ISSN: 0976-3031

Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research
Vol. 7, Issue, 7, pp. 12555-12560, July, 2016

International Journal of Recent Scientific Research

Research Article

CLINICAL EFFICACY OF ISOBARIC LEVOBUPIVACAINE IN SPINAL ANAESTHESIA FOR ABDOMINAL AND VAGINAL HYSTERECTOMIES

***Naithani U., Meena P., Mohan C.M., Narang A and Verma D**

Department of Anaesthesiology and Critical Care, R.N.T Medical College, Udaipur

ARTICLE INFO

Article History:

Received 10th April, 2016
Received in revised form 14th April, 2016
Accepted 08th June, 2016
Published online 28th July, 2016

Key Words:

Levobupivacaine, Vaginal hysterectomy, Abdominal hysterectomy, Spinal anesthesia.

ABSTRACT

Levobupivacaine, most recentlevoisomer of bupivacaine with lesser cardio-neurotoxicity, is now increasingly being used in spinal anaesthesia, however its use in hysterectomy is not much studied. We evaluated clinical characteristics of isobaric levobupivacaine in spinal anaesthesia for abdominal and vaginal hysterectomy.70 patients undergoing abdominal hysterectomy (n=35) and vaginal hysterectomy (n=35) in spinal anaesthesia received 20 mg (0.5%, 4 ml) of isobaric levobupivacaine in L_2-L_3 interspace. Data regarding sensory-motor block (onset, extent, duration), hemodynamics, clinical efficacy in terms of anaesthetic supplementation and adverse effects were recorded.Sensory onset in terms of time to T_{10} was 5.56±1.80 min. and time to T_6 was 10.71±2.76 min. Median value of peak sensory level was T_6(T_{10}-T_4). All patients achieved maximum bromage score of 3 (complete motor block) in 5.45±1.469 min. (motor onset). Incidence of hypotension was 42.82% (n=30/70) and bradycardia was 7.14% (n=5/70), which occurred as a single episode and were easily treated with mepentermine and atropine respectively. Spinal anaesthesia was considered completely successful (no supplementation) in 100% (n=35/35) cases of vaginal hysterectomy and 91.42% (n=32/35) cases of abdominal hysterectomy. Only 8.57% (n=3/35) cases of abdominal hysterectomy required intraoperative anaesthetic supplementation (ketamine). None of the cases was converted to general anaesthesia (failure rate=0%). We conclude that 20 mg of isobaric levobupivacaine in spinal anaesthesia produced effective sensory-motor block with stable hemodynamic profile for abdominal and vaginal hysterectomy. Owing to greater safety profile it could be a reasonable option in the arena of spinal anaesthesia.

INTRODUCTION

Spinal anaesthesia (SA) is commonly used for hysterectomies because it is simple to perform, economical, involves less drug doses, produces rapid onset of anaesthesia and complete muscle relaxation.

Bupivacaine is the most commonly used local anesthetic in spinal and epidural anesthesia since long, however, its margin of safety is narrower. After reports of refractory cardiac arrest following unintended intravascular injection of bupivacaine during attempted neuraxial anesthesia,intense research was started for alternative local anesthetic having desirable blocking properties of bupivacaine, with a greater margin of safety (Albright *et al, 1979*)[1].

Bupivacaine contains a racemic mixture of levorotatory and dextrorotatory isomers. Levorotatory isomer have a lower potential for systemic toxicity than the dextro form of the drug (Leone *et al* 2008)[2]. Ropivacaine and levobupivacaine are the two levorotatory isomer formulation of local anesthetic approved for clinical use as an alternative to bupivacaine. A clinical profile of potency (Camorica *et al*, 2007)[3] and toxicity (Santos *et al*, 2001)[4] is documented as 'high' for bupivacaine, 'intermediate' for levobupivacaine and 'low' for ropivacaine. This is attributed to former being more lipophilic contributing to more potency as well as more toxicity.

