International Journal of Medical Anesthesiology

**E-ISSN:** 2664-3774
**P-ISSN:** 2664-3766
www.anesthesiologypaper.com
IJMA 2024; 7(3): 23-28
Received: 20-04-2024
Accepted: 31-05-2024

**Dr. Sanika Sudhir Shinde,**
Junior resident, Department of Anesthesiology, SKNMC-GH, Pune, Maharashtra, India

**Dr. Dhanashree Dongare**
Professor, Department of Anesthesiology, SKNMC-GH, Pune, Maharashtra, India

**Dr. Sagade Tejal Kalyanrao**
Junior resident, Department of Anesthesiology, SKNMC-GH, Pune, Maharashtra, India

**Dr. Gayatri Rajesh Parjane**
Junior resident, Department of Anesthesiology, SKNMC-GH, Pune, Maharashtra, India

**Corresponding Author:**
**Dr. Sanika Sudhir Shinde,**
Junior resident, Department of Anesthesiology, SKNMC-GH, Pune, Maharashtra, India

# To study the effectiveness of dexamethasone as an adjuvant with levobupivacaine 0.5% in USG guided interscalene brachial plexus block for shoulder surgeries

**Dr.Sanika Sudhir Shinde, Dr. Dhanashree Dongare, Dr. Sagade Tejal Kalyanrao and Dr. Gayatri Rajesh Parjane**

**DOI:** https://doi.org/10.33545/26643766.2024.v7.i3a.482

**Abstract**
**Introduction:** Pain can be intense after orthopedic surgeries. To improve analgesia and facilitate early mobilization, regional anaesthesia in the form of interscalene brachial plexus block is often used along with general anaesthesia for arthroscopic shoulder surgeries. Here we have studied postoperative analgesic effect of ultrasound guided interscalene block with Inj. Levobupivacaine, duration of action of said block (sensory and motor) as well as the overall analgesic consumption in the first 24 hours of postoperative period after addition of dexamethasone.
**Objectives:** Primary objective was to study the effect on duration of analgesia. Secondary objectives were to study the effect on (i) onset of blockade (ii) duration of sensory and motor blockade (iii) total analgesic consumption in 24 hours.
**Materials and Methods:** It was a prospective, randomized, double-blinded study. After approval from institutional ethics committee, sixty patients of either sex, belonging to ASA I/II, posted for arthroscopic shoulder surgeries, under ultrasound guided interscalene brachial plexus block, with general anaesthesia, were divided into two groups [30 patients in each group]. Patients were given interscalene brachial plexus block as follows:-
Group A – Inj. Levobupivacaine 0.5% 20ml with normal saline 1ml
Group B – Inj. Levobupivacaine 0.5% 20ml with dexamethasone 4mg
**Results:** The study revealed that patients in group B had significantly prolonged mean duration of analgesia, lower VAS score, and less number of rescue analgesic requirements in first 24 hours postoperatively as compared to group A. No adverse effects recorded in any group.
**Conclusion:** The study concluded that dexamethasone when used as an adjuvant with levobupivacaine in ultrasound guided brachial plexus block, provided profound prolongation of duration of analgesia and reduces analgesic consumption of patients undergoing arthroscopic shoulder surgeries.

**Keywords:** Ultrasonography, Interscalene brachial plexus block, beach chair position, Inj. Levobupivacaine 0.5%, Inj. Dexamethasone 4mg, VAS scores

## 1. Introduction

The presence of respiratory comorbidities is correlated with a higher occurrence of peri-operative respiratory adverse events (PRAE). Adenotonsillectomy is often associated with the occurrence of upper and lower respiratory infections, with asthma, in pediatric patients. Children diagnosed with respiratory diseases have a three-fold elevation in the prevalence of PRAEs in comparison to their healthy relatives [1].

