Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/5dwmg995

A COMPARATIVE STUDY OF DEXMEDETOMIDINE AND DEXAMETHASONE AS AN ADJUVANT WITH LEVOBUPIVACAINE FOR SUPRACLAVICULAR ULTRASOUND GUIDED BLOCK IN TERTIARY CARE HOSPITAL

Dr Sukriti Atram[1*], Dr Poonam Vasantrao Nakaskar[2], Dr Mayur Masurkar[3]

[1*]Associate Professor, Department of Anaesthesia and critical care, Grant Government Medical College, Mumbai
[2]Senior Resident, Department of Anaesthesia, GMC, Akola
[3]Senior Resident, Department of Anaesthesia, Trauma care centre, Jogeshwari, Mumbai

Abstract

Background:
The search for newer and safer anaesthetic agents has always been a key priority in anaesthesiology. Levobupivacaine, the pure S (-) enantiomer of bupivacaine, has emerged as a safer option for regional anaesthesia compared to its racemic counterpart. Additionally, various adjuvants have been used alongside local anaesthetics to shorten the onset time and extend the duration of analgesia in brachial plexus blocks. However, there is limited research on the use of Dexmedetomidine and Dexamethasone as adjuvants with Levobupivacaine.

Aims: The primary aim of the study is to know the effect of Dexmedetomidine and Dexamethasone as an adjuvant to Levobupivacaine in supraclavicular brachial plexus block.

Methods: A descriptive, observational study was conducted on 60 ASA Grade I and II patients undergoing upper limb surgeries under supraclavicular brachial plexus block using an ultrasound machine. The patients were randomized into two groups of 30 each to receive either Dexmedetomidine 20 ug [group M] or Dexamethasone 4mg [group A] as an adjuvant to Levobupivacaine. The effect of Dexmedetomidine and Dexamethasone as an adjuvant to Levobupivacaine in Supraclavicular Brachial Plexus Block with regards to onset and duration of motor and sensory block, duration of analgesia, need for rescue analgesia and number of rescue analgesia in first 8 hours after surgery was evaluated.

Results: The mean onset time for sensory block in our study group M was 5.10 ± 1.16 minutes
The mean duration of sensory block in our study group M was 12.70 ± 0.84 hours
The mean onset time for sensory block in our study group A was 2.20 ± 0.89 minutes
The mean duration of sensory block in our study group A was 14.17 ± 1.02 hours
The mean onset time for motor block in our study group M was 6.97 ± 1.10 minutes
The mean duration of motor block in our study group M was 11.63 ± 0.81 hours
The mean onset time for motor block in our study group A was 3.17 ± 1.14 minutes
The mean duration of motor block in our study group A was 13.10 ± 0.99 hours
The mean duration of analgesia in our study group M was 13.43 ± 0.73 hours
The mean duration of analgesia in our study group A was 15.00 ± 0.74 hours

Conclusion: Dexmedetomidine and Dexamethasone can be effectively and safely used as an adjuvant to Levobupivacaine (0.5%) in USG guided Supraclavicular block in patients undergoing forearm orthopaedic surgeries. There was no statistical difference in the onset of sensory and motor

blockade However, due to paucity of studies in literature, there is still scope for further study using different drug dosage strengths.

Keywords: Supraclavicular block, Dexamethasone, Dexmedetomidine, USG, Levobupivacaine.

Introduction

Brachial plexus block is a commonly used approach for upper limb surgeries as an alternative to General Anaesthesia. Brachial plexus provides a major part of sensory and motor innervation to upper limb; hence it is an effective method of providing Anaesthesia from shoulder to finger tips. (1)

Past 2 decades, the Pheripheral nerve stimulator was the gold standard for nerve localization in regional anesthesia. Though, with recent time, high-frequency imaging, the use of Ultrasound (US) technology has significantly increased for nerve localization (2,3). Use of Ultrasound has become the Golds standard since it enables clinicians to deposit the Local Anaesthetic close to the nerves in real time and usually devoid of complications, its advantages, including avoidance of intraneuronal/intravascular injection, faster onset times, improved block quality, decreased pain from muscular contractions, prolonged postoperative analgesia, and decreased need for rescue analgesics (4,5).

Levobupivacaine, the pure S (—)-enantiomer of Bupivacaine, emerged as a safer alternative for regional anesthesia than its racemic parent. It demonstrated less affinity and strength of depressant effects on myocardial and central nervous system in pharmacodynamic studies, and a superior pharmacokinetic profile. Reports of toxicity with Levobupivacaine are scarce and occasional toxic symptoms are usually reversible with minimal treatment with no fatal outcome. (6)

Perineural Dexamethasone prolonged the durations of analgesia and motor blockade when used with Local Anaesthetics. It Decreased nociceptive C-fibre activity via a direct effect on Glucocorticoid receptors and inhibitory potassium channels is probably the mechanism of action of Dexamethasone. Some authors suggest a local vasoconstrictive effect which results in reduced local anesthetic absorption (7)

Dexmedetomidine is an alpha-2-adrenergic receptor (α2- AR) agonist. It promotes sedation, hypnosis, analgesia, sympatholysis, neuroprotection and inhibition of insulin secretion. (8)

Dexmedetomidine exerts analgesic effects at the spinal cord level and at supraspinal sites. It causes activation of alpha-2A receptors, inhibition of the conduction of nerve signals through C and Aδ fibres and the local release of encephalin (9).

Aim & Objectives

The primary aim of the study is to compare Dexmedetomidine and Dexamethasone as an adjuvant with Levobupivacaine for supraclavicular USG guided block.

The objective of the study is to assess and compare the efficacy of Dexamethasone or Dexmedetomidine when added to Levobupivacaine in Supraclavicular brachial plexus block for upper limb surgeries with regard

1. Onset time for complete sensory blockade
2. Onset time for complete motor blockade
3. Duration of analgesia
4. Duration of motor blockade.
5. Hemodynamic variables (HR, BP, O2 saturation)
6. Adverse effects of Dexmedetomidine and Dexamethasone when used in combination with Levobupivacaine

Methods

In this Descriptive Observational study, after obtaining approval from institutional Ethics committee and written informed consent from all the patients, this prospective blind randomized control study

including 60 adult patients aged 18-65 years of both gender with ASA I and II, scheduled for elective moderate duration surgery was initiated.
The patients were randomized into two groups of 30 patients each, to receive either Dexmedetomidine [group M] or Dexamethasone [group A] as an adjuvant to Levobupivacaine. Patients had undergone pre-anaesthetic checkup for detailed history, examination, and appropriate investigations. Patients were fasting for at least 8hr before surgery. On arrival to the operation theater, 18 G intravenous access were established and lactated Ringer 's intravenous infusion was started at the rate of 6–8ml/kg for all patients to replenish the overnight fasting.
Group allocation was done according to computer generated random number table.

Standard monitoring comprising non-invasive blood pressure (BP), heart rate (HR), ECG, and pulse oximetry (SpO2) were instituted for all patients throughout the surgical procedure. A few patients required IV midazolam 0.03 mg/ kg before the block for anxiolysis.

