INTRODUCTION

The aim of postoperative pain management is to provide subjective comfort in addition to inhibiting trauma-induced nociceptive impulses to blunt autonomic and somatic reflex responses to pain. Brachial plexus block remains the only practical alternative to general anaesthesia for significant surgery on the upper limb. It provides a superior quality of analgesia and avoids the common side-effects associated with general anaesthesia such as postoperative nausea and vomiting. The brachial plexus supravacular block is extremely useful in patients with significant co-morbidities such as severe respiratory and cardiovascular disease, morbid obesity and those with potential airway difficulties.

These blocks are therefore particularly useful in the ambulatory surgical setting for a wide variety of patients and procedures\(^1\). Various local anaesthetic agents like bupivacaine, levobupivacaine, ropivacaine and lignocaine have been used with safety and efficacy in performing such blocks. Out of various agents which are used for brachial plexus block, levobupivacaine is the agent which not only prolongs motor and sensory blockade but is also less cardiotoxic and neurotoxic. The study was done with an objective to estimate the duration of analgesia and the requirement of rescue analgesia post operatively after inducing the patient with 0.5% levobupivacaine in comparison to 0.25% of levobupivacaine. There were a total of 60 participants of which there were 14 male patients in group L50 and 15 in group L25 as compared to female patients being 16 and 15 in groups L50 and L25. The mean duration of surgery in group L50 was 58.83± 27.41 minutes and 40.93 ±17.90 minutes in group L25 (P=0.001). The number of demands for rescue analgesia were lower in group L50 compared to L25.

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operatively after inducing the patient with 0.5% levobupivacaine in comparison to 0.25% of levobupivacaine.

**METHODOLOGY**

**Study design**
Observational Cross-sectional study

**Study Site**
Department of Anaesthesia, Dr RPGMC Kangra at Tanda

**Inclusion criteria**
1. Males and females between the age group 18-60 years.
2. ASA physical class I-II.
3. Body Mass Index 18.5-29.9 kg/m2
4. Patients who underwent open reduction and internal fixation for fractures of lower end humerus and forearm bones

**Exclusion criteria**
1. Patients on steroids
2. Body Mass Index>30 kg/m2
3. Local infections or anatomic deformities
4. Coagulation disorder and allergy to local anaesthetics

**Randomization**
Randomization was done by computer generated randomized number table. Random numbers were enclosed in a sealed opaque envelope and opened by one of the investigators to know the study drug/combination to be administered, only after shifting of patient inside operation theatre. Observer anaesthesiologist who collected the postoperative data was blinded to the test.

**Procedure**
Standard monitoring was established with starting of peripheral intravenous (IV) line by 18G cannula in contralateral hand on arrival to operation theatre. Patients were continuously monitored with ECG, heart rate, NIBP (noninvasive blood pressure) and pulse oximetry. Patients were placed in supine position and head turned away from the side to be blocked. After proper positioning of patient and under all aseptic precautions, ultrasound guided supraclavicular brachial block was performed using linear probe of 8-12 Hz of a Micromaxx sonosite ultrasound machine. The sixty-eight enrolled patients after fulfilling all the inclusion criteria were randomly divided into 2 groups. Group L50 (n=32) received 19 mL of 0.5% levobupivacaine plus dexamethasone 4 mg (total volume = 20 mL). Group L25 (n=36) received 19 mL of 0.25% of levobupivacaine plus dexamethasone 4 mg (total volume = 20 mL). Eight patients were excluded because of partial block.