Patients experience intense pain after orthopedic surgeries. Brachial plexus block provides adequate perioperative analgesia. It also helps in using minimal amount of anaesthetic drugs and is beneficial in minimizing the stress response. Interscalene approach to brachial plexus block along with general anaesthesia is widely used for arthroscopic shoulder surgeries, like rotator cuff repair, arthroscopy for frozen shoulder, acromioclavicular joint repair, etc. [1,2]. These procedures demand immediate postoperative mobilization of shoulder, thus increasing the requirement postoperative analgesia. The orthopaedicians require beach chair position for arthroscopic shoulder surgeries, as this position gives limited brachial plexus stress and it increases gleno-humeral and sub-acromial visualization [3].

The patients head needs to be strapped in this position, and hence general anaesthesia along with the interscalene block is preferred. Interscalene block can be performed using various techniques like landmark technique, peripheral nerve stimulation, ultrasound guidance. When performed using ultrasound guidance, the block becomes more precise and will have reduced complications [4]. Various adjuvants have been used along with local anaesthetic to prolong the analgesia from nerve block [5-8]. Levobupivacaine is a long acting local anaesthetic and has lesser toxicity than bupivacaine [9]. Using dexamethasone as an adjuvant to levobupivacaine, has shown beneficial effects [10, 11]. The current study was designed to test the effects of dexamethasone 4mg when added as an adjuvant to levobupivacaine, on the sensory and motor blockade and analgesic properties of interscalene block, in arthroscopic shoulder surgeries.

1.1 Primary aim was to study the effect of dexamethasone 4mg on duration of postoperative analgesia, provided by the interscalene block postoperatively.

**1.2 Secondary aims were to study its effect**

- Onset of blockade.
- Duration of sensory and motor blockade.
- Total analgesic consumption in 24 hours.

## 2. Materials and Methods

After getting approval from the Institutional Ethical committee, the study was conducted in the department of Anaesthesiology, Smt. Kashibai Navale Medical College and General Hospital, Narhe, Pune.

**2.1 Study Design:** This study was a prospective randomized double blinded study.

**2.2 Inclusion Criteria**

- Patients of age group 18-65 years, belonging to either sex.
- Patients belonging to ASA grade I or II.
- Patients scheduled for arthroscopic shoulder surgeries.

**2.3 Exclusion Criteria**

- Age < 18 > 65 years.
- Patient refusal for informed consent.
- Coagulopathy, neuropathy, local infection.
- (iv)History of allergy to study drug.

**2.4 Sample Size**

Patients who did not meet the inclusion criteria and who refused to participate, were excluded and had a sample size of 60 patients, who were randomly allocated to one of the study groups (group A or group B) (30 patients in each group), by computer generalized randomization. Sample size was calculated using SAS, version 9.2 of the SAS system for window (SAS institute Inc., North Carolina), Written informed consent was taken from patients in their own language.

Group A: Inj. Levobupivacaine 0.5% 20ml, as local anaesthetic and normal saline, 1ml

Group B: Inj. Levobupivacaine 0.5% 20ml, as local anaesthetic and Inj. Dexamethasone 4mg, as an adjuvant.

**2.5 Procedure**

Detailed history was taken and complete pre-anaesthetic checkup was done. Visual analogue scale was explained pre-operatively and patients were kept fasting for eight hours prior to surgery. On shifting the patient inside OT, standard monitors such as electro-cardiogram, non-invasive blood pressure monitor and pulse oximeter were connected. Intravenous line was secured with 18G/20G intravenous catheter. Under strict aseptic conditions, with USG guidance, interscalene block was performed using 22G hypodermic needle [portable ultrasound machine (Sonosite Edge, Sonosite Inc. WA, USA) with a linear ultrasound transducer, 8-13 MHz]. Sensory and motor block assessment was done at each minute after completion of the block. General anaesthesia was given within 15 minutes after the block. Preoxygenation was done and premedication were given. Induction was done using Inj. Propofol (2mg/kg) iv and Inj. Vecuronium (0.1mg/kg) iv was given for relaxation. Patients were intubated using appropriate sized endotracheal tube by direct laryngoscopy. Anaesthesia was maintained using inhalational agents like sevoflurane and nitrous oxide, along with muscle relaxants, by their maintenance doses. After confirming an equal, bilateral, air entry after intubation, patients were given Beach Chair position, as per surgeon's demand. All the haemodynamic parameters were monitored intraoperatively. Some patients required additional analgesia in form of intravenous opioids (fentanyl, tramadol), paracetamol, etc. These gave good surgical field, good analgesia and better haemodynamic stability. Patients were observed postoperatively for any complications. Postoperative analgesia was monitored as per VAS score of 0-10 at 2, 4, 6, 12 and 24 hours. If VAS score was 4 or more, it was considered that the analgesic action of the block has terminated and injection tramadol 100mg intravenously was given as rescue analgesia.