According to group allocation patients will receive either of the following:
Group M: will receive 30 ml of 0.5% Levobupivacaine with 0.2 ml (20ug) of Dexmedetomidine.
Group A: Will receive 30 ml of 0.5% Levobupivacaine with 1ml (1ml=4mg) of Dexamethasone

Patients were instructed to lie in supine position with arms by side of body. A bolster was placed below the shoulder and head was turned to opposite side so anatomy of patient's Supraclavicular area will be better studied using ultrasound machine. After aseptic patient preparation of the area, at a point 1.5 to 2.0 cm posterior and cephalad to midpoint of clavicle, subclavian artery pulsations will be felt. A skin wheel will be raised with local anaesthetic (lignocaine 2% 1.5 ml) cephalo posterior to pulsations. The USG probe was cleaned with antiseptic solution and covered with sterile transparent tegadem. With the patient in the proper position the transducer is positioned in the transverse plane immediately superior to the clavicle at approximately its midpoint. The transducer is tilted caudally to obtain a cross-sectional view of the subclavian artery. The brachial plexus is seen as a collection of hypoechoic oval structures lateral and superficial to the artery. A 22 gauge, 1.5 inches short beveled needle is then inserted in-plane toward the brachial plexus, in a lateral-to-medial direction. After proper placement of the needle under USG guidance and negative aspiration of blood the study drug is injected slowly in quantities of 5 ml intermittently with total drug of 30 ml ,then antiseptic solution dressing was applied at the needle prick site and bolster was removed. Parameters like Pulse, BP, Spo2 were noted. Surgery was started after complete nerve blockade at the surgical site. I.V fluids were given according to the Nill by mouth (NBM) status of the patient.

Onset of sensory block: Sensory block was assessed by loss of sensation to pinprick in the midline using a 22-gauge blunt hypodermic needle every minute using
Hollmen scale:

Hollmen scale:
- 1 - normal sensation of pinprick,
- 2 - pin prick felt as sharp pointed but weaker compared with the same area in the other limb
- 3 - pin prick recognized as touch with blunt object
- 4 -no perception of pin prick.

A sensory block of scale 3 was considered as an endpoint for surgery. The onset of sensory block was taken as the time from injection of drug to Hollmen sensory scale of 2. Duration of sensory block was taken as the time elapsed between performing the block to regression of sensory block and scale of ≤ 2.
The onset of sensory block can also be assessed using the pinprick method using a 25 G hypodermic needle in the appropriate area using a three-point scale for pain (2, sharp pain; 1, blunt pain; and 0,

no pain) and the onset time of sensory block will be the time from completion of the injection to first loss of pinprick sensation.

1. **Onset of motor block:** Defined as the time from end of injection to the inability of the patient to move his/her fingers and raise the hand. Motor block was measured at 0, 5, 10, 20, 30 and 40 minutes. A **Modified Lovett rating scale** was used for assessing motor block, ranging from 6 (usual muscular force) to 0 (complete paralysis). Thumb abduction is evaluated for the radial nerve, thumb adduction for the ulnar nerve, thumb opposition for the median nerve and flexion of elbow for the musculocutaneous nerve.

Lovett Rating Scale:
6-Normal muscular force.
5- Slightly reduced muscular force.
4- Pronounced reduction of muscular force
3-Slightly impaired mobility
2-Pronounced mobility impairment.
1- Almost complete paralysis.
0- Complete paralysis

Motor block can also be assessed using **Hollmen scale** (1 - normal muscle action, 2 - slightly weak muscle action, 3 - very weak muscular action, and 4 - complete loss of muscle action). A motor block of scale 3 will be considered as an endpoint for the surgery. The onset of motor block will be taken as the time from injection of drug to Hollmen motor scale of 2. Duration of motor block will be taken as time elapsed between performing block to regression of motor scale and lower degree.

2. Duration of analgesia: The duration of analgesia is assessed by using an 11-point (0-10) VERBAL NUMERIC RATING SCALE (VNRS) in which a score of ―0 indicates―no pain and a score of ―10 indicates the ―worst pain imaginable.‖ The VNRS measurements were obtained at baseline (before placement of the block), at the time of skin incision, at the completion of the surgical procedure, and at hourly interval upto 12 hours following placement of the block. Duration of post-operative analgesia was taken till the time patient asked for rescue analgesia (VNRS>3).

3. Duration of motor block: Defined as time interval from onset of motor blockade to the time when the patients will be able to lift their hand and move their fingers with normal muscle power. Motor block can be assessed hourly for 24 hours in the postoperative room. **4. Hemodynamic monitoring**: Intraoperative hemodynamic parameters and blood loss is recorded by an observer not participating in the study. Hypotension (systolic blood pressure <80 mmHg) was managed with crystalloids and IV boluses of 3 mg of Mephentermine. Bradycardia (pulse rate <50/min) can be managed with IV Atropine 0.6 mg.

5. Adverse effects: All the patients were observed for side effects such as nausea, vomiting, block site hematoma, local anaesthetic toxicity like light-headedness, dizziness, tinnitus, disorientation, drowsiness, generalized muscle twitching, convulsions, respiratory depression, and cardiovascular depression.

Patients were monitored for any drug related side effects and immediate block related complications. Intraoperative monitoring of parameters was done by an observer who is not participating in the study. Post operative monitoring in the recovery room, at 4 hours and at 8 hours in the ward was done by the same observer. If there is sparing of dermatomes in the region of surgery in any patient, the block was supplemented with midazolam (0.05 mg/kg) After surgery patients were shifted to recovery room and monitored for one and half hour If all the parameters like Pulse, BP, SPO2 were within normal limits then patient was shifted to ward.

6. Postoperative Monitoring: Postoperative pain can be assessed by visual analogue scale (VAS) at 2 h, 4 h, 6 h, 8 hr after surgery. Whenever VAS score reached ≥4, rescue analgesia will be given in the form of I.V. injection paracetamol.

VAS score will be determined as 0 - no pain, 1–3 - mild pain, 4–7 - moderate pain, and 8– 10 - severe

pain. HR, SBP, and DBP were also recorded at 0, 5, 10 ,15, 30, 45, 60, 75, 90,120 ,180 and 240 min. Adverse effects comprised hypotension (i.e., 20% decrease relative to baseline), bradycardia (i.e., 20% decrease relative to baseline), nausea, vomiting, and hypoxemia (SpO2 <90%). The decoding of the groups is done at the end of the study followed by statistical analysis of the results. After completion of the study, the results were statistically analyzed using Chi-square test for nonparametric data and Student unpaired *t*-test for parametric data for inter-group comparison.

. **Post operatively following scores will be noted –**

1. VISUAL ANALOGUE SCALE:

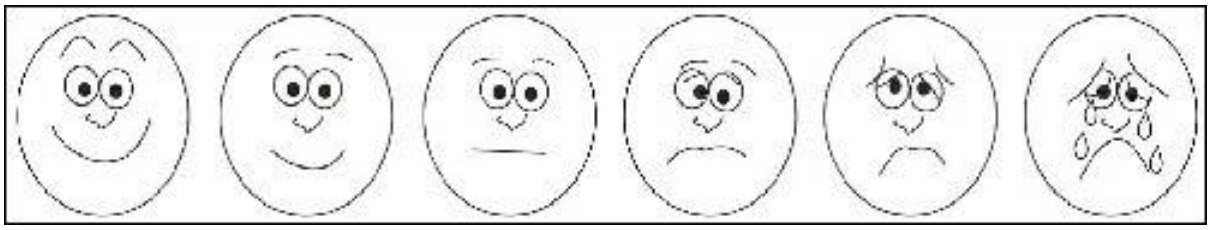


Table no. 1

0	2	4	6	8	10
Very happy	Hurts just a little bit	Hurts a little more	Hurts even more	Hurts a whole lot	Hurts as Much as

2 NUMERIC PAIN SCORE:

Table no. 2

0	1	2	3	4	5	6	7	8	9	10
No	Mild	Mild	Mild	Mod	Mod.	Mod.	Severe	severe	Severe	Severe
pain	pain	pain	pain	Pain	Pain	pain	pain	pain	pain	pain

Statistical analysis

Data was recorded in printed proforma. After data collection, data entry was done in Microsoft Excel. Data analysis was done with the help of SPSS Software version 24. Continuous variables were expressed as mean ± SD values, qualitative data was expressed as frequency and percentage. Association between qualitative data was assessed with Pearson chi square test and association between continuous variables was assessed using independent t test. Probability value (p value) was used to determine the level of significance p value < 0.05 was considered as significant, p value < 0.01 was considered as highly significant.

