aged between 18 to 65 years group in Patients undergoing infraumbilical surgeries
Exclusion criteria: Diabetes, hypertension & other systemic disorders, Contraindications to sub arachnoid block like coagulopathy, local skin infection, raised intracranial pressure, spinal deformity, Patient allergic to study drugs.
The patients fulfilling inclusion criteria were briefed about the nature of the study and interventions and a written informed consent was obtained (Annexure III).
Patients were randomized based on computerized generated randomization into two groups.

- Group B (n=40)
- Group L (n=40)

Demographic data of the patients like name, age, sex and history was obtained through an interview. The physical and medical examination conducted. These findings were recorded on predesigned and pretested proforma (Annexure-II).

Pre-anaesthetic Examination and Preparation

A thorough pre-anaesthetic evaluation was done with special emphasis on cardiorespiratory system, nervous system and endocrinal abnormalities. Previous anaesthetic exposure and drug sensitivity were enquired. A thorough general and

systemic examination was carried out for baseline parameters and airway assessment, special attention was paid for any kind of spinal deformities, active skin lesions over the lumbosacral area. Weight was recorded. A written informed consent was taken and routine lab investigations were confirmed. Patients were advised to be nil orally from 10 PM onwards and were pre- medicated with oral diazepam 0.2 mg/kg (not exceeding 10 mg) on the previous night of surgery. Before shifting to the operation theatre, I.V access was obtained with 18 Gauge I.V cannula and patients were preloaded with intravenous infusion of 10 mL/Kg of ringers lactate solution 30 minutes prior to surgery.

Anaesthesia machine was checked. Then preoperative baseline parameters like pulse rate, blood pressure, respiratory rate was recorded. Following emergency drugs and equipment's were kept ready before anaesthesia intervention. Group B: Under all aseptic precautions, L3-4 space identified, a 25G Quincke's spinal needle was inserted into L3-4 space and 3.2 ml of 0.5% Bupivacaine isobaric was injected into the space. Patients were turned immediately to supine position.

Group L: Under all aseptic precautions, L3-4 space identified and a 25G Quincke's spinal needle inserted into L3-4 space and 3.2ml of 0.5% levobupivacaine isobaric was injected into the space. Patients were turned immediately to supine position.
Subsequently patient vital parameters were monitored which included noninvasive arterial pressure, heart rate, electrocardiogram, and oxygen saturation by pulse oximeter at regular intervals.

Sensory block: Sensory block was assessed bilaterally, using alcohol swab in mid axillary line. Sensory block onset was defined as the time taken to achieve T10 block level and duration of sensory block was defined as two dermatome regression of anaesthesia from the highest level to L2. The surgery was allowed to start once sensory block reached at least T10 but general anaesthesia was induced if this did not occur after 15 minutes.
Motor block: Motor block was assessed immediately after sensory block using a Modified Bromage Grade. Onset of motor block was defined as the time to reach Modified Bromage Grade 1 and Total duration of motor block was defined as the time for return to Modified Bromage Grade 0.
Bromage 0, free movement of legs and feet, with ability to raise extended leg.
Bromage 1, inability to raise extended leg and knee flexion is decreased, but full flexion of ankle and feet is present.
Bromage 2, inability to raise leg or flex knees, flexion of ankle and feet present.
Bromage 3, inability to raise leg, flex knee or ankle, or move toes.
Blocks were assessed every minute for 10 minutes and then every 10 mintues duration till motor block reached bromage 0. Intraoperative noninvasive monitoring of vitals (HR, SBP, DBP and SPO2) was done. Time to request for first post-operative rescue analgesia – In the post anaesthesia care unit, time to request for first post-operative rescue analgesia was noted. Post-operative pain score was measured by using VAS of 'zero' to 'ten' where 'zero' indicated no pain and 'ten' indicated worst imaginable pain. Rescue analgesia of injection paracetamol 1gram intravenously was given if the VAS score was more than three. Hypotension was considered if the blood pressure fell by more than 20% from the baseline and was treated with incremental doses of 5 – 10 mg of i.v

ephedrine and intravenous Ringer lactate solution. Bradycardia was considered when heart rate fell below 50 bpm and was treated with 0.5 mg i.v atropine.

Statistical Methods

The data was tabulated and master chart was prepared (Annexure V). In the present study, results are given as Mean ± Standard Deviation and Range values for continuous data. Student's t-test was used to compare the two groups. Categorical data are expressed as number and percentages and difference between the groups was compared by chi-square test. A p value of 0.05 or less was set for statistical significance.