## 3. Results

Parameters monitored were mean onset time of blockade, duration of sensory and motor blockade, time of first rescue analgesia, all the hemodynamic parameters (HR, SBP, DBP, and MAP) and side effects if any. Collected data were compiled, entered, and subjected to SPSS version 20, for statistical analysis. Numerical data were analyzed using Student's t test. Categorical data were analyzed by Chi-square test. Results reported were considered statistically significant if P value was < 0.05.

**3.1 Demographic Data:** Demographic characteristics in terms of age, gender, ASA physical status, and duration of surgery were found to be comparable.

**Table 1:** Demographic Data

| Demographic Variables | Group A (N=30) [Mean ± SD] | Group B (N=30) [Mean ± SD] | P-Value |
|---|---|---|---|
| Age (in years) | 41.5 ± 23.5 | 41.5 ± 23.5 | 0.45 |
| Gender (male/female) | 19/11 | 22/8 | 0.82 |
| ASA physical status (I/II) | 20/10 | 23/7 | 0.81 |
| Duration of surgery (in minutes) | 107.4 ± 18.6 | 96.9 ± 19 | 0.061 |

**3.2 Block Characteristics:** There was no difference in the onset of sensory and motor blockade of both groups. Onset of blockade was statistically significant, but clinically insignificant. Sensory and Motor blockade, as well as duration of analgesia were found to be prolonged in Group B which received the adjuvant. These results were statistically significant.

**Table 2:** Comparison of characteristics of block between both groups.

| Block Characteristics | Group A (N=30) | Group B (N=30) | P-Value |
|---|---|---|---|
| Sensory onset | 4.56min ± 0.5min | 4.27min ± 0.5min | 0.040 |
| Motor onset | 7.29min ± 0.4min | 7.57min ± 0.6min | 0.045 |
| Motor duration | 460.96min ± 27.5min | 760.43min ± 29.4min | <0.05 |
| Sensory duration | 516.73min ± 22min | 860.2min ± 27.1min | <0.05 |
| Time of 1st rescue analgesia | 586.16min ± 24.5min | 951.5min ± 24.22min | <0.05 |

**3.3 Intraoperative Parameters:** Patients were hemodynamically stable in both groups. The hemodynamic parameters were comparable in both groups. None of the patient developed any complications, adverse effects related to procedure or drugs in either group. HR & BP of group B patients were closer to baseline as compared to Group A patients.