Results

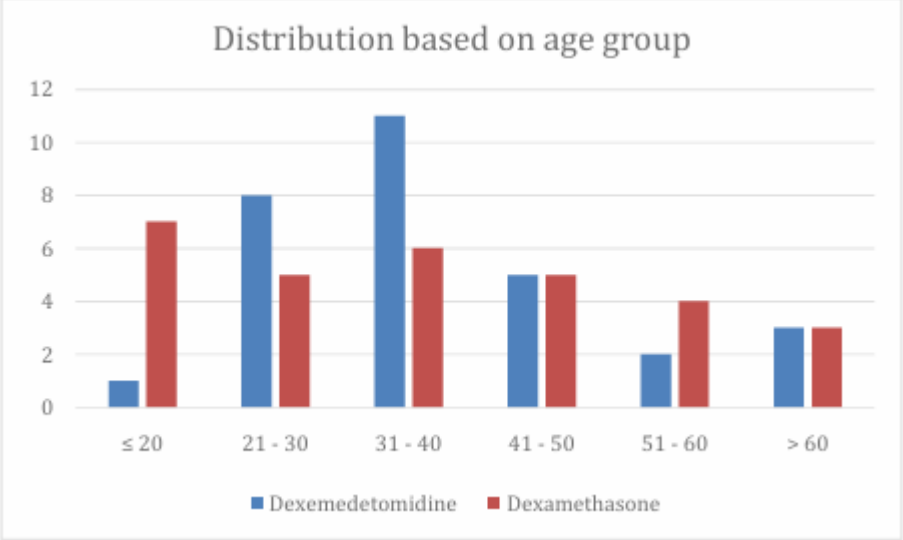
60 patients aged 18yrs – 60yrs of physical status ASA grade 1 and ASA grade 2 undergoing elective upper limb surgeries were selected. Block was successful in all the patients, and all the enrolled patients completed the study.

Demographic variables and vital parameters

1. No of patients

* Age 18-40 years 38 (63.33%)
* Age 41-60 years 22 (36.66%)

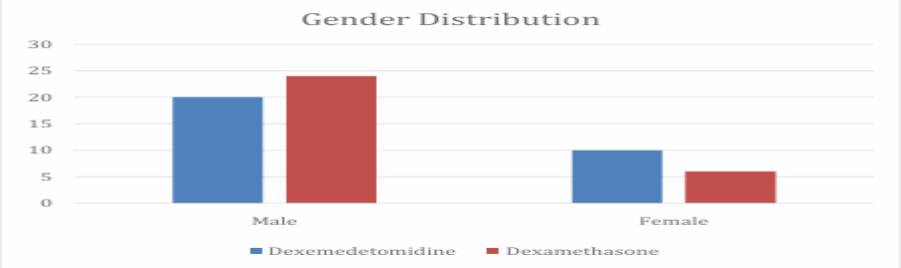
Graph 1



2. Gender

* Males 44 (73.33%)
* Females 16 (26.66%)

