

<https://doi.org/10.48047/AFJBS.6.15.2024.3917-3923>



African Journal of Biological Sciences

Journal homepage: <http://www.afjbs.com>



Research Paper

Open Access

Comparative Study between Two Different Doses of Intrathecal Injection of Nalbuphine with Bupivacaine in Lower Abdominal Surgeries

Urishmita Deka¹, Keshav Upadhyaya¹, Debakhi Dutta², Bidyut Borah¹, Kalyan Sarma³, Vikramjit Baruah^{4*}, Manabendra Medhi⁵

¹Assistant Professor, Department of Anaesthesiology, Fakhruddin Ali Ahmed Medical College and Hospital, Barpeta, Barpeta-Hospital-Jania Rd, Joti Gaon, Jaher Pam, Assam 781301, India

²Senior Resident, Department of Anaesthesiology, Fakhruddin Ali Ahmed Medical College and Hospital, Barpeta, Barpeta-Hospital-Jania Rd, Joti Gaon, Jaher Pam, Assam 781301, India

³Assistant Professor Department of Anaesthesiology, Diphu Medical College and Hospital, RCHG+RVH, Diphu, Assam 782462, India

⁴Associate Professor Department of Anaesthesiology, Jorhat Medical College and Hospital, P5VW+22H, Kushal Konwar Path, Kushal Nagar, Barbheta, Jorhat, Assam 785001, India

⁵Post Graduate Trainee, Department of Anaesthesiology, Fakhruddin Ali Ahmed Medical College and Hospital, Barpeta, Barpeta-Hospital-Jania Rd, Joti Gaon, Jaher Pam, Assam 781301, India

Corresponding author- **Dr. Vikramjit Baruah***

Article History

Volume 6, Issue 15, 2024

Received : 03 May 2024

Accepted : 28 Aug 2024

Published: 07 Sep 2024

[doi:10.48047/AFJBS.6.15.2024.3917-3923](https://doi.org/10.48047/AFJBS.6.15.2024.3917-3923)

Abstract: Background: Subarachnoid block is widely utilized for lower abdominal and limb surgeries due to its rapid onset, effective blockade, and minimal side effects. Bupivacaine traditionally dominates as the primary agent, but the exploration of adjuvants such as nalbuphine has shown a considerable promise in improving analgesia and anaesthesia. Nalbuphine, a semi-synthetic opioid, with its unique pharmacological profile, is positioned as a potential intrathecal adjuvant. However, its efficacy varies, necessitating an evaluation of its effectiveness at moderate doses in conjunction with hyperbaric bupivacaine for lower abdominal surgeries. **Methodology:** In the present hospital based observational study, 90 patients undergoing lower abdominal surgeries were enrolled. Patients were randomly assigned to three groups, each receiving a different intrathecal formulation. Group A received bupivacaine alone, while Group B & C received nalbuphine as adjuvants in dosage of 0.6mg and 0.8mg respectively. Sensory and motor blocks were assessed using pinprick and the Bromage scale, respectively. Groups were compared for onset, duration, and adverse effects. **Results:** The study found that the duration of sensory and motor blocks in groups B and C was significantly prolonged compared to group A, $p < 0.05$. Duration of anesthesia also progressively increased from A to C ($p < 0.05$). While there were no clinically significant differences in hemodynamics; hypotension and bradycardia, nausea and vomiting were more observed in nalbuphine groups with higher doses. **Conclusion:** Intrathecal nalbuphine demonstrated a substantial prolongation of sensory and motor block durations, suggesting its potential for enhanced postoperative analgesia in lower abdominal surgeries. The study underscores the utility of nalbuphine in subarachnoid blocks, emphasizing the need for careful monitoring and consideration of observed hypotension. Further research with larger cohorts is crucial to validate these findings and optimize the intrathecal nalbuphine dose for improved clinical outcomes.

Keywords: Subarachnoid block, nalbuphine, bupivacaine, lower abdominal surgeries, sensory block, motor block, analgesia, hemodynamics, adverse effects, perioperative care.

INTRODUCTION

Subarachnoid block has become a preferred technique for lower abdominal and limb surgeries providing a faster onset, effective motor and sensory blockade and minimal side effects [1]. Traditionally bupivacaine has been the drug of choice for subarachnoid block [1].