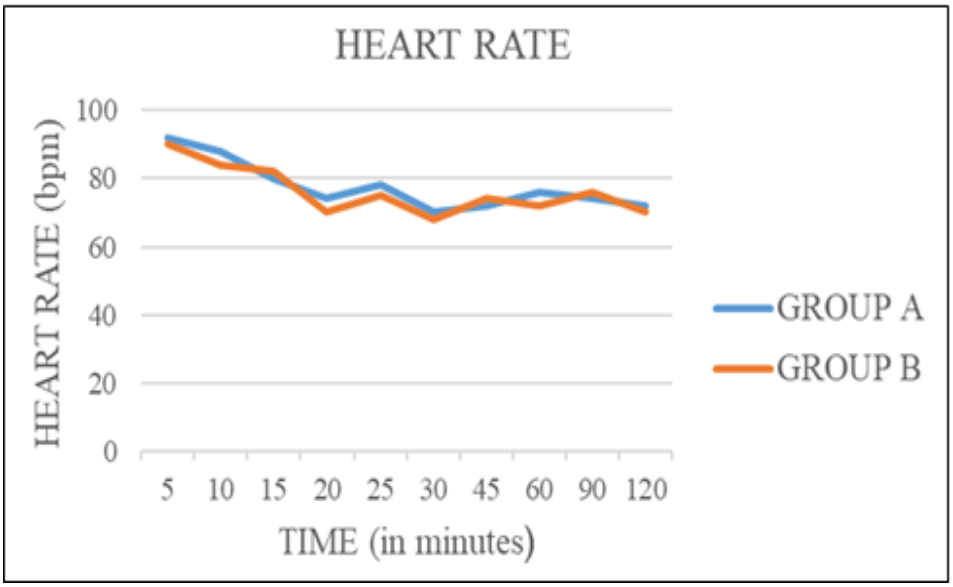


**Fig 1:** Line diagram comparing heart rate of patients in both groups

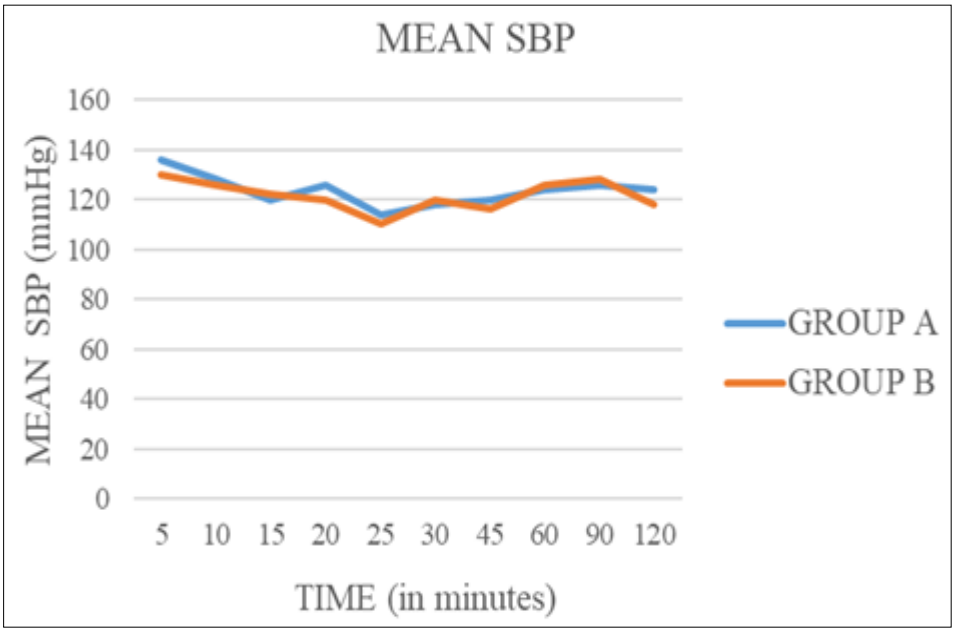


**Fig 2:** Line diagram comparing mean systolic blood pressure of patients in both groups

**3.4 Postoperative Analgesia:** The intensity of pain and number of rescue analgesia were found to be decreased in group B.