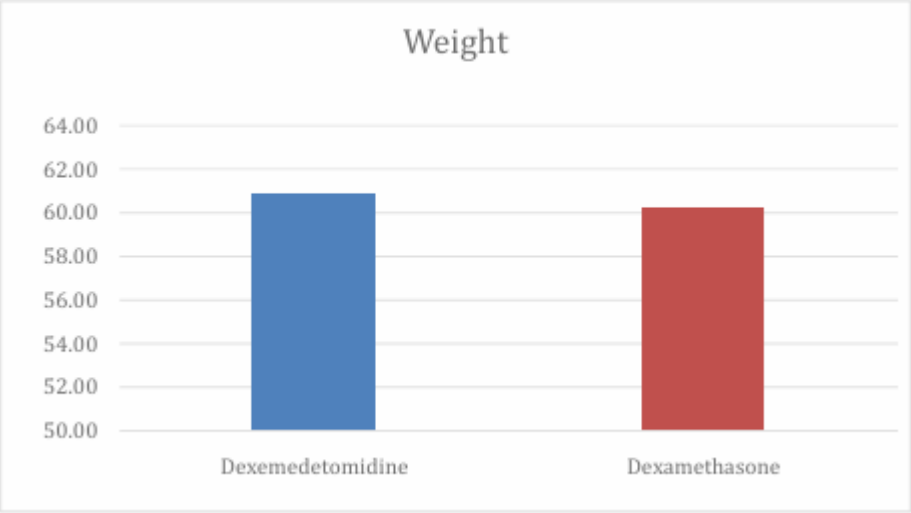
Graph 2



3. Mean weight (kgs)

- Group M 60.8 ± 7.05
- Group A 60.2 ± 9.83

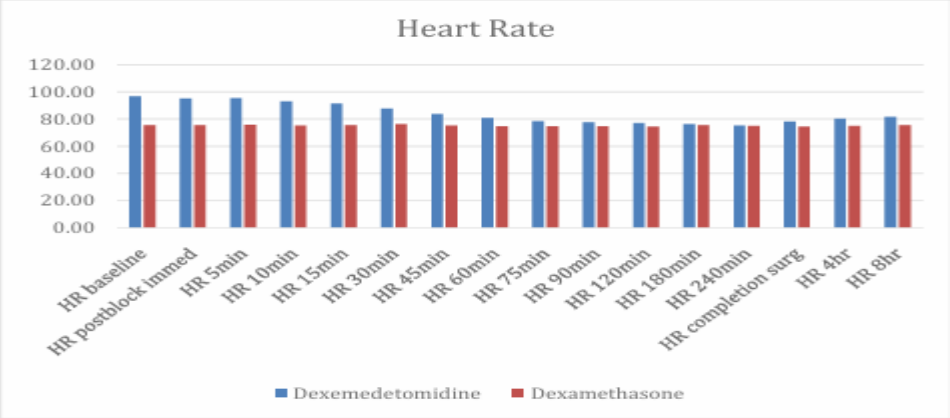
Graph 3



4. Mean baseline heart rate (minutes)
- Group M 96.60 ± 7.70
- Group A 75.57 ± 7.50

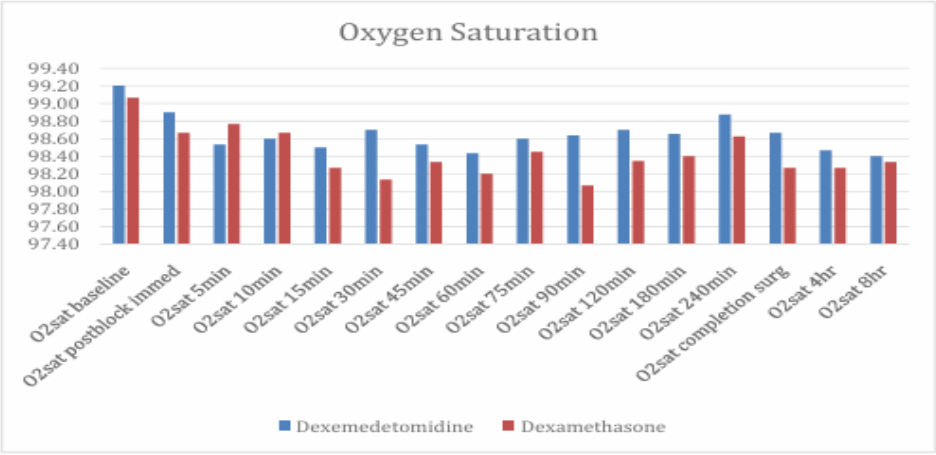
The lowest mean heart rate was
- Group M 75.13 ± 3.36 at 240 the min after giving block
- Group A 74.31 ± 6.76 at 120 the min after giving block

Graph 4



5. Mean Baseline Spo2
- Group M 99.20 ± 0.76 %
- Group A 99.07 ± 0.64

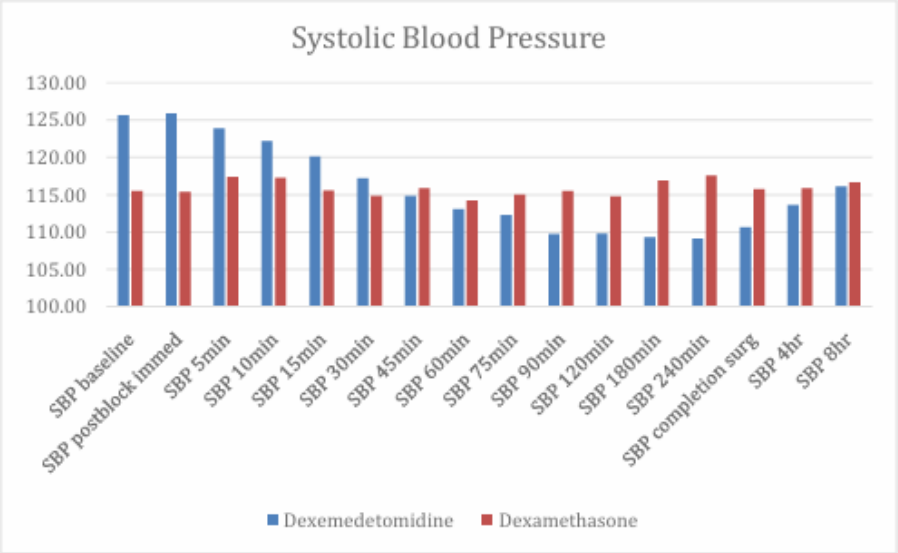
Graph 5



6. Mean baseline systolic blood pressure (mmHg)
- Group M 125.7 ± 10.05
- Group A 115.47 ± 7.07

* The lowest mean systolic blood pressure was
- Group M 109.13 ± 7.43 mm of Hg at 240 min after giving block
- Group A 114.23 ± 6.92 mm of Hg at 60 min after giving block

Graph 6



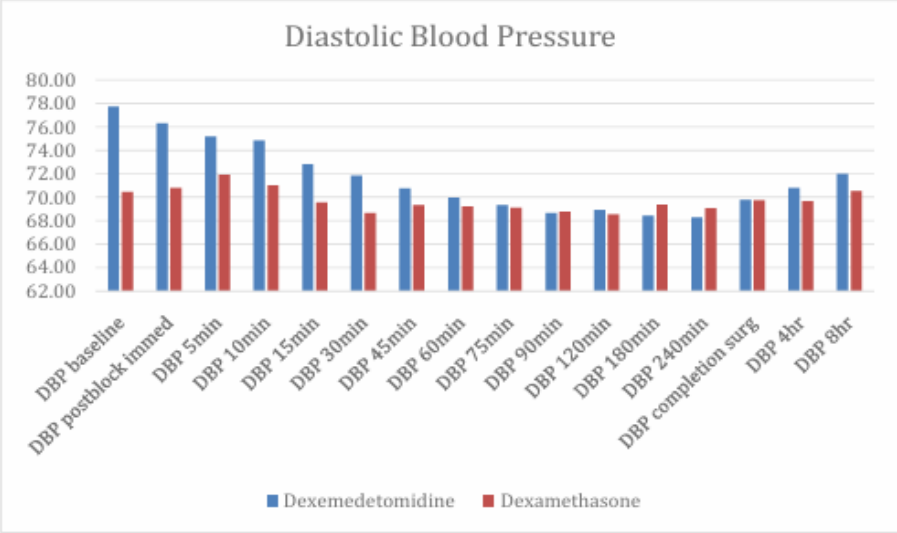
7.Mean baseline diastolic blood pressure (mmHg)

- Group M 77.70 ± 5.01
- Group A 70.43 ± 3.97

* The lowest mean diastolic blood pressure was

- Group M 68.25 ± 2.31 mm of Hg at 240 min after giving block
- Group A 68.52 ± 3.92 mm of Hg at 120 min after giving block

Graph 7



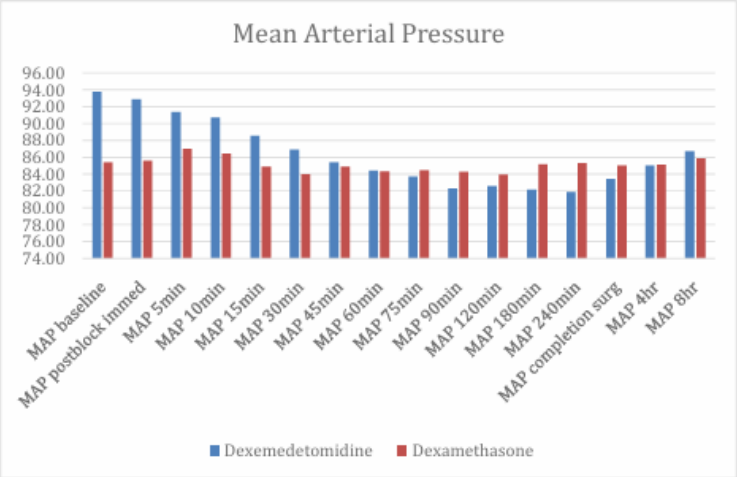
8. Mean baseline mean arterial pressure (mmHg)

- Group M 93.73 ± 5.71
- Group A 85.40 ± 3.86

* The lowest mean MAP was

- Group M 81.88 ± 2.64 mm of Hg at 240 min after giving block
- Group A 83.93 ± 3.53 mm of Hg at 120 min after giving block