Though ropivacaine has greatest margin of safety but it requires 50% larger dose than bupivacaine / levobupivacaine, and lesser motor block is also its limiting factor (Copperjans *et al*, 2006)[5]. That's why ropivacaine could not become a preferable choice in spinal anesthesia. Unlike ropivacaine, levobupivacaine is almost equipotent to bupivacaine (Lyons G *et al*, 1998)[6] and has a greater margin of safety than bupivacaine (Huang *et al*, 1998)[7].

Isobaric Levobupivacaine was found effective in spinal anesthesia in a wide range of surgeries like cesarean section (Turkmen *et al*, 2012)[8], trans urethral resection of prostate (Cuvas *et al*, 2010)[9], orthopedic (Herrera *et al*, 2014)[10] and lower abdominal surgery (D'Souza *et al*, 2014)[11], however it is not much investigated in hysterectomies, which is a major gynecological case load. On internet search we could find only

Corresponding author: **Naithani U*
Department of Anaesthesiology and Critical Care, R.N.T Medical College, Udaipur

two studies, one in abdominal hysterectomy (Sanansilp *et al*, 2012)[12]and one in vaginal hysterectomy (Chattopadhyay *et al*, 2013)[13] in which isobaric Levobupivacaine in SA was used and found effective for vaginal hysterectomy (VH)[13] but not a promising agent for abdominal hysterectomy (AH)[12]. The only single study available in AH by Sananslip *et al*[12] documented that isobaric preparation of Levobupivacaine in dose of 15 mg is too low to achieve desired sensory level for AH, however hyperbaric preparations were effective owing to high cephalic spread according to gravity. Since commercial preparations of hyperbaric levobupivacaine are not yet available in India, addition of glucose to make it hyperbaric in every case is cumbersome and not without risk.

With this background, we hypothesized that increasing the dose of isobaric- Levobupivacaine to 20 mg would increase the success rate. Therefore, we planned the present study to assess the clinical efficacy of isobaric- Levobupivacaine (4 ml, 0.5% =20 mg) in spinal anesthesia for abdominal and vaginal hysterectomies. If it is found effective, being less cardiotoxic, commercially available isobaric Levobupivacaine can become a better alternative to bupivacaine in spinal anesthesia for hysterectomies.

MATERIAL AND METHODS

After taking approval from institutional ethical committee the present study was carried out in Department of Anaesthesia at Pannadhai Women Hospital at RNT Medical College in Udaipur (Raj.) from August 2015 to December 2015. Informed written consent for taking part in the study was taken from the 70 female patients (30-70 yr, 40-80 kg), who were undergoing abdominal/vaginal hysterectomy under spinal anaesthesia on elective basis. Thorough preanesthetic evaluation including history, physical examination and necessary investigations was done, for selection of patients. Exclusion criteria were patient refusal, associated systemic illness, contraindication to spinal anesthesia, morbid obesity, short stature, allergy to amide local anesthetics, fused spine, musculo skeletal abnormalities, coagulation defects etc.

Study design: A prospective, randomized, open label, non-comparative clinical study.

Basis of sample size: As there was no similar study available, the sample size was calculated by central limit theorem[14] which states that *if sampling distribution is symmetric, unimodal and without outliners the sample size of 15 is adequate. As a rule of thumb in statistics a sample size of 30 is considered to be large enough*. We took 35 patients each for abdominal and vaginal hysterectomy to compensate for dropouts

Primary outcome of the study was success rate in terms of proportion of cases in whom surgery could be completed without supplementation. Secondary outcomes were sensory and motor onset time, peak sensory level, maximum Bromage score, duration of sensory –motor block, duration of analgesia, need for supplementation analgesia, changes in blood pressure and heart rate, incidence of hypotension, bradycardia, complaints by patient and surgeon, and other complications if any.

Spinal anaesthesia technique

After overnight fasting, peripheral intravenous line via 20G cannula was taken in pre-induction room and Ringer lactate 500ml was given as preload.

In gynecological elective operating room multiparamonitor was applied having Non-Invasive Blood Pressure, Electrocardiography and peripheral oxygen saturation (SpO_2) and baseline vitals were recorded. Inj. Midazolam 2mg and Inj. Ondansetron 4mg i.v. were given for premedication before spinal anesthesia.