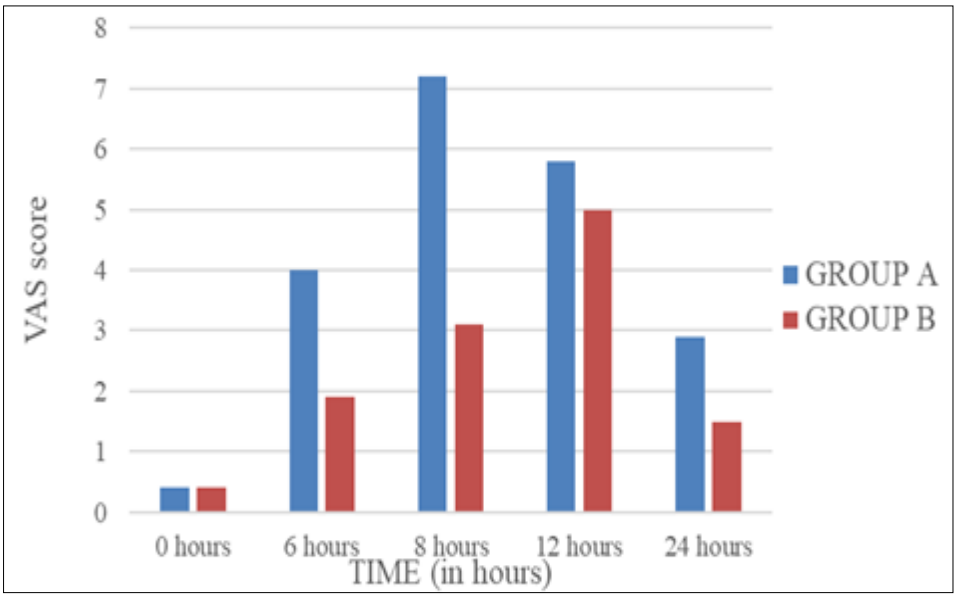


**Fig 3:** Bar diagram comparing the VAS Score of patients in both groups

The maximum of group A patients had VAS score of 7/10 in postoperative period whereas group B patients showed VAS score up to 5/10.

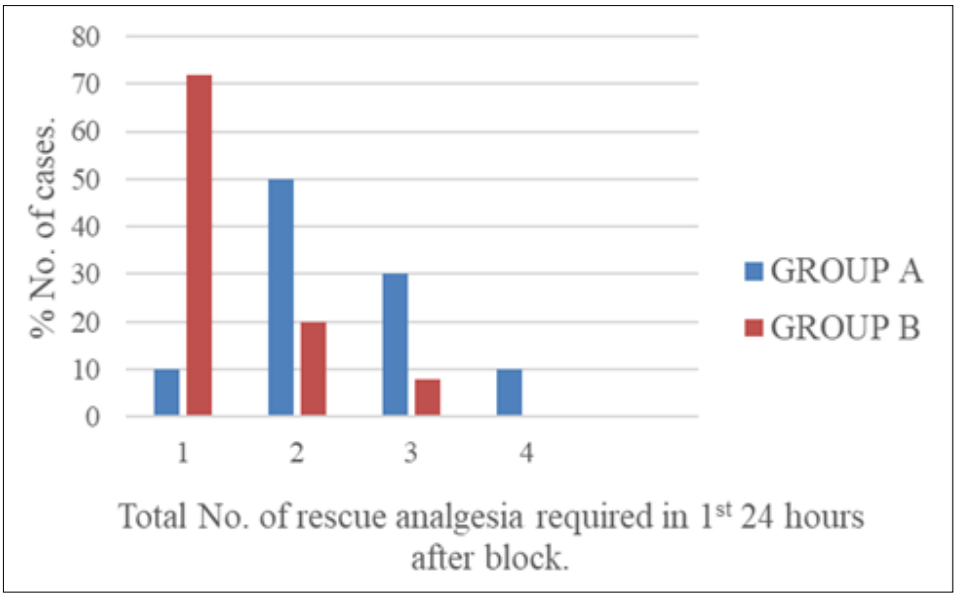


**Fig 4:** Bar diagram comparing total number of rescue analgesia required by patients of both groups in first 24 hours after block

The maximum of group A patients required 2/3 rescue analgesia in 1st 24 hours; whereas maximum of group B patients required only 1 & few required 2 rescue analgesia.

## 4. Discussion

Interscalene block with general anaesthesia is widely used for various arthroscopic surgeries. Levobupivacaine has been successfully used in place of bupivacaine, as the local anaesthetic, since it shows lesser cardiotoxicity. Various adjuvants can be added to the local anaesthetic to prolong it's effects. Dexamethasone is a long acting glucocorticoid, which produces analgesia by increasing the activity of inhibitory potassium channels on nociceptive C-fibres. It also produces vasoconstriction and reduces the absorption of local anaesthetics and prolongs action of local anaesthetics.