Graph 8

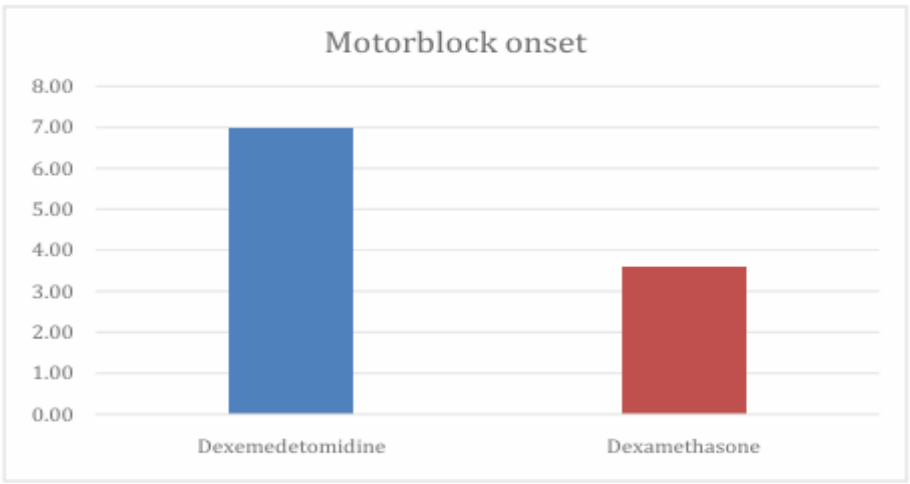


Sensory and motor block characteristics

1. Mean onset time for motor block (minutes)

- Group M 6.97 ± 1.10
- Group A 3.57 ± 1.14

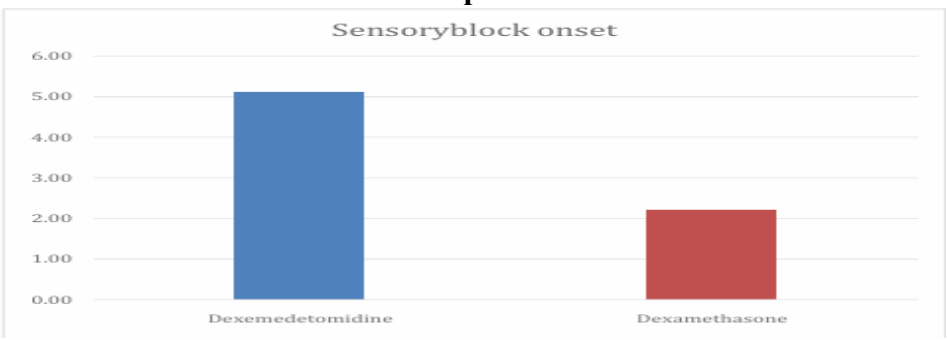
Graph 9



2. Mean onset time for sensory block (minutes)

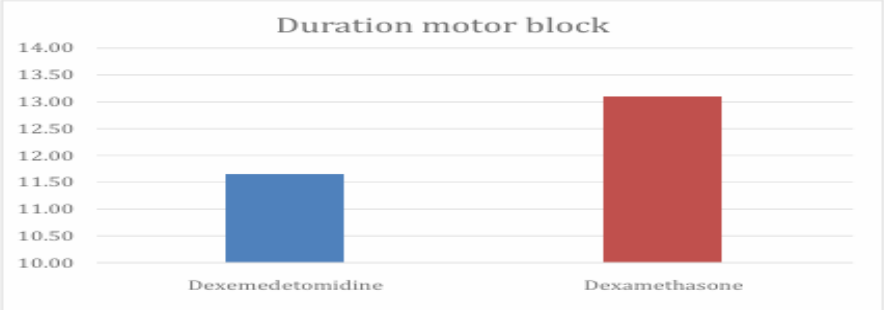
- Group M 5.10 ± 1.16
- Group A 2.20 ± 0.89

Graph 10



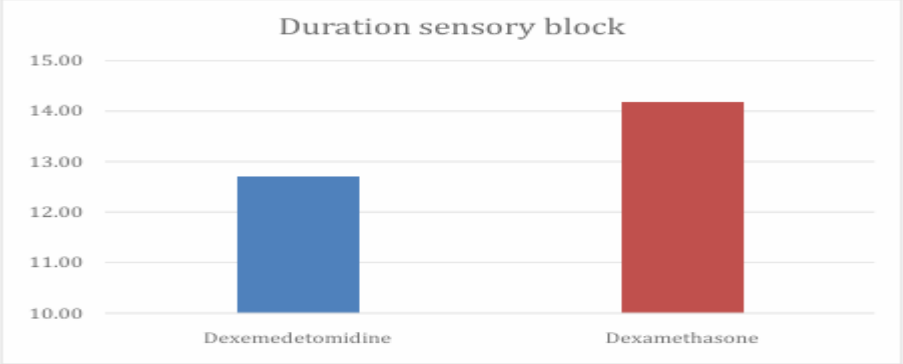
3. Mean duration of motor block (minutes)
- Group M 11.63 ± 0.81
- Group A 13.10 ± 0.99

Graph 11



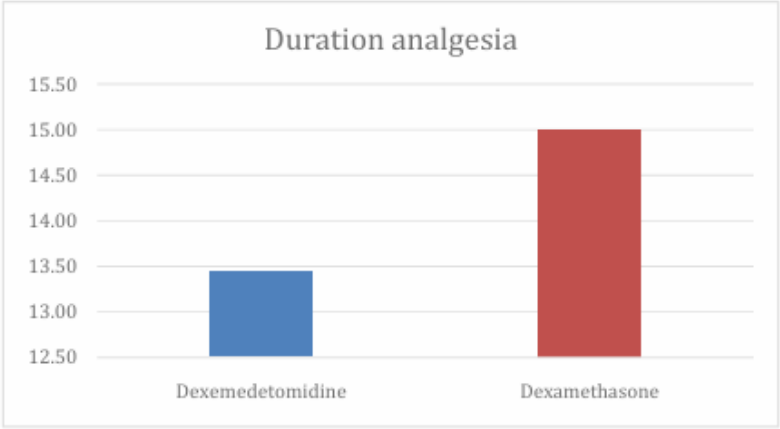
4. Mean duration of sensory block (minutes)
- Group M 12.70 ± 0.84
- Group A 14.17 ± 1.02