To enhance the quality and duration of analgesia, various adjuvants like opioids, alpha agonists, ketamine, adenosine, tramadol, and magnesium have been explored [2].

Intrathecal opioids, such as morphine and more recently nalbuphine, have shown a considerable promise in providing effective analgesia and anaesthesia with fewer side effects [2].

Nalbuphine, a semi-synthetic opioid, offers rapid onset and clearance, acting as a KAPPA receptor agonist and MU receptor antagonist [3].

Its unique pharmacological profile, characterized by rapid onset, clearance, and a balanced agonist-antagonist effect, positions nalbuphine as a promising intrathecal adjuvant [4].

However, intrathecal nalbuphine's efficacy varies across studies. Therefore, the present study attempts to evaluate the effectiveness of intrathecal nalbuphine, administered at moderate doses of 0.6 and 0.8 mg in conjunction with 15 mg of 0.5% hyperbaric bupivacaine, in patients undergoing lower abdominal surgeries.

Aims and Objectives

Aim: To compare the efficacy of two doses of Nalbuphine with Bupivacaine in lower abdominal surgeries.

Primary Objectives:

- To study onset and duration of sensory blockade (analgesia to pinprick)
- To study onset and duration of complete motor blockade by Bromage scale.
- To study duration of analgesia postoperatively

Secondary Objectives:

- To study changes in haemodynamic parameters
- To study adverse effects if any (nausea, vomiting, hypotension, bradycardia)

Materials and Method

Study Design: Hospital based observational study.

Study Setting: Dept of Anaesthesiology, Fakhruddin Ali Ahmed Medical College and Hospital, Barpeta.

Study Sample Size: 30 for each group (Total 90).

Statistical Analysis: For comparing 3 groups, Analysis of Variance (ANOVA) was utilized.

Inclusion Criteria

- American Society of Anesthesiologists (ASA) Grade I and II physical status, scheduled for lower abdominal surgery
- Age group of between 20 and 60 years irrespective of gender.

Exclusion Criteria

- Patient refusal for intrathecal block.
- Emergency surgeries
- ASA III, IV, or V
- History of allergy or hypersensitivity to any of the study drug, local skin sepsis, marked spinal deformities, Infection at the site of injection.
- Increased Intracranial pressure.
- Patients with Cardio-vascular System (CVS), renal or hepatic dysfunction, neuromuscular disorders, morbid obesity, and with marked coagulopathies, pregnancy.
- Patients on psychotropic drugs or history of psychiatric illness that would interfere with perception of pain.

METHODOLOGY

After obtaining Institutional Ethics committee approval, and written consent from the patients, they were randomly allocated into 3 groups with 30 patients in each group after matching the patient's age, sex and ASA grading:

Group A: (30 patients) received intrathecal anaesthesia with 3ml (15mg) of 0.5% hyperbaric bupivacaine + 0.5ml of Normal saline = total 3.5ml.

Group B: (30 patients) received intrathecal anaesthesia with 3ml (15mg) of 0.5% hyperbaric bupivacaine + 0.6mg nalbuphine diluted to 0.5ml of normal saline = total 3.5ml

Group C: (30 patients) received intrathecal anaesthesia with 3ml (15mg) of 0.5% hyperbaric bupivacaine + 0.8mg nalbuphine diluted to 0.5ml of normal saline = total 3.5ml.

After 15 minutes infusion of ringer lactate (RL) solution, under perfectly sterile circumstances intrathecal anesthesia was administered at the L4 or L5 interspace with a 25 gauge, 95 mm spinal needle and the respective 3.5 ml injection was given to all the three groups.

Vitals were monitored in every 5 mins till end of surgery followed by every hour till 12 hours.