The patient was placed in right lateral position. Taking full aseptic precautions, lumbar puncture was done in L2-L3 space via midline approach using 25G spinal needle (quincke type) [Pricon, Isconsurgicals LTD, Jodhpur], keeping bevel up. After getting free flow of CSF bevel of spinal needle was turned 90^o towards right, so end of injection had faced cephalic and 0.5% 4 ml (20mg)isobaric levobupivacaine (Levo-anawin 0.5% 10 ml or 4 ml injection, Neon Laboratories Limited, India)] was injected intrathecally within some 10 seconds and patient was turned to supine.

Time of end of spinal injection was taken as time zero (t_0) for further data recording. Hemodynamic variables (Systolic Blood Pressure, Diastolic Blood Pressure, Heart Rate, and SpO2) were recorded at every 5 min. interval till 15 min after intrathecal injection then every 15 min till end of the surgery.
Sensory block was assessed in mid clavicular line bilaterally using 24G hypodermic needle pin prick, and loss of sensation to pinprick was taken as sensory block[13,14].

Motor block was recorded using modified Bromage score[13,14] as follows-

0 - able to flex hips/knee/ankle (no motor block); 1 - able to move knee and ankle, unable to raise extended leg or flex hip (partial motor block); 2- able to flex ankle, unable to flex hip and knee (near complete motor block);
3 - unable to move any part of lower limb (complete motor block).

Sensory – motor block were assessed at 5, 10 and 15 min after intrathecal injection, at the end of surgery and postoperatively every 30 min till complete recovery.

When target sensory level of T_6 in group AH and T_{10} in group VH were achieved along with Bromage score 2 or 3, surgery was allowed to start in spinal anesthesia (SA) and time was noted. Even at 15 min if target sensory level is not achieved, but Bromage score is 2 or 3 and no sensation at surgical incision site on pinching with artery forceps, surgery was started in SA with an aim of supplementing it when required. However if there is pain at incision site or Bromage score is <2 then case was declared as *failed* case at the start and converted to general anesthesia (GA). If patient complains of intraoperative pain in SA, supplementation was given as fentanyl 100 mcg/ ketamine (1-2 mg/kg)/ propofol infusion (50 -100 mcg/kg/min) and case was defined as *partial success*. If pain persists the case was converted to GA and declared as *failed* case.

Data recording

- Age, sex, weight, height, indication of surgery, duration of surgery
- Sensory onset (Time taken to achieve T10, time to T6)
- Motor onset (time taken to achieve Maximum Bromage score)
- Peak sensory level, Maximum Bromage score
- Sensory block duration (Time taken to return to S1), Motor block duration (Time taken to return to Bromage score 0)
- Duration of analgesia (Time to first rescue analgesia)
- Incidence of hypotension (systolic blood pressure <90 mmHg), Bradycardia (heart Rate < 60 bpm). They were treated with mephentermine 6 mg and atropine 0.4 mg respectively.
- Adverse effects like pruritus, nausea, vomiting, headache, arrhythmia or other.
- Supplemental analgesia.
- Degree of Success (clinical efficacy) of spinal anaesthesia was graded as-

1. Completely successful (no supplementation needed)
2. Partially successful (fentanyl/ ketamine/ propofol given)
3. Failure (if converted to General Anaesthesia with intubation)

Clinical efficacy (success rate) was calculated in terms of proportion of cases in whom surgery was completed without need of any intraoperative anaesthetic supplementation (completely successful cases), it was presented in percentage as well as descriptive term as per Hopkins scale. As it is difficult to interpret results of efficacy in percentage, Hopkins (2000)[15] gave a complete scale for better understanding of results in effect statistics as follows:

Hopkins Scale[15]

Clinical Efficacy	Trivial	Small /low	Moderate	Large /high	Very large/very high	Near Perfect	Perfect
Coefficient	0.0	0.1	0.3	0.5	0.7	0.9	1
Percentage	0%	10%	30%	50%	70%	90%	100%

Statistical analysis

Data were entered into MS EXCEL and analyzed using SPSS version 17(IBM, Corporations, NewYork, USA). Categorical (qualitative) data were presented as number (proportion) and compared using chi square test. Continuous variables (quantitative) were presented as mean±SD and compared using t – test or ANOVA as per need. $p< 0.05$ was considered as statistically significant.