Graph 12



5. Mean duration of analgesia (hours)
- Group M 13.43 ± 0.73
- Group A 15.00 ± 0.74

Graph 13



6. Mean VNRS score

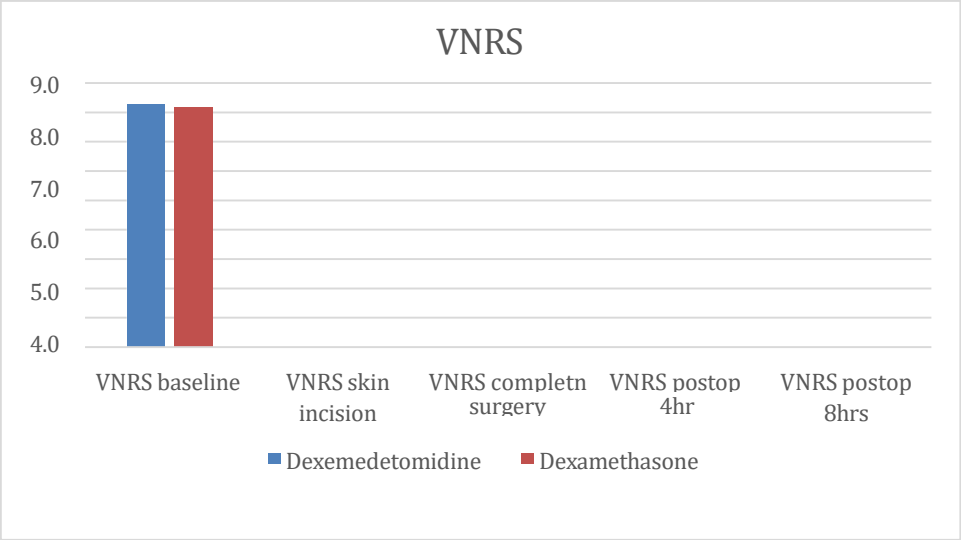
At baseline

- Group M 8.3 ± 0.4
- Group A 8.2 ± 0.4

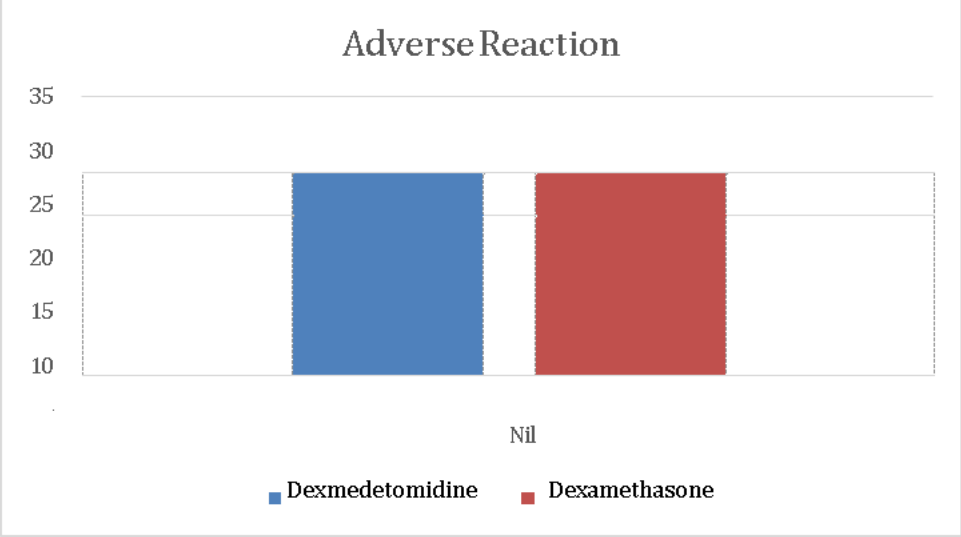
At skin incision, completion of surgery, postop 4 hours, postop 8 hours was recorded to be 0.

The mean VNRS score was not found to be statistically significant in Dexamethasone group compared to the Dexmedetomidine group $p > 0.05$.:

Graph 14



Graph 15: Comparison of side effects in between Dexamethasone group and Dexmedetomidine group



Chi square = 0, p value = 1

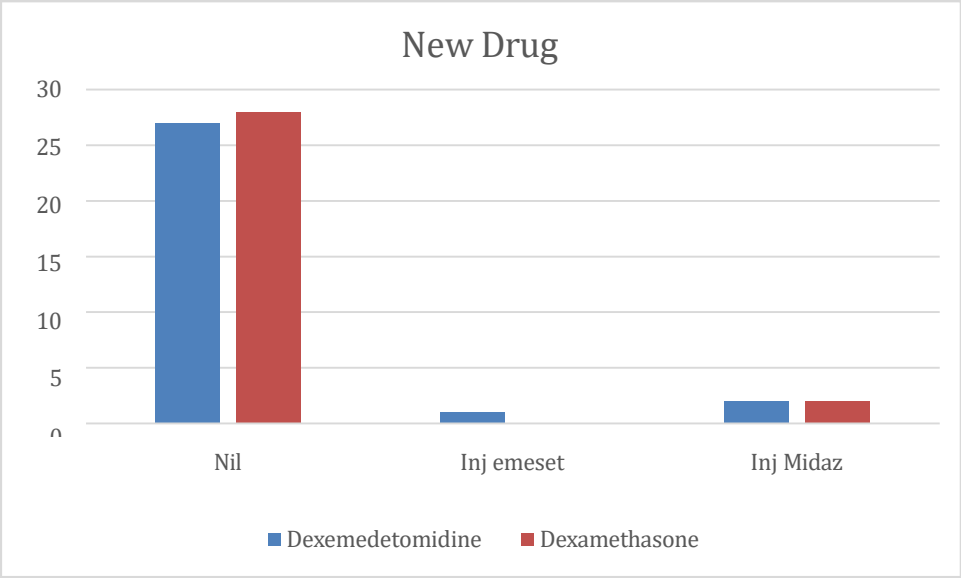
There were no side effects observed in 100 % patients who received Dexmedetomidine compared to 100 % in Dexamethasone group.

There was no statistically significant difference in the adverse effects in between groups $p > 0.05$.

Graph 16: Comparison of any new drug in between Dexamethasone group and Dexmedetomidine group
Chi square = 0.352, p value = 0.839

Inj Emset was given in 3.3% of patients in Dexmedetomidine group compared to 0% in Dexamethasone group Inj Midaz was given in 6.7% of Dexmedetomidine and Dexamethasone group. There was no statistically significant difference in between groups $p > 0.05$.

Graph 16:



Discussion
The Supraclavicular brachial plexus block is an excellent form of Regional Anaesthesia for upper limb orthopaedic surgeries as well as an effective form of analgesia for the control of post operative pain. The claim of ultrasound technique for exact localization of nerves/plexus has revolutionized the Regional Anaesthesia field in which ultrasound probes with suitable frequencies have been successfully tried.The success rate and the mean time to onset of anaesthesia is significantly better under ultrasound guidance.(10,11)
. Levobupivacaine, the pure S (-) enantiomer of Bupivacaine has been found to be equally efficacious as Bupivacaine, but with a superior pharmacokinetic profile and with less cardiac and neurotoxic adverse effects. (12) The long duration of sensory block associated with good analgesia and less toxicity of Levobupivacaine makes it a better choice for upper extremity blocks. (13)
Addition of various adjuncts to Local Anaesthetic solution increases the efficacy and duration of block, reduces postoperative analgesic requirement, and reduces systemic adverse effects by reducing the total dose of local anaesthetic agent used. Adjuncts like Clonidine, Dexmedetomidine, Dexamethasone, Buprenorphine, Tramadol have been successfully used in the past as adjuncts to local anaesthetics. (14)

1. DEMOGRAPHIC VARIABLES:
Altogether 60 patients between the age group 18-65 years were selected for the study. The total no. of patients in the age group of 31-40 years was 11 (36.7%) in Dexmedetomidine group and 6 (20%) in in Dexamethasone group, whereas 8 (26.7%) patients in Dexmedetomidine group and 5 (16.7) patients in Dexamethasone group were in age group of 21-30 years.
Out of 60 patients included in the study, 44 were males and 16 were females. The percentage of males in the study was 73.33. % and that of female is 26.66%.
Mean weight of patients in our study group is 60.80 kg in Dexmedetomidine group and

60.20 kg in Dexamethasone group.

2. CHARACTERISTICS OF MOTOR BLOCK: ONSET OF MOTOR BLOCK:

Mean onset time for motor block in our study group was 3.57 minutes in Dexamethasone group and 6.97 minutes in Dexmedetomidine group.