**RESULTS**
A total of 68 patients in two groups each received levobupivacaine 0.5%, levobupivacaine 0.25% with perineural dexamethasone 4 mg to obtain the USG guided supraclavicular block and comprised the Groups L50 and L25 of study. Total number of patients enrolled during the study period was 68 in the two groups being 32 and 36 in groups L50 and L25 respectively. The number of patients who had partial blocks or failed blocks were 6 in group L25 and 2 in group L50. After excluding these patients, the total number of patients taken for study was 30 in each group. The patients’ age ranged from 24 to 65 years in L50 group and 21 to 66 years in L25 group. The mean age of the patients in L50 group (46.27±12.91 years) was comparable to the mean age of the patients in L25 group (41.63±11.64; P=0.150). There were 14 male patients in group L50 and 15 in group L25 as compared to female patients being 16 and 15 in groups L50 and L25. There were 51% females and 49% males, nearly in a male to female ratio of 1:1. The mean duration of surgery in group L50 was 58.83±27.41 minutes and 40.93±17.90 minutes in group L25 (P=0.05) and we observed a statistically significant difference in the duration of surgery. The pain free period was defined as time interval between test drug administration up to first rescue analgesic requirement in minutes recorded. Pain assessment was done using VAS intra-operatively every 10 minutes. Patients were educated about the 10-point Visual Analogue Scale (VAS) where 0 was no pain and 10 was worst imaginable pain.

**Pain Free Period**
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**Rescue analgesic requirement**
When VAS score was more than 3, injection diclofenac 75 mg iv (intravenous) was administered as an infusion in 100 mL normal saline. At the end of 24 hours study period total rescue analgesic required was recorded.

**Statistical Analysis**
The data was collected and cleaned using MS Excel 2010 and statistical analysis was done using SPSS software 21. The One-Sample Kolmogorov-Smirnov Test was used for assessing the data distribution in the study. The quantitative data was expressed using mean and standard deviation. The qualitative data was expressed in frequencies and proportions. A comparison between the two groups was done using independent t-test. A p-value of less than 0.05 was considered to be statistically significant.
Our study also studied the requirement of rescue analgesia. The requirement of rescue analgesia was significantly higher in the patients in L25 group in comparison to the requirement of rescue analgesia in L50 group (median [range]: 4.0 [3.0-4.0] vs. 2.0 [1.0-2.0]; P=0.001).

Baseline mean PR in groups L50 and L25 was 80.67 (SD=8.98) beats per minute and 82.17 (SD= 10.68) beats per minute respectively, showing no significant inter group difference statistically (P=0.675). There was no statistically significant difference between the groups at any intraoperative time intervals (P>0.05). (Table 1).

Table 1: Mean Heart Rate (In Beats per Minute) Of the Study Participants during the Intraoperative Period (n=30)

<table>
<thead>
<tr>
<th>Time Interval</th>
<th>Group L50 (n=30)</th>
<th>Group L25 (n=30)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
</tr>
<tr>
<td>Baseline</td>
<td>80.67</td>
<td>8.98</td>
<td>82.17</td>
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<tr>
<td>5 min</td>
<td>80.83</td>
<td>8.84</td>
<td>81.23</td>
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<tr>
<td>10 min</td>
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<tr>
<td>15 min</td>
<td>79.13</td>
<td>9.12</td>
<td>80.10</td>
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<tr>
<td>25 min</td>
<td>78.03</td>
<td>8.21</td>
<td>78.73</td>
</tr>
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<td>35 min</td>
<td>77.43</td>
<td>7.48</td>
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<td>45 min</td>
<td>76.28</td>
<td>6.98</td>
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</tr>
<tr>
<td>60 min</td>
<td>75.73</td>
<td>7.81</td>
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<tr>
<td>90 min</td>
<td>77.06</td>
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</tr>
<tr>
<td>120 min</td>
<td>75.17</td>
<td>9.64</td>
<td>80.00</td>
</tr>
</tbody>
</table>

Baseline mean MAP in groups L50 and L25 was 88.60 (SD=9.78) and 91.57 (SD=11.06) mm of Hg respectively showing no significant inter group difference statistically (P=0.097). There was no significant difference in MAP at any intraoperative time (P>0.05). (Figure 1)