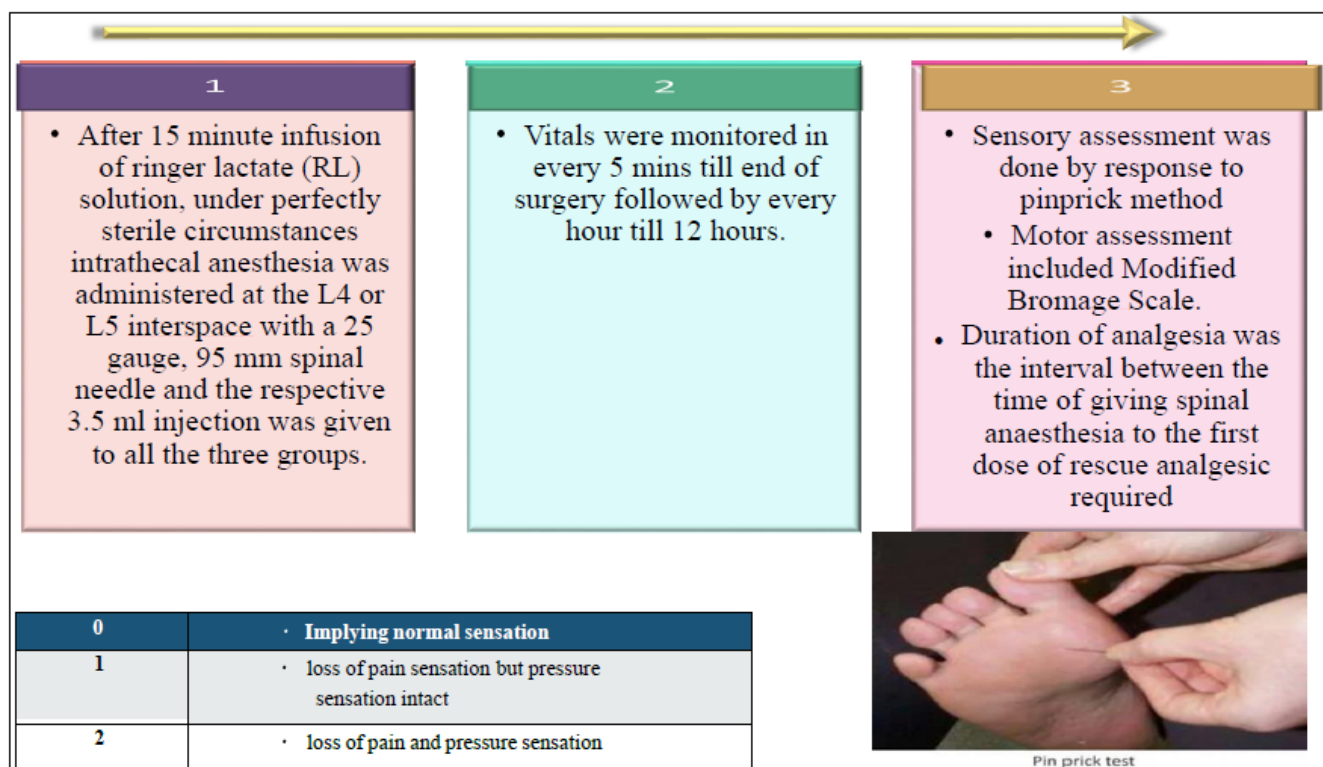
Sensory assessment was done by response to pinprick method. Motor assessment was done by Modified Bromage Scale.

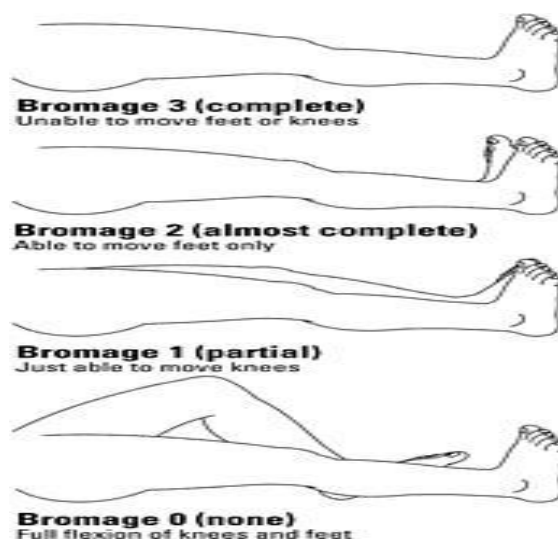
Duration of analgesia was the interval between the time of giving spinal anaesthesia to the first dose of rescue analgesic required.