Observation & Results

Table 1. Demographic Distribution in present study

	Bupivacaine		Levobupivacaine		P value
Sex	No. of patients	% of patients	No. of patients	% of patients	0.65
Male	22	55%	24	60%	
Female	18	45%	16	40%	
Age (years)	44.18	7.03	47.1	6.52	0.071
Weight(kgs)	65.95	8.29	67.43	6.75	0.817
Height (cms)	164	5.37	163.38	7.23	0.227
Grade I	32	80	30	75	1.0
Grade II	8	20	10	25	

In this study 55 % were males and 45 % were female patients in group B and 60% were males and 40% were female patients in group L, suggesting both the groups had comparable demographic characteristics. The mean age in group B was 44.18 ± 7.03 and in group L it was 47.1 ± 6.52 (p=0.071). The mean weight in group B was 65.95 ± 8.29 kgs and in group L it was 67.43 ± 6.75 kgs (p=0.817). The mean height in group B was 164 ± 5.37 cms and in group L it was 163.38 ± 7.23cms (p=0.227), suggesting mean age, weight and height in both the groups were comparable. In group B, 80% patients were ASA I and in group L 75% patients were ASA I. Remaining being ASA II. Thus both the groups were comparable with p= 1.

Table-2: Onset and duration of sensory and motor block

Group	Onset (minutes)		Duration(minutes)	
	Mean	Standard deviation	Mean	Standard deviation
Onset and duration of sensory block				
Bupivacaine	5.53	1.18	300.43	30.15
Levobupivacaine	6.5	1.13	260.13	19.38
P	<0.001		<0.001	
Onset and duration of motor block				
Group B	9.05	1.26	260.2	28.29

Group L	11.35	1.37	212.75	20.86
P	<0.001		<0.001	

In this study onset of sensory block was defined as the time taken to achieve T10 block level. The mean onset for sensory block in group B was 5.53 ± 1.18 minutes and in group L was 6.5 ± 1.13 minutes. The result was highly statistically significant (p<0.001) where group B had early onset for sensory block compared to group L. In this study duration of sensory block was determined as two dermatome regression of anaesthesia from the highest level to L-2 dermatome. The mean duration of sensory block in group B was 300.43 ± 30.15 minutes and mean duration of sensory block in group L was 260.13 ± 19.38 minutes and the result was highly statistically significant with p<0.001 where group B had longer mean duration of sensory block compared to group L.

In this study onset of motor block was defined as the time to reach Modified Bromage Grade 1. The mean onset for motor block in group B was 9.05±1.26 minutes and in group L was 11.35±1.37 minutes. The result was highly statistically significant with p <0.001 where group B had early onset of motor block compared to group L. In this study total duration of motor block was defined as the time for return to Modified Bromage Grade 0. The mean duration of motor block in group B was 260.2 ± 28.29 minutes and mean duration of motor block in group L was 212.75 ± 20.86minutes. This result was highly statistically significant with p <0.001 where group B had longer mean duration of motor block compared to group L.

Table-3: Comparison of mean heart rate at different intervals (bpm)

	Bupivacaine		Levobupivacaine		
Interval	Mean HR	St dev	Mean HR	St dev	P value
PRE OP	79.23	8.02	79.55	7.10	0.85
5 min	77.63	7.99	78.20	6.70	0.73
10 min	76.88	7.47	75.55	7.13	0.42
15 min	75.73	6.25	73.68	5.73	0.13
20 min	74.85	6.57	73.18	6.79	0.27
25 min	74.25	6.19	72.35	6.70	0.19
30 min	72.68	6.47	71.38	6.09	0.36
45 min	71.70	6.44	70.93	7.31	0.62
60 min	71.93	6.46	70.70	7.23	0.43
75 min	72.18	7.74	71.05	8.05	0.53
90 min	71.45	6.02	69.78	6.70	0.24
105 min	71.95	6.84	70.35	7.34	0.32
120 min	72.20	7.26	70.83	7.34	0.40
135 min	72.18	7.09	70.00	6.88	0.17

There was no statistically significant difference found between the two groups regarding changes in mean heart rate at various intervals (p>0.05).