Srinivasa *et al*. [12] compared 2 doses of dexamethasone with placebo and found that the onset of the blockade was not affected. But the duration of analgesia was found to be prolonged in the groups where dexamethasone was added. Since there was no difference in observations of two different doses of dexamethasone, in our study we used the lower dose of dexamethasone, to avoid steroid related hyperglycemia. Also, we found similar results with lesser volume of levo-bupivacaine 0.5%. In interscalene block, blockade occurs at the level of roots of the brachial plexus (C5 to C7). At this point, the brachial plexus is compact and a small volume of local anaesthetic produces rapid onset of reliable blockade of the brachial plexus.

Shuro morito *et al*. [13] used levo-bupivacaine 0.25% with dexamethasone 3.3 mg in comparison with placebo and found that the duration of analgesia was increased in the group with the adjuvant. In our study we used 0.5% levo-bupivacaine since it was well within the maximum allowable dose, and for better analgesic effect. There was no protocol of early mobilization after arthroscopic shoulder surgeries in our institute, hence there was no compulsion to

use any other dose of levobupivacaine. Lars J Lehman *et al*. [14] compared three groups where they administered either only interscalene block, or, only general anaesthesia, or combination of both. They found that the combination gave better anaesthetic outcome and decreased opioid consumption.

## 5. Conclusion

Our study concluded that dexamethasone when added as an adjuvant to levobupivacaine in ultrasound guided interscalene brachial plexus block, it provides reduced analgesic consumption of the patients undergoing shoulder surgeries and longer pain free period with better patient satisfaction.

## 6. Limitations

- Comparison of late onset neuropathy was not in our study design.
- IV dexamethasone have also shown to provide analgesic effect, but it was not included in our study, so, serum dexamethasone levels were not assessed.

## 7. Acknowledgments

We acknowledge our gratitude towards department of Anaesthesiology and Department of Orthopaedics, Smt. Kashibai Navale Medical College and General Hospital, Narhe, Pune.