Sensory block height was assessed by loss of sensation to pin prick on the dependent site using 20 gauge hypodermic needle in the midclavicular line.

Block was considered adequate when sensory level reached T10 dermatome. Modified Bromage Scale for Motor Block. Onset of motor block was defined as attainment of Bromage score 3.

Duration of motor block was the time interval between the administration of the drug to the ability of the patient to flex the knee with free movement of the feet.



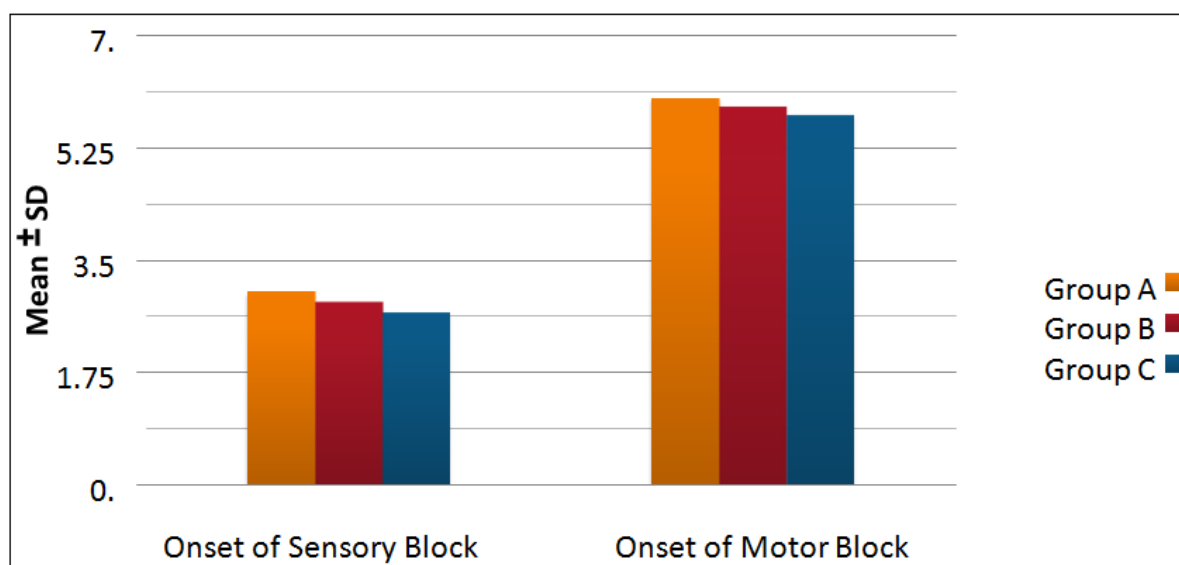


RESULTS AND DISCUSSIONS

Comparison of the groups in terms of characteristic parameters

Groups	Group A	Group B	Group C	P: value
Weight	60.07±8.86	56.50±8.29	58.23±9.55	0.305
Age	44±9	42±12	41±10	0.64
ASA I	16	18	17	0.87
ASA II	14	12	13	
Sex (M:F)	16:14	14:16	17:13	0.73
Duration of Surgery (min.)	58.30±5.61	58.17±9.22	58.90±5.35	0.91

There was no significant difference among the mean onset of sensory block in group A (3.00 ± 0.84 mins), group B (2.83 ± 0.29 mins) and group C (2.66 ± 0.48 mins), $p > 0.05$, as were the mean onset of motor block among group A (6.02 ± 0.18 mins), group B (5.88 ± 0.39 mins) and group C (5.75 ± 0.12 mins), $p > 0.05$.



Onset of Sensory and Motor Block of Different Groups

This consistent onset of sensory and motor block suggests that the different doses of intrathecal nalbuphine, when administered in conjunction with 15 mg of 0.5% hyperbaric bupivacaine, did not significantly impact the speed at which sensory and motor blockade occurred.

The lack of statistical significance ($p > 0.05$) in these parameters highlights the uniformity in the anesthetic

induction phase among the study groups.