Alarasan et al (15) studied the effect of Dexamethasone in low volume Supraclavicular brachial plexus block in their study found that mean onset of motor block in the group in which Dexamethasone were added to Bupivacaine is 12±1.64 minutes as compared to 18.03 ± 2.4 minutes in control group .They concluded that onset of motor block was significantly earlier in Dexamethasone group compared to control group.The mean onset time of motor block in our study is significantly less than the above study

Baloda R et al (16) in 2016 studied the effect of Dexamethasone to Levobupivacaine in Supraclavicular Brachial Plexus Block with isotonic sodium chloride in Levobupivacaine in another group. The onset of block in Dexamethasone group is 13.7 ±2.04 minutes as compared to 15.03±0.88 minutes with sodium chloride. The finding is similar to our study with earlier mean onset of motor block.

Esmaoglu et al (17) in 2010 studied effect of adding Dexmedetomidine to Levobupivacaine for Axillary Brachial Plexus blockade. They found that onset of motor block was 9.50±1.04 minutes in Levobupivacaine with Dexmeditomidine group than the Levobupivacaine group which was 11.10 ±1.24 minutes which was statistically significant. Comparing this study to our study has earlier onset of motor block.

DURATION OF MOTOR BLOCK

The mean duration of motor block in our study was 13.10 ±0.99 hours in Dexamethasone group and 11.63 ± 0.81 hours in Dexmedetomidine group.

Alarasan et al(15) in their study found that mean duration of motor block in the group in which Dexamethasone were added to Bupivacaine in low volume Supraclavicular Brachial Plexus Block is 5.62 hours as compared to 3.55 hours in control group .They concluded that duration of motor block was significantly longer in Dexamethasone group compared to control group.The mean duration time of motor block in our study is significantly longer than the above study.

Baloda R et al (16) in their study, the duration of motor block in Dexamethasone group is 13.3 hours as compared to 9 hours in another group. this is like our study with longer duration of motor block.

Esmaoglu et al (17), their study found that duration of motor block was 12.88 hours in Levobupivacaine with Dexmedetomidine group than the Levobupivacaine group which was 9.58 hours. This shows that duration of motor block is significantly prolonged in Dexmedetomidine group. (In our study the duration of motor block is less as compared to this study.

Adinarayanan S et al (18) Compare the dexamethasone and dexmedetomidine as adjuvants to bupivacaine in supraclavicular brachial plexus block the onset of motor block was 15.71±3.78 13.79±3.44 with Dexamethasone and dexmedetomidine respectively.

3. CHARACTERISTICS OF SENSORY BLOCK:

ONSET AND DURATION OF SENSORY BLOCK

Mean Onset if sensory block in Dexamethasone group is 2.2 ± 0.89 minutes whereas in Dexmeditomidine group is 5.10 ±1.16 minutes.

Mean Duration of sensory block in Dexamethasone group is 14.17 ±1.02 hours as compared to 12.70±0.84 hours in Dexmeditomidine group.

Alarasan et al (15) they found that onset of sensory block in Dexamethasone group was 10.36 ± 1.99 minutes as compared to 12.9± 2.23 minutes in control group.Mean duration of sensory block in the group in which Dexamethasone was 6.1 hours as compared to 4.03 hours in control group. They concluded that duration of sensory block was significantly longer in Dexamethasone group compared

to control group.The mean duration time of sensory block in our study is significantly longer than the above study. Thus, Dexamethasone addition significantly increases duration of sensory block and shortens the onset of block.

Baloda R et al (16) studied.The onset of sensory block in Dexamethasone group is 8.16 ± 0.98 minutes as compared to 10.20±1.34 minutes in other group The duration of sensory block in Dexamethasone group is 15.38 hours as compared to 10.95 hours in another group. This is same as our study with longer duration of sensory block.

Adinarayanan S et al (22) Compare the dexamethasone and dexmedetomidine as adjuvants to bupivacaine in supraclavicular brachial plexus block the onset of motor block was 1303.93±233.71 and 888.62±57.92 with Dexamethasone and dexmedetomidine respectively. which is more than our study

DURATION OF ANALGESIA

Duration of Analgesia was considered as the time interval between the completion of local anaesthetic injection and the onset of pain in the postoperative period. (VAS >3)

It was assessed by Visual Analogue Scale (VAS)

Mean duration of analgesia in the Dexamethasone group is 15± 0.74 hours and 13.43±0.73 hours in the Dexmedetomidine group.

Alarasan et al (15) in their study found that VAS score in postoperative period was higher in the control group after 210 min as compared to the Dexamethasone group

Baloda R et al(16) in their studied at 12 hours postoperative interval 24 out of 30 patients in control group complained of pain in contrast with Dexamethasone group where none of the patients complained of pain at 12 hours postoperative interval.

S Choi et al (18) studied the effects of Dexamethasone that prolonged the analgesic duration for long acting LA from 730 min to 1306 min and for intermediate acting LA from 168 min to 343 min ..This study has like our study as both study showed prolonged duration of analgesia when Dexamethasone when used as adjuvant with LA in BPB.

Esmaoglu et al (17) found that duration of analgesia in levobupivacaine group was 887 min as compared to 1008 min in Dexmedetomidine group thus Dexmedetomidine addition prolonged the duration of analgesia as compared to levobupivacaine alone. In our study also Dexmeditomidine prolong the duration of analgesia with levobupivacaine.

ASSESSMENT OF PAIN

The mean value of baseline VNRS score in our study in Dexmedetomidine group was 8.3± 0.4 where as in Dexamethasone group was 8.2 ±0.4.

Alarasan et al (15), **Shrestha et al** (21). found that VAS score in postoperative period was higher in the Dexamethasone group.

4. HEMODYNAMICS

HEART RATE

The mean baseline HR in Dexmedetomidine group was 96 per min. There was fall in HR from 15 min to 240 min. The lowest recorded HR was 75 per min which is in normal physiological range. The mean baseline HR in Dexamethasone group was 75 per min. There was no such fall in HR noted in Dexamethasone group.

SPO2

Mean baseline Spo2 in our study is 99% in both groups.

RESPIRATORY RATE

The mean RR in Dexmedetomidine group was 19 & Dexamethasone group was 17. There are no significant variations in RR in both groups.

SYSTOLIC BLOOD PRESSURE

The baseline mean SBP in Dexmedetomidine group was 125.67mmHg. There was fall in mean SBP compared to baseline from 10 min to 240 min in Dexmedetomidine group. The lowest recorded SBP is 109 mmHg. However, this fall in SBP is within physiological range.

The baseline means SBP in Dexamethasone group 115.47 mmHg. There was no fall observed in SBP in the Dexamethasone group with more hemodynamic stability.

DIASTOLIC BLOOD PRESSURE

The baseline means DBP in Dexmeditomidine group was 77 mmHg.There was fall in mean DBP compared to baseline from 10 min to 240 min in Dexmedetomidine group. The lowest recorded DBP is 68 mmHg. However, this fall in DBP is within physiological range .

The baseline mean DBP in the Dexamethasone group was 70 mmHg. There was no fall observed in DBP in the Dexamethasone group with more hemodynamic stability.

MEAN ARTERIAL PRESSURE

The baseline MAP in Dexmedetomidine group was 93 mmHg. There was fall in MAP compared to baseline from 10 min to 240 min in Dexmedetomidine group. The lowest recorded MAP is 81 mmHg. However, this fall in MAP is within physiological range.