As this study was non- comparative results of each variable are presented for VH (n=35) and AH (n-=35) separately as well as an overall value in hysterectomies (n=70). *P* value by comparing the findings in VH versus AH are also presented in each table to know whether clinical effect of 20 mg of levobupivacaine in spinal anesthesia are applicable to both surgeries equally, only if $p > 0.05$, hence it should not be misinterpreted as comparative study of VH and AH.

RESULTS

Baseline characteristics

There was no significant difference in mean height, weight and ASA grading of AH and VH patients, *P*> 0.05. VH was performed for UV prolapse in all cases, while AH was performed for varying diagnosis. Mean age of VH patients was significantly higher (*P*= 0.025) and the duration of surgery was also significantly longer in VH as compared to AH. (*P*= 0.0001), [Table 1].

Table 1 Distribution of patients according to demography, type and duration of surgery in both groups

Variables		Group VH (n=35)	Group AH (n=35)	P value
Age (yrs)		46.68±7.98	42.51±7.21	0.025
Weight (kg)		56.17±7.33	56.60±7.71	0.816
Height (cm)		154.54±7.13	155.62±6.56	0.497
ASA grade	**I**	28 (80%)	29 (82.85%)	p=0.7
	II	7 (20%)	6 (17.14%)	
Type of surgery				
Uterovaginal prolapse		35 (100%)	-	
DUB		-	18 (51.42%)	
Fibroid		-	10 (28.57%)	
PID		-	5 (14.28%)	p=0.5
Endometriosis		-	2 (5.71%)	
Total		35 (100%)	35 (100%)	
Duration of surgery (min)		71.77±15.004	50.40±9.305	0.0001

Data presented as Mean±SD or number (percentage) as appropriate

Sensory- Motor Block Characteristics

There was no statistically significant difference in onset, extent and duration of sensory and motor block in both VH and AH groups, *P*>0.05, as shown in Table 2. In our study of 70 patients, time to T10 was 5.56±1.800 min and time to T_6 was 10.71±2.766 min. All patients achieved maximum Bromage score of 3 signifying complete motor block in both groups. Motor onset time (time to achieve maximum Bromage score) was 5.45±1.469 min.

Table 2 Sensory and motor block characteristics

Variables	Group VH (n=35)	Group AH (n =35)	Total (n=70)	P value
Time to T10 (min)	5.83±1.895	5.30±1.705	5.56±1.800	0.257
Time to T6 (min)	11.33±2.604	10.10±2.928	10.71±2.766	0.9
Maximum Bromage score	3	3	3	1
Time to reach Bromage 3 (min)	5.33±1.269	5.57±1.669	5.45±1.469	1.00
Duration of analgesia (min)	181.97±17.109	186.13±21.043	184.13±19.043	0.404
Duration of sensory blockade (min)	272.47±22.01	276.83±31.175	274.65±26.592	0.533
Duration of motor blockade (min)	330.77±32.77	342.63±36.72	340.701±34.74	0.647

Data are presented as mean±SD

Mean and median (range) value of height of sensory block achieved at various time intervals, along with patient distribution is shown in Table 3 for VH and in Table 4 for AH patients. Median value of peak peak sensory level was T10 (T5-T12) at 5 min and T6 (T4-T10) at 10 min, 15 min and at the end of surgery in both groups.