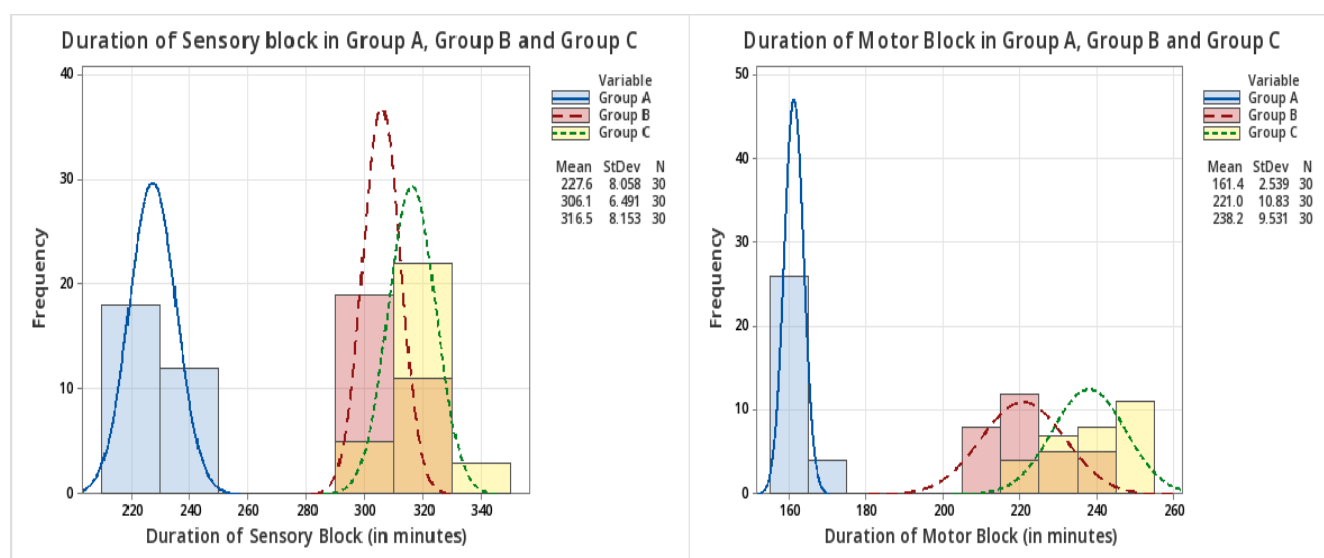
The mean duration of sensory block in group B (306 ± 6.49 mins) and group C (316 ± 8.15 mins) were significantly longer than in group A (227 ± 8.06 mins), $p < 0.05$, similar to the prolonged mean duration of motor block in group B (221 ± 10.83 mins) and group C (238 ± 9.53 mins) compared to the group A (161 ± 6.1 mins), $p < 0.05$.

This finding suggests that the addition of nalbuphine to bupivacaine led to a prolonged sensory and motor blockade, indicating a potential enhancement in the quality and duration of analgesia.

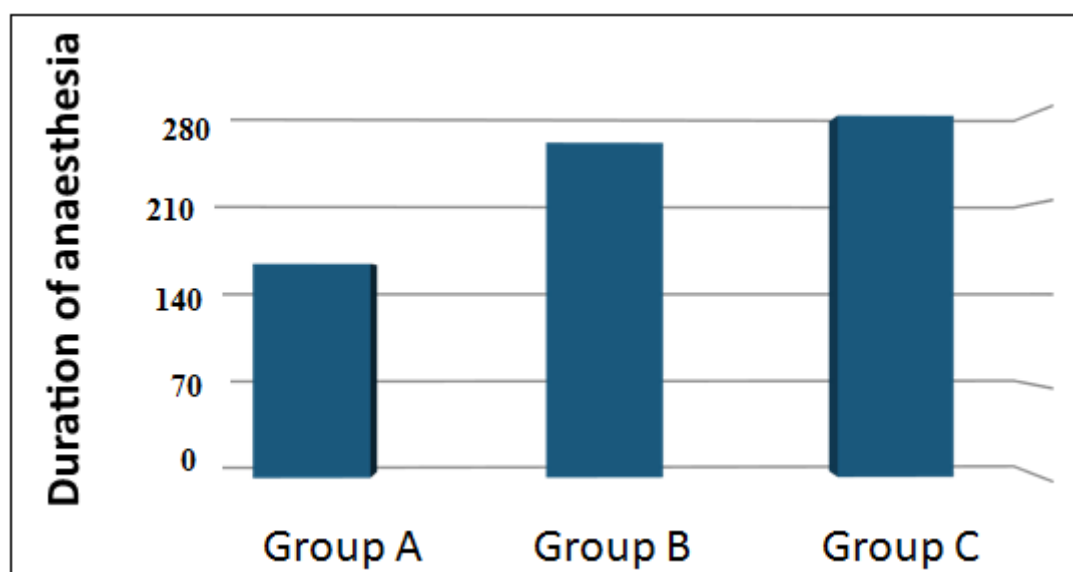
This observation holds clinical significance as it implies a prolonged period of effective pain relief and immobilization for patients undergoing lower abdominal surgeries.