The baseline MAP in Dexamethasone group was 85 mmHg. There was no fall observed in MAP in the Dexamethasone group with more hemodynamic stability.

Alarasan et al (15) and Baloda R et al(16) They recorded and observed No significant difference in between the Dexamethasone groups regarding SBP, DBP, MAP as well as pulse rate and oxygen saturation

Esmaoglu et al (17). Systolic arterial blood pressure levels in group LD at 10, 15, 30, 45, 60, 90, and 120 minutes were significantly lower than those in group L ($P < 0.05$). Diastolic arterial blood pressure levels in group LD at 60, 90, and 120 minutes were significantly lower than those in group L ($P < 0.05$). Heart rate levels in group LD, except basal measurements, were significantly lower than those in group L ($P < 0.05$). In group LD bradycardia was observed in 7 patients, although there was no bradycardia in group L ($P < 0.05$).

SIDE EFFECTS

In our study side effects like bradycardia, hypotension, nausea, vomitting, drowsiness, pruritus, hypoxemia etc were not observed. Also, complications like pneumothorax, hemothorax, Horner's syndrome, phrenic nerve injury etc were not seen in our study.

S Choi et al (18), **Islam et al (19), Sarma BA et al (20), Shrestha et al.(21)**, showed that perineural administration of Dexamethasone with LA prolongs brachial plexus block with no observed adverse events. We found the same in our study.

Conclusion

Based on the observations in our study we conclude that there was no statistical difference in the onset of sensory and motor blockade of 0.5% Levobupivacaine with 4 mg of Dexamethasone and 0.5% Levobupivacaine with 20ug of Dexmedetomidine added in Supraclavicular USG guided block in patients undergoing forearm orthopaedic surgeries. However, there is more hemodynamic stability with Dexamethasone group as compared to Dexmedetomidine. Dexmedetomidine as slight variation in heart rate and blood pressure which was within normal physiological range. Also, there was no significant difference in duration of post operative analgesia between the two groups with slightly more prolonged block with Dexamethasone group. So, we concluded that Dexamethasone is more hemodynamically stable and an excellent post-op analgesia with minimal side effect.

Limitations
There are certain limitations in our study. We did not record the sedation score to study the effect of perineural dexmedetomidine on sedation and no blood sugar was measure for Dexamethasone group.

Financial support and sponsorship – Nil.
Conflict of Interest: None declared

References
1. Pester JM, Hendrix JM, Varacallo MA. Brachial Plexus Block Techniques. [Updated 2023 Aug 4]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK470213/
2. Liu SS, Zayas VM, Gordon MA et al. A prospective randomized controlled trial comparing ultrasound versus nerve stimulator guidance for interscalene block for ambulatory shoulder surgery for postoperative neurological symptoms. Anesth Analg 2009; 109(1): 265-71.
3. Hopkins PM. Ultrasound guidance as a gold standard in regional anaesthesia. Br J Anaesth 2007; 98(3): 299-301.
4. McCartney CJ, Lin L, Shastri U. Evidence basis for the use of ultrasound for upper-extremity blocks. Reg Anesth Pain Med. 2010; 35(2 suppl): S10-S15.
5. Marhofer P, Sitzwohl C, Greher M, Kapral S. Ultrasound guidance for infraclavicular brachial plexus anaesthesia in children. Anesthesia 2004; 59(7): 642-6.
6. Burlacu CL, Buggy DJ. Update on local anesthetics: focus on levobupivacaine. Ther Clin Risk Manag. 2008 Apr;4(2):381-92. doi: 10.2147/tcrm. s1433. PMID: 18728849; PMCID: PMC2504073.
7. Khan ZP, Ferguson CN, Jones RM. alpha-2 and imidazoline receptor agonists. Their pharmacology and therapeutic role. Anaesthesia. 1999;54:146–65.
8. Ralph Getler, Clieghton H Brown, Mitchel H, Silvius N. Dexmedetomidine; a novel sedative analgesic agent. Baylor university medical centre proceedings. 2001;14 (1).
9. Johansson A, Hao J, Sjölund B. Local corticosteroid application blocks transmission in normal nociceptive C-fibres. Acta Anaesthesiol Scand. 1990 Jul;34(5):335–8
10. La grange p, et al: br j anaesth: application of the doppler ultrasound bloodflow detector in supraclavicular brachial plexus block 50(9):965, 1978
11. Williams SR, Chouinard P, Arcand G, et al: Ultrasound guidance speeds execution and improves the quality of supraclavicular block. Anesth Analg 2003; 97:1518- 1523.
12. Bajwa SJ, Kaur J.: Clinical profile of levobupivacaine in regional anesthesia: A systematic review. J Anaesthesiol Clin Pharmacol. 2013;29:530–9.
13. Piangatelli C, De Angelis C, Pecora L, Recanatini F, Cerchiara P, Testasecca D, Levobupivacaine and ropivacaine in the infraclavicular brachial plexus block.Minerva Anaesthesiol. 2006; 72:217–21
14. Chad M. Brummett, Brian A. Williams: Additives to Local Anesthetics forPeripheral Nerve Blockade: int anesthesiol clin. Fall, 2011,49(4):104-116
15. Alarasan AK, Agrawal J, Choudhary B, Melhotra A, Uike S, Mukherji A. Effect of dexamethasone in low volume supraclavicular brachial plexus block: A double- blinded randomized clinical study. J Anaesthesiol Clin Pharmacol. 2016;32:234–9. [PMC free article] [PubMed] [Google Scholar]
16. Baloda R, Bhupal JP, Kumar P, Gandhi GS. Supraclavicular brachial plexus block with or without dexamethasone as an adjuvant to 0.5% levobupivacaine: A comparative study. J Clin Diagn Res. 2016;10:UC09–12. [PMC free article] [PubMed] [Google Scholar]
17. Esmaoglu A, Yegenoglu F, Akin A, Turk CY. Dexmedetomidine added to levobupivacaine prolongs axillary brachial plexus block. Anesth Analg. 2010 Dec;111(6):1548-51. doi: 10.1213/ANE.0b013e3181fa3095. Epub 2010 Oct 1. PMID: 20889939.
18. Choi S, Rodseth R, McCartney CJ. Effects of dexamethasone as a local anaesthetic adjuvant for

brachial plexus block: a systematic review and meta-analysis of randomized trials. Br J Anaesth. 2014;112(3):427–39. [PubMed] [Google Scholar]
19. Islam SM, Hossain MHMD, Maruf AA. Effect of addition of dexamethasone to local anaesthetics in supraclavicular brachial plexus block. JAFMC Bangladesh. 2011;7(1):11–14. [Google Scholar]
20. Sarma BA, Sundari MR, Suman KV, Rao DB. Low dose dexmedotomidineas an adjuvant to bupivacaine in supraclavicular brachial plexus block. IOSR J Dent Med Sci (IOSR-JDMS). 2015.
21. Shrestha BR, Maharjan SK, Tabedar S. Supraclavicular brachial plexus block with and without dexamethasone-a comparative study. Kathmandu University medical journal (KUMJ). 2003 Jul 1;1(3):158-60.
22. Adinarayanan S, Chandran R, Swaminathan S,Srinivasan G, Bidkar PU. Comparison of dexamethasone and dexmedetomidine as adjuvants to bupivacaine in supraclavicular brachial plexus block: A prospective randomized study. Indian J Clin Anaesth 2019;6(4):523-527