Table 3 Patient distribution according to sensory level achieved at various time intervals in vaginal hysterectomy patients (Group VH, n=35)

	Sensory level	At 5 min	At 10 min	At 15min	At the end of surgery
Patients distribution according to peak sensory level n(%)	T_2	-	-	-	
	T_4	-	-	3(8.75%)	2(5.71%)
	T_5	1(2.85%)	1 (2.85%)	-	9(25.71%)
	T_6	1(2.85%)	24(68.57%)	29(82.85%)	23(65.71%)
	T_7	5(14.28%)	-	-	
	T_8	-	3(8.75%)	2(5.71%)	1(2.85%)
	T_{10}	25(71.42%)	7(20%)	1(2.85%)	
	T_{12}	3(8.75%)	-	-	
Mean±SD		$T_{9.48\pm1.615}$	$T_{6.94\pm1.661}$	$T_{6.05\pm1.027}$	$T_{5.40\pm0.937}$
Range		T_5-T_{12}	T_5 - T_{10}	T_4 - T_{10}	T_4 – T_8
Median		T_{10}	T_6	T_6	T_6

Table 4 Patient distribution according to Sensory level achieved at various time intervals in abdominal hysterectomy patients (Group AH, n=35)

	Peak sensory level	At 5 min	At 10 min	At 15min	At the end of surgery
Patients distribution according to peak sensory level n (%)	T_2				
	T_4		1(2.85%)	1(2.85%)	3(8.57%)
	T_5	1(2.85%)	2(5.71%)	3(8.57%)	10(28.57%)
	T_6	4(11.42%)	25(71.42%)	28(80%)	21(60%)
	T_7				
	T_8		2(5.71%)	2(5.71%)	1(2.85%)
	T_{10}	26(74.28%)	5(14.28%)	1(2.85%)	
	T_{12}	4(11.42%)			
Mean±SD		$T_{9.62\pm1.716}$	$T_{6.57\pm1.558}$	$T_{6.14\pm0.879}$	$T_{5.27\pm1.112}$
Range		T_5 - T_{12}	T_4 - T_{10}	T_4- T_{10}	T_4- T_8
Median		T_{10}	T_6	T_6	T_6

Overall duration of analgesia was 184.13±19.043 min (around 3 hr), sensory block duration was 274.65±26.592 min (4 hr 30 min), and motor block duration was 340.701±34.74 min (6hr). There were no significant differences in these parameters in both VH and AH patients $P > 0.05$, [Table 2]

Analgesic Supplementation and Success rate

As T10 level was required for vaginal hysterectomy and all patients achieved it along with Bromage score of 3. Therefore in all 35 (100%) patients vaginal hysterectomies surgery was accomplished in spinal anesthesia without need of any supplementation (100% complete success rate).

In abdominal hysterectomy group (n=35), target sensory level of T_6 was achieved by 32 (91.43%) patients along with Bromage score 3 and surgery completed in SA without any supplementation (91.42% complete success rate).

Remaining 3 (8.37%) patients in group AH complained of intraoperative pain at the time of uterine manipulation and fentanyl/ ketamine/ propofol supplementation were given as a single dose in 2(2.85%) patients and 1 (1.42%) patient required it twice. In these patients peak sensory level was T8 and T10 respectively at 15 min along with Bromage score 3 with no pain at the incision site. In these patients the sensory level later ascended to T6 and T8 respectively, hence surgery was completed in SA with supplemental analgesia and conversion to GA was not required. These cases were considered as 'partial success' (8.57%).

None of the patients in the study was converted to general anesthesia (0% failure rate).

Clinical Efficacy

Success rate in terms of 'no anesthetic supplementation' was 100% in vaginal hysterectomy and 91.42% in abdominal hysterectomy respectively. As per Hopkins scale isobaric levobupivacaine in dose of 20 mg is a 'perfect' agent for vaginal hysterectomy and it was 'near perfect 'agent for abdominal hysterectomy in spinal anesthesia.

Hemodynamic profile

SBP, DBP, Heart rate and SpO_2 showed no significant fall from baseline throughout the study and remained within 20% of baseline value in both groups. On intergroup comparison there was no significant difference in these vital parameters in both groups $P > 0.05$.

Adverse effects

Incidence of Hypotension was 40% (14/35) in VH and 45.71% (16/35) in AH patients while bradycardia occurred in 5.72% (2/35) patients in VH and 8.57% (3/35) in AH cases which was statistically comparable, p >0.05. Thus overall incidence of hypotension in the study was 42.82% (n=30/70) and bradycardia was 7.14% (n=5/70). These occurred as a single episode and were easily treated with mephentermine (6 mg) and atropine (0.4mg) respectively with a single dose.