Table-4: Comparison of mean systolic blood pressure at different intervals (mm Hg)

	Bupivacaine		Levobupivacaine		
Interval	Mean SBP	St dev	Mean SBP	St dev	P value
PRE OP	128.23	12.17	126.13	12.56	0.45
5 min	112.73	21.60	114.83	18.88	0.64
10 min	112.08	17.09	113.78	14.18	0.63
15 min	115.98	10.84	114.75	11.31	0.62
20 min	113.85	9.22	113.58	9.57	0.90
25 min	111.35	8.61	110.53	9.19	0.68
30 min	112.25	8.85	111.35	8.70	0.65
45 min	111.95	8.02	110.90	8.59	0.57
60 min	109.38	8.24	111.05	8.51	0.37
75 min	109.93	8.29	111.23	8.50	0.49
90 min	110.65	8.89	111.20	9.35	0.79
105 min	112.03	8.79	113.23	8.99	0.55
120 min	111.73	7.83	113.13	7.84	0.43
135 min	110.93	8.31	112.45	8.58	0.42

There was no statistically significant difference found between the two groups regarding changes in mean systolic blood pressure at various intervals ($p>0.05$).

Table-5: Comparison of mean diastolic blood pressure at different intervals (mm Hg)

	Bupivacaine		Levobupivacaine		
Interval	Mean DBP	St dev	Mean DBP	St dev	P value
PRE OP	79.78	8.00	78.55	7.69	0.49
5 min	72.28	9.13	73.15	8.89	0.67
10 min	73.38	7.28	72.70	8.22	0.70
15 min	72.33	6.65	70.75	7.19	0.31
20 min	71.93	6.99	70.60	7.26	0.41
25 min	71.30	7.68	69.78	8.17	0.39
30 min	70.13	7.73	69.70	7.95	0.81
45 min	69.33	6.93	68.55	7.16	0.62
60 min	69.58	7.49	69.40	7.60	0.92
75 min	69.13	7.77	69.03	8.01	0.95
90 min	68.73	7.28	69.88	7.07	0.48
105 min	69.00	6.52	70.35	6.76	0.37
120 min	70.58	6.64	70.50	7.07	0.96
135 min	70.55	6.26	70.50	6.03	0.97

There was no significant difference with respect to variations in diastolic blood pressure between the two groups ($p > 0.05$).

In the current study statistically significant difference was not found between the two groups regarding changes in mean MAP ($p > 0.05$). Thus the two groups were comparable in terms of hemodynamic variations.

Table-6: Comparison of side effects

	Bupivacaine		Levobupivacaine		
Side effects	No. of patients	% of patients	No. of patients	% of patients	P value
Nausea	2	5%	1	3%	0.56
Vomiting	2	5%	1	3%	0.56
Hypotension	12	30%	6	15%	0.11
Bradycardia	2	5%	1	3%	0.56
Urinary retention	1	3%	1	3%	1

Incidence of hypotension was higher in bupivacaine group compared to levobupivacaine group. There was no significant difference between the groups in the incidence of other side effects. The most common side effect was hypotension and the least common was urinary retention.

Table-7: Comparison of various determinants

	Bupivacaine		Levobupivacaine		
Determinant	Mean	St dev	Mean	St dev	P value
Onset of sensory blockade (min)	5.53	1.18	6.50	1.13	<0.001
Duration of sensory blockade (min)	300.43	30.15	260.13	19.38	<0.001
Onset of motor blockade (min)	9.05	1.26	11.35	1.37	<0.001
Duration of motor blockade (min)	260.20	28.29	212.75	20.86	<0.001

In this study it is found that bupivacaine had faster onset of sensory & motor blockade compared to levobupivacaine. However, bupivacaine showed longer duration of sensory and motor blockade compared to levobupivacaine.

Discussion

Subarachnoid block is a commonly employed anaesthetic technique for infraumbilical surgeries. It is a safe, inexpensive and easy-to-administer technique which also offers a high level of post–anaesthesia satisfaction for patients. The technique is simple, has rapid onset and is reliable. The risks of general anesthesia, including mishaps due to airway management are avoided by this technique. In the current study we have compared 0.5% isobaric levobupivacaine and 0.5% isobaric bupivacaine which was administered intrathecally for elective infraumbilical surgeries.

In this study demographic parameters like age, sex, weight and height were comparable between the two groups. In this study onset of sensory block which

was defined as the time taken to achieve T10 block level was found to be 5.53s +/- 1.18 minutes for B group and 6.50+/- 1.13 minutes for L group. There was significant difference seen in the study where those who received bupivacaine (B group) had a faster onset of sensory block compared to those who had received levobupivacaine (L group) with P value<0.001(highly significant).

In this study duration of sensory block was determined as two dermatome regression of anaesthesia from the highest level to L-2 dermatome. It was found to be 300.43+/- 30.15 in group B and 260.13+/- 19.38 in group L and with a p value of less than 0.001(highly significant). The study showed group B had a longer duration of sensory block compared to group L.