**DISCUSSION**

Regional anaesthesia allows a procedure to be done on a region of body without your being unconscious. Ultrasonography has revolutionized the practice of regional anaesthesia. With the advent of ultrasound and with real time needle visualization, supraclavicular brachial plexus block has changed from an approach with the highest risk of pneumothorax to a block with minimal risks, making it the ideal choice for most upper extremity surgeries. Abrahams et al.,6 confirmed the advantages of ultrasound guided supraclavicular block over nerve stimulator. It has also been reported that that supraclavicular nerve blocks were performed faster with ultrasound guidance when compared with nerve stimulation7.

Baskan et al.,5 reported that posterior interscalene brachial plexus block with 0.25% levobupivacaine and 0.25% bupivacaine at a dosage of 100 mg provides comfortable anaesthesia and analgesia for shoulder surgery. Therefore, we intended to use two different volumes of levobupivacaine (0.5% vs. 0.25%) in patients posted for elbow, forearm and hand in randomized control surgeries study. In addition, Gupta et al.,9 has suggested that it is the volume of bupivacaine rather than the concentration which is the
major determinant of the ED50 for achieving supraclavicular brachial plexus block.

Srinivasa Rao et al., reported that the addition of dexamethasone to 0.5% levobupivacaine significantly improved the quality of analgesia following interscalene block. The meta-analysis by Kirkham et al., suggested that 4 mg of perineural dexamethasone represents a ceiling dose and prolongs analgesia by a mean period of 6 and 8 hours, when combined with short-/intermediate- or long-acting local anaesthetics, respectively; higher doses failed to provide additional analgesic duration. Furthermore, it has been established in a meta-analysis that increasing perineural dexamethasone dose above 4 mg does not have any clinical impact.

In our study, time from completing block to the time to first rescue analgesia demanded (VAS>3) was taken as total duration of analgesia. In our study, median duration of analgesia in L50 group was 567.00 minutes in comparison to L25 group which was 229 minutes. The duration of analgesia between the groups was significantly higher in L50 group.

In our study, media dose of total doses of rescue analgesia was 150 mg in L50 group and 225 mg in L25 group. In the study by Hashim and Hassan, mean total dose of rescue analgesia was 84.1 mg, 110.5 mg, and 170 mg in group DB (dexametomidine and bupivacaine), KB (ketamine and bupivacaine), and FB (fentanyl and bupivacaine). In their study, they have used VAS more than 4 for administration of rescue analgesia.

We observed that with levobupivacaine 0.25% in USG guided supraclavicular block with 4 mg dexamethasone as perineural adjuvant, patients started complaining discomfort at the time of tourniquet application after 30 minutes approximately. Therefore, we used 0.25% levobupivacaine in superficial surgeries with duration lasting less than 60 minutes, and in surgeries where tourniquet application was not required.

In another study, When patients were administered with bupivacaine 0.5%, duration was 1053 min (802–1304 min); in levobupivacaine 0.5% group, duration was 1001 min (844–1158 min); and levobupivacaine 0.25% group had duration of 707 min (551–863 min) [P=0.01]. The authors recommended levobupivacaine 0.5% instead of bupivacaine 0.5% for the three-in-one block as supplement to spinal or general anaesthesia.

CONCLUSION
The duration of postoperative analgesia determined by time for first rescue analgesic requirement was significantly prolonged in group L50 compared to group L25. This prolongation was concentration dependent and irrespective of adjuvant. The number of demands for rescue analgesia were lower in group L50 compared to group L25. There was no significant change in the vital parameters of all the patients under study both intraoperatively and postoperatively. 0.5 % levobupivacaine has better therapeutic profile as compared to 0.25% levobupivacaine without any significant side effects in USG guided supraclavicular brachial plexus block for upper limb orthopedic surgeries.

REFERENCES
10. Nallam SR. Interscalene brachial plexus block: comparison of efficacy of varying doses of...