None of the patients complained of nausea, vomiting, pruritus, headache, or any other adverse effect.

DISCUSSION

In our study mean age was significantly higher in VH patients as compared to AH patients (p = 0.025). Because uterovaginal prolapse generally occurs in older age, while dysfunctional uterine bleeding, pelvic inflammatory disease, which are indication of AH surgery may occur in lower age group. Duration of surgery was also significantly longer in VH than in AH. Other demographic data were comparable in both. These findingsare similar to previous studies (Sanansilp *et al*, 2012) [12] (Chattopadhyay *et al*, 2013)[13].

We used 20 mg (4 ml of 0.5%) isobaric levobupivacaine in spinal anesthesia, as our study was in hysterectomy patients in whom sensory level of T_4- T_6 is required for trans abdominal hysterectomy, and T_{10} for vaginal hysterectomy but sometimes VH needs to be converted to AH. Sensory motor block in subarachnoid block is dose dependent, therefore maximal doses were selected with an aim of achieving high success rate.

In our study spinal anesthesia was completely successful (no supplementation) in all (100%, n=35) cases in vaginal hysterectomy patients, and in 91.43% (n=32/35) cases in abdominal hysterectomy patients. Remaining 3/35 (8.57%) patients of abdominal hysterectomy group required intraoperative supplementation with ketamine/ propofol/ fentanyl, and considered as partial success. However, none of the case in our study required conversion to general anesthesia with intubation, (0% failure rate).

In our study, time to T_{10} was 5.56±1.80 min, time to T_6 was 10.71±2.76 min and time to B_3 was 5.45±1.469 min, therefore time to allow start of surgery was around 5 min for VH and 10 min for AH. Relatively high success rate in vaginal hysterectomy patients (100%) as compare to abdominal

hysterectomy (91.42%) in present study could be because vaginal hysterectomy surgeries require T_{10} sensory level while abdominal hysterectomy surgeries require T_4/T_6 level.

Chattopadhyay *et al*[13] used 10 mg isobaric levobupivacaine in vaginal hystrectomy and reported success in 21/22 (95%) cases, 1(4.5%) case required supplementation.

Sananslip*et al*[12] compared 15 mg of isobaric versus hyperbaric levobupivacaine in abdominal hysterectomy (AH) and reported success rate was 40% (4/10) with isobaric and 90% (1/10) with hyperbaric levobupivacaine. They documented that isobaric levobupivacaine is not effective for AH patients rather hyperbaric levobupivacaine should be used. Hyperbaric solution are considered more reliable in spinal anesthesia, as they tend to spread to the thoracic kyphosis at approximate T_4 when the patient lay down, regardless of patients height and this pooling facilitate one dose fits all approach (Solakovik *et al*, 2010)[16].

Sananslip *et al*[12] concluded that isobaric levobupivacaine in dosage given (15 mg) was too low to provide analgesia up to T_4 sensory level long time enough. They suggested that further studies should be done to find the optimal dose and to find whether a higher site of needle insertion or a faster rate of injection with measures correlated to gravity can provide better anesthesia for intra-abdominal surgeries which require a sensory level up to T4 and may last up to 3 hours.

High success rate observed in our study (91% in AH, 100% in VH) as compared to above studies (Sananslip[12], Chattopadhyay[13]) could be attributed to two factors-

1) We used high dose (20 mg) as compared to 15mg by Sananslip[12] in AH (40% success) and 10 mg by Chattopadhyay[13] in VH (95% success).
2) We injected spinal drug in L_2-L_3 space in cephalic direction at a faster rate whereas in the above studies they injected drug in L3-L4 space and also cephalic turn of bevel was not done.

These measures also resulted in shortening in the onset time of sensory and motor blockade, achievement of higher peak sensory level and complete motor block, and longer duration of sensory and motor block observed in our study as compared to the above mentioned studies[12,13][Table. 5].