**Financial support and sponsorship:** Nil

**Conflict of Interest:** Nil

## 8. References

1. Pani N, Routray SS, Pani S, Mallik S, Pattnaik S, Pradhan A. Post-operative analgesia for shoulder arthroscopic surgeries: a comparison between inter-scalene block and shoulder block. Indian Journal of Anaesthesia (Print) [Internet]. 2019 Jan 1 [cited 2024 Apr 9];63(5):382-2. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6530293/.
2. Hughes MS, Matava MJ, Wright RW, Brophy RH, Smith MV. Interscalene brachial plexus block for arthroscopic shoulder surgery. The Journal of Bone and Joint Surgery-American. 2013 Jul;95(14):1318-24. Available from: https://pubmed.ncbi.nlm.nih.gov/23864181/.
3. Higgins JD, Frank RM, Hamamoto JT, Provencher MT, Romeo AA, Verma NN. Shoulder arthroscopy in the beach chair position. Arthroscopy Techniques [Internet]. 2017 Aug;6(4) Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5621929/.
4. Lim JA, Sung SY, Lee JH, Lee SY, Kwak SG, Ryu T, *et al*. Comparison of ultrasound-guided and nerve stimulator-guided interscalene blocks as a sole anesthesia in shoulder arthroscopic rotator cuff repair: a retrospective study. Medicine [Internet]. 2020 Aug 28;99(35). Available from: https://journals.lww.com/md-journal/fulltext/2020/08280/comparison_of_ultrasound_guided_and_nerve.27.aspx.
5. Ping Y, Ye Q, Wang W, Ye P, You Z. Dexmedetomidine as an adjuvant to local anesthetics in brachial plexus blocks. Medicine [Internet]. 2017 Jan;96(4). Available from: https://pubmed.ncbi.nlm.nih.gov/28121930/.
6. Hwang JT, Jang JS, Lee JJ, Song DK, Lee HN, Kim DY, *et al*. Dexmedetomidine combined with interscalene brachial plexus block has a synergistic effect on relieving postoperative pain after arthroscopic rotator cuff repair. Knee Surgery, Sports Traumatology, Arthroscopy [Internet]. 2020 Jul 1 [cited 2024 Jun 17];28(7):2343-53. Available from: https://europepmc.org/article/med/31773201.
7. Iyengar SS, Pangotra A, Abhishek K, Sinha N, Rao NS, Singh VK, *et al*. The comparison of dexmedetomidine to dexamethasone as adjuvants to bupivacaine in ultrasound-guided infraclavicular brachial plexus block in upper limb surgeries. Cureus [Internet]. 2023 Jul 10; Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10412748/.
8. Yadav S, Yadav K, Bogra J, Kohli M, Gupta R. A comparison between dexamethasone and clonidine as adjuvants to levobupivacaine in the supraclavicular approach to the brachial plexus block: a double-blind study. Cureus [Internet]. 2023 Oct 1 [cited 2024 Apr 21];15(10). Available from: https://pubmed.ncbi.nlm.nih.gov/37954721/.
9. Baskan S, Taspinar V, Ozdogan L, Gulsoy KY, Erk G, Dikmen B, *et al*. Comparison of 0.25% levobupivacaine and 0.25% bupivacaine for posterior approach interscalene brachial plexus block. Journal of Anesthesia [Internet]. 2010 Jan 9;24(1):38-42. Available from: https://pubmed.ncbi.nlm.nih.gov/20175283/.
10. Vasconcelos MM, Pontes JPJ, Rodrigues AM, Neto DRB, Alves RR, Silva FCP, *et al*. Dexametasona perineural em bloqueio de plexo braquial interescalênico com levobupivacaína guiado por ultrassonografia para artroscopia de ombro em regime ambulatorial: ensaio clínico controlado e randomizado. Brazilian Journal of Anesthesiology [Internet]. 2020 Nov;70(6):588-94. Available from: https://pubmed.ncbi.nlm.nih.gov/33189370/.
11. Choi S, Rodseth R, McCartney CJL. Effects of dexamethasone as a local anaesthetic adjuvant for brachial plexus block: a systematic review and meta-analysis of randomized trials. British Journal of Anaesthesia [Internet]. 2014 Mar;112(3):427-39. Available from: https://pubmed.ncbi.nlm.nih.gov/24413428/.
12. Nallam SR. Interscalene brachial plexus block: comparison of efficacy of varying doses of dexamethasone combined with levobupivacaine: A double-blind randomised trial. Journal of Evolution of Medical and Dental Sciences. 2014 Jun 18;3(25):6900-8. Available from: https://www.researchgate.net/publication/273165585_International_Brazilian_Society_of_ultrasound_guided_interscalene_brachial_plexus_block_comparison_of_efficacy_of_varying_doses_of_dexamethasone_combined_with_levobupivacaine_a_double-blind_randomised_trail.
13. Morita S, Oizumi N, Suenaga N, Yoshioka C, Yamane S, Tanaka Y. Dexamethasone added to levobupivacaine prolongs the duration of interscalene brachial plexus

block and decreases rebound pain after arthroscopic rotator cuff repair. Journal of Shoulder and Elbow Surgery [Internet]. 2020 Sep;29(9):1751-7. Available from: https://pubmed.ncbi.nlm.nih.gov/32815804/.
14. Lehmann LJ, Loosen G, Weiss C, Schmittner MD. Interscalene plexus block versus general anaesthesia for shoulder surgery: A randomized controlled study. European Journal of Orthopaedic Surgery & Traumatology [Internet]. 2014 May 15;25(2):255-61. Available from: https://pubmed.ncbi.nlm.nih.gov/24829053/.

**How to Cite This Article**
Yousef AA, Eid GM, Messbah WE, Azzam EA. To study the effectiveness of dexamethasone as an adjuvant with levobupivacaine 0.5% in USG guided interscalene brachial plexus block for shoulder surgeries. International Journal of Medical Anesthesiology. 2024;7(3):23-28.