Similar study done by Nirmala et al. on 100 ASA I – II patients undergoing total abdominal hysterectomies found similar results. Patients received 3.5ml of isobaric 0.5 % bupivacaine & 3.5ml of 0.5% isobaric levobupivacaine. The time of onset of sensory block of levobupivacaine was 8± 3.5 and bupivacaine was 7.2± 2.6 min (p value <0.05). Duration of sensory block of bupivacaine was 280 +/- 40 min and that of levobupivacaine was 248 +/- 46 min with a p value of < 0.001. These results were very similar to our study.[5]

Similar study was done by J.F. Luck et al but the results of the study were different. They conducted a study on 60 ASA I – II patients undergoing elective surgeries under spinal anaesthesia.3ml of 0.5% hyperbaric bupivacaine was compared with 3ml of hyperbaric levobupivacaine and 3ml of 0.5 % hyperbaric ropivacaine and was found that onset of sensory block was median 5(2-8) minutes in all the 3 groups.[6]

Onset of motor block was defined as the time to reach Modified Bromage Grade 1. In our study it was found to be 9.05 +/- 1.26 minutes in bupivacaine group and 11.35 +/- 1.37 in levobupivacaine group. There was statistical difference found between the 2 groups with p< 0.001. The study showed bupivacaine group showing faster onset of motor block compared to levobupivacaine group. Total duration of motor block was defined as the time for return to Modified Bromage Grade 0. In our study it was found to be 260.20+/- 28.29 in bupivacaine group and 212.75 +/- 20.86 in levobupivacaine group and with a p< 0.001. The study showed high statistical difference where bupivacaine group showed longer duration of motor block compared to levobupivacaine group.

Similar study by Gautier et al. reported that the duration of analgesia and motor block with levobupivacaine was shorter than bupivacaine at the same intrathecal dose (8 mg).[7] Héctor J and Malachy O observed the S-enantiomer levobupivacaine to be significantly less potent than the racemate bupivacaine by 13% on a percentage weight per volume basis for motor block.[8]

Sari R et al., compared levobupivacaine and bupivacaine in spinal anaesthesia given for percutaneous nephrolithotomy. It was observed that the progression of sensory block to T4 was faster in bupivacaine group (9.7+/- 5.8 min) compared to levobupivacaine group (15.8+/- 7.1 min). The onset of motor blockade to Bromage 3 score was achieved faster in bupivacaine group than levobupivacaine group (7.8

± 4.5 min vs 10.9 ± 5.9 min, p=0.02). Bromage 2 was achieved faster in levobupivacaine group than bupivacaine group (135.9 +/- 37 min vs 139.2 +/- 47.8 min, p=0.04) thereby concluding that bupivacaine had faster onset time of sensory and motor block and longer duration of motor block compared to levobupivacaine.[9]

Similar results of faster onset and longer duration of motor block with bupivacaine compared to levobupivacaine have been reported by Altun D et al, Guler G et al., and Goksu H et al.[10,11,12] Vellosillo M et al., compared 12.5 mg of isobaric levobupivacaine and 12.5 mg of isobaric bupivacaine in patients undergoing knee arthroscopy. Sensory (p=0.018) and motor blockade onset (p=0.003) was found to be faster in the bupivacaine group. It took less time to regain maximum motor blockade in the bupivacaine group (p=0.014), and the levobupivacaine group required use of analgesia earlier (p=0.025). In conclusion it was found that faster onset of sensory and motor block, longer duration of sensory block and longer pain free postoperative period with similar haemodynamics were seen in bupivacaine group compared to levobupivacaine.[13] However there were other studies which showed that both drugs had shown similar quality of sensory & motor blockade with comparable haemodynamic effects. Study done by Glaser et al. who performed prospective randomized double-blinded study to evaluate the anesthetic potencies and hemodynamics of intrathecal levobupivacaine compared with racemic bupivacaine. Eighty patients undergoing elective hip replacement received either 3.5 mL levobupivacaine 0.5% isobaric or 3.5 mL bupivacaine 0.5% isobaric. Intergroup differences between levobupivacaine and bupivacaine were insignificant both with regard to the onset time and the duration of sensory and motor blockade (11 +/- 6 versus 13 +/- 8 min; 10 +/- 7 versus 9 +/- 7 min; 228 +/- 77 versus 237 +/- 88 min; 280 +/- 84 versus 284 +/- 80 min)12. Both groups showed slight reductions in heart rate and mean arterial pressure, but there was no intergroup difference in hemodynamics.[12] Thus these 2 groups were comparable in terms of onset and duration of motor blockade which differed with our current study.