As it is a known fact that isobaric solution remain around the level they are injected, their spread is not gravity dependent and cannot be altered by changing the position of patient (Gori *et al*, 2010)[17]. Higher level of sensory block with isobaric solutions could be achieved if injected at a higher space and in cephalic direction and higher doses of LA are used[12,16].

However, we suggest that future studies should be conducted which compare 15mg versus 20mg, choosing lower space versus higher space, and end of injection is turned cephalic or not, to reach any significant conclusion on this fact.

We also suggest that hyperbaric preparation of levobupivacaine should be made commercially available. As it will increase the height of block, and onset time can be shortened with lower dose of local anesthetic.

In our study, isobaric levobupivacine (20 mg) in spinal anaesthesia was found safe. As expected, a decrease in blood pressure, and heart rate attributable to sympathetic block accompanying spinal anaesthesia were the only adverse effects observed in the study. No cases of cardiac depression or central nervous system toxicity caused by vascular absorption or direct intravascular injection of local anaesthetic (levobupivacaine) occurred.

In spinal anaesthesia, an effective block is achieved with small dose of local anaesthetic and the potential for systemic toxicity of local anaesthetic is small. However, if unintentional intravascular injection occurs the drug with minimum toxicity should be preferred. Evidence suggest that levobupivacaine has reduced potential of myocardial depressionand arrythmogenicityand provide greater margin of safety than racemic bupivacaine as proved in animal studies (Santos *et al*, 2001) [4,]as well as human volunteer studies (Bardsley *et al*, 1998)[18].

CONCLUSION

We conclude that isobaric levobupivacaine (20 mg) in spinal anaesthesia produced effective sensory and motor blockade of sufficient duration with stable hemodynamic profile to accomplish abdominal and vaginal hysterectomy. Owing to its less cardiac-neurotoxicity it could be an enrichment to anaesthetic arena.

Table 5 Comparison of Sensory, Motor characteristics and Success rate of various studies

Study		Sensory Onset		Motor Onset	Peak Sensory Level		Sensory block duration (min)	Motor block duration (min)	Success rate
		Time to T10 (min)	Time to T4/T6 (min)	Time to B3 (min)	At 5 min	At 15 min			
Sananslip et al Abdominal hysterectomy	Isobaric levobupivacaine (15 mg)	6.6±4.7	10±7.1	13.6±7.3	L1	T7	*Regression to T10* 160±50.4	*Regression to B2* 143.3±74.7	40%
	Hyperbaric levobupivacaine (15 mg)	2.8±1.1 $P = 0.039$	9.1±3.7	8.2±6.8 $P = 0.064$	T8	T4	158.9±60	102.4±20.9	90%
Chattopadhayay Vaginal hysterectomy	2 ml 0.5% isobaric levo (10 mg)	6.9±1.7	-	8.9±5	T8 (T10-T6)		150.6±14	130.6±12	95%
	4 ml 0.25% isobaric levo (10 mg)	6.4±1.5 $P>0.05$	-	12.8±7 $P<0.05$	T8 (T10-T6) $P>0.05$		121.4±10	108.8±11	95%
Our Study 20mg (0.5%) isobaric Levobupivacaine	Abdominal Hysterectomy	5.30±1.71	10.10±2.93	5.57±1.67	T10($T_{9.62\pm1.716}$)	T6($T_{6.095\pm1.906}$)	*Regression to S1* 276.83±31.17	*Regression to B0* 342.63±36.72	91.42%
	Vaginal Hysterectomy	5.83±1.90 $P = 0.257$	11.33±2.60 $P = 0.9$	5.33±1.27	T10($T_{9.48\pm1.615}$)	T6($T_{6.05\pm1.027}$)	272.47±22.01	330.77±32.77	100%

References

1. Albright GA. Cardiac arrest following regional anesthesia with etidocaine or bupivacaine. Anesthesiology 1979; 51:285-7.
2. Leone S, Cianni S D, Casati A, Fanelli G. Pharmacology, toxicology, and clinical use of new long acting local anesthetics, ropivacaine and levobupivacaine. Acta Biomed 2008; 79: 92-105.
3. Camorcia M, Capogna G, Berritta C, Columb MO. The relative potencies for motor block after intrathecal ropivacaine, levobupivacaine and bupivacaine. AnesthAnalg 2007; 104(4):904-7.
4. Santos AC, De Armas PI. Systemic toxicity of levobupivacaine, bupivacaine and ropivacaine during continuous intravenous infusion to nonpregnant and pregnant ewes. Anesthesiology 2001; 95:1256-1264.
5. Coppejans HC, Vercavteren MP. Low dose combined spinal-epidural anesthesia for caesarean delivery. A comparison of three plain anesthetics. Acta Anesthesiol Belg 2006; 57:39-43.
6. Lyons G, Columb M, Wilson RC, Johnson RV. Epidural pain relief in labour: Potencies of levobupivacaine and racemic bupivacaine. *Br J Anaesth* 1998; 81:899-901.
7. Huang YF, Pryor ME, Mather LE, Verring BT. Cardiovascular and central nervous system effects of intravenous levobupivacaine and bupivacaine in sheep. AnesthAnalg 1998; 46:245-9.
8. Turkmen A, Molralar DG, Ali A, Altan A. Comparison of the anesthetic effects of intrathecal levobupivacaine fentanyl and bupivacaine + fentanyl during caesarean section. *Middle East J Anesthesiol* 2012; 21:577-582.
9. Cuvas O, Basar H, Yeygel A, Turkyilmaz E, Sunay MM. Spinal anesthesia for transurethral resection operations : levobupivacaine with or without fentanyl. *Middle East J Anesthesiol* 2010; 20:547 -552.
10. Herrera R, de Andres J, Estan L, Morales Olivas FJ, Martinez-Mir I, Steinfeldt T. Hemodynamic impact of isobaric levobupivacaine versus hyperbaric bupivacaine for subarachnoid anesthesia in patients aged 65 and older undergoing hip surgery. BMC Anesthesiol 2014; 14:97 (11 pages) http://www.biomedcentral .com/1471-2253/14/97.
11. D'Souza AD, Saldanha NM, Monteiro AD, Harshavardhan H. Comparison of intrathecal hyperbaric 0.5% bupivacaine, isobaric 0.5% levobupivacaine and isobaric 0.75% ropivacaine for lower abdominal surgeries. *Int J Health Sci Res* 2014; 4(1): 22-29.
12. Sanansilp V, Trivate T, Chomubai P, Visalyaputra S, Suksopee P, Permpolprasert L, Bormann BV. Clinical characteristics of spinal levobupivacaine: hyperbaric compared with isobaric solution. *The Scientific World Journal* 2012; Vol.2012. Article id 169076, 7 pages. http://dx.doi.org/10.1100/2012/169076.
13. Chattopadhyay S, Halder S, Saha GC, Karmakar S, Pahari S. Comparison of two concentrations of isobaric intrathecal levobupivacaine for vaginal hysterectomy. *Indian J Pain* 2013; 27(3):154-158.
14. http://stattrek.com/m/sampling/sampling-distribution.aspx
15. Hopkins, W. G. (2000). A new view of statistics. Internet Society for Sport Science: http://www.sportsci.org/ resource/stats.
16. Solakovic N. Level of sensory block and baricity of bupivacaine 0.5% in spinal anesthesia. Med Arch 2010; 64(3):158-60
17. Gori F, Corradetti F, Cerotto V and Peduto VA. Influence of Positioning on Plain Levobupivacaine Spinal Anesthesia in Cesarean Section. Anesthesiology Research and Practice. Volume 2010, Article ID 212696, 4 pages.
18. Bardsley H, Gristwood R and Baker H. A comparison of the cardiovascular effects of levobupivacaine and rac-bupivacaine following intravenous administration to healthy volunteers. *Br J Clin Pharmacol* 1998; 46:245–9.

****

How to cite this article:

Naithani U *et al*., Clinical Efficacy of Isobaric Levobupivacaine in Spinal Anaesthesia for Abdominal and Vaginal Hysterectomies. *Int J Recent Sci Res.* 7(7), pp. 12555-12560.