F.Fottorini et al. did a study on 60 patients undergoing elective orthopaedic surgeries and compared 0.5 % isobaric levobupivacaine and 0.5% bupivacaine. Onset of motor block was 8+/- 4 minutes and duration of motor block 245+/- 86 minutes with bupivacaine and onset of motor block 11+/-6 minutes and duration 256+/-86 minutes with levobupivacaine.[14] Thus onset of motor block was faster with bupivacaine compared to levobupivacaine. However the duration of motor block of both the groups were comparable. Either heart rate or mean arterial pressure slightly decreased in both groups, with no preoperative significant differences.

Vanna O et al. studied 70 patients undergoing elective transurethral endoscopic surgery who received either 0.5% isobaric levobupivacaine or 0.5% hyperbaric bupivacaine intrathecally and found that the two groups were similar in terms of time to block suitable for surgery, duration of sensory block, time to two segments regression, time to T12 regression, time to onset and offset of motor block, verbal numeric pain scores at the start of the operation and adverse events.[15]

Sahin S H et al. while doing study on 50 patients to know the effects of bupivacaine versus levobupivacaine on pulmonary function in patients with chronic obstructive pulmonary disease undergoing urologic surgery found that there were no significant differences between groups regarding sensory and motor onset times, maximal spread of sensory block, duration of sensory block and motor block, and time to L2 segment regression of spinal anesthesia. [15] Bergamaschi F et al., found levobupivacaine and bupivacaine to be equally effective for epidural anaesthesia also in patients undergoing LSCS.[16]

Sathitkarnmanee et al. conducted a study with 70 patients to compare 0.5% isobaric levobupivacaine (3 mL) versus 0.5% isobaric bupivacaine (3 mL) for elective lower limb and lower abdominal surgery with spinal anesthesia. These authors showed that 3 mL of 0.5% isobaric racemic bupivacaine and 0.5% isobaric levobupivacaine for spinal anesthesia had equivalent peak block height and showed equally effective efficacy regarding both the onset time and duration of motor and sensory blockade. Spinal levobupivacaine is an alternative to bupivacaine.[17]

Similar results were reported by Alley EA et al., who randomised 18 healthy volunteers into three equal groups to receive two spinal anaesthetic drugs, levobupivacaine and bupivacaine, of equal milligram doses and found that hyperbaric levobupivacaine has equivalent clinical efficacy to racemic bupivacaine for spinal anaesthesia in doses from 4-12 miligrams.[18]

Lee YY et al., used 2.6 mL of isobaric levobupivacaine and bupivacaine in urological surgeries and found that there were no significant differences between the two groups in the quality of sensory and motor block or in haemodynamic change. Anaesthesia was adequate and patient satisfaction good in all cases. They concluded that 0.5% levobupivacaine can be used as an alternative to 0.5% racemic bupivacaine in spinal anaesthesia for surgery when a sensory block to at least T10 is required.[19]

In our current study there was no statistically significant difference found in the hemodynamic variations between the two groups. Similar results were found in other studies. In our study, the incidence of hypotension was significantly less with the use of levobupivacaine than with bupivacaine (15 % vs 30%). This finding is similar to the study done by Erdil et al. who found a 10% incidence of hypotension with levobupivacaine and 30% with bupivacaine.[20] Other side effects like nausea, vomiting, bradycardia & urinary retention were comparable for both the drugs.

Our study was done using isobaric solutions. In current clinical practice hyperbaric bupivacaine is most commonly used for intrathecal administration. It would be useful to do further studies comparing hyperbaric levobupivacaine and hyperbaric bupivacaine for intrathecal usage. In our study bupivacaine showed faster onset of sensory and motor blockade and longer duration of sensory and motor blockade compared to levobupivacaine. It will be useful to do further studies with adjuvants added to it to study their effects.

Conclusion

Based on the study results it may be concluded that, intrathecal administration of 0.5% isobaric bupivacaine has early onset of sensory & motor block and longer duration of sensory & motor blockade compared to 0.5% isobaric levobupivacaine. The haemodynamic changes with both drugs were found to be similar & comparable. Incidence of hypotension was slightly higher with bupivacaine. The incidence of other adverse effects for both drugs were similar. This brings to inference that even though bupivacaine has a better potency and gives better quality of sensory and motor blockade, levobupivacaine can be used as a safe alternative to bupivacaine for spinal anaesthesia especially for shorter surgical procedures that don't require prolonged sensory and motor blockade aiding the patients for early post-operative ambulation. However larger studies need to be conducted to confirm these findings.

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