It has also been observed that the duration of anaesthesia has progressively increased from Group A to C which is significant ($p < 0.05$).

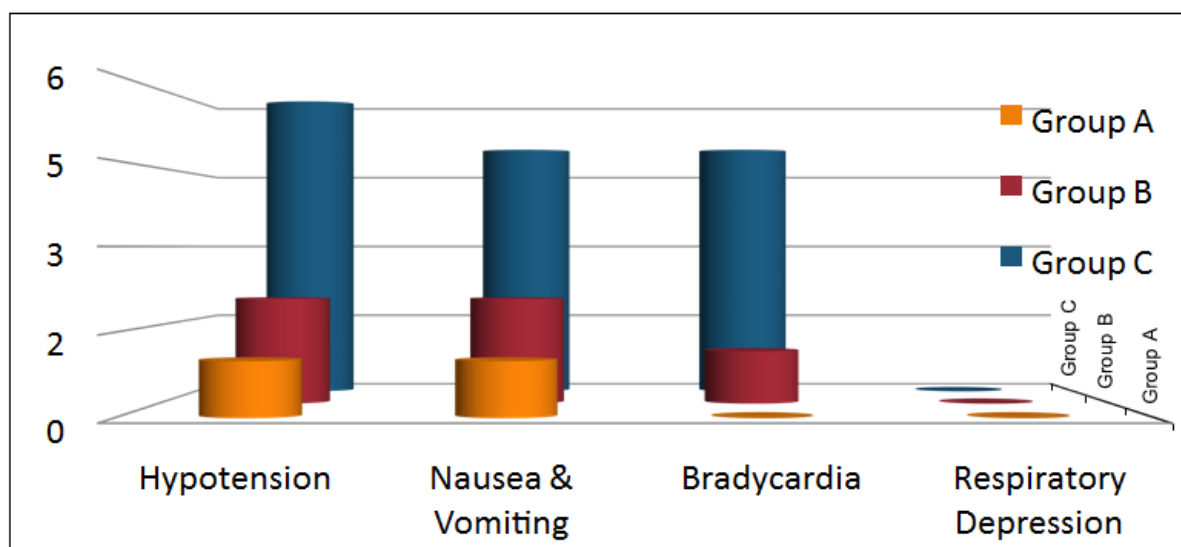
The mean duration of anaesthesia in Group A is 163 ± 3.2 mins, in Group B is 255 ± 14.9 mins and in Group C is 276 ± 10.5 mins.



Duration of Anesthesia



Alloted Groups



Although hypotension, bradycardia and nausea vomiting was noted in few patients, highest being in Group C (0.8mg nalbuphine) and it was statistically significant ($p < 0.05$); the present study did not show any clinically significant difference in the hemodynamic parameters and adverse effects.

CONCLUSIONS

This study underscores the potential of intrathecal nalbuphine as an effective adjuvant in subarachnoid blocks for lower abdominal surgeries.

The prolonged sensory and motor block durations, coupled with an extended duration of anesthesia, suggest the utility of nalbuphine in enhancing perioperative care. While the hemodynamic effects were manageable, careful consideration of the observed hypotension in nalbuphine groups is warranted.

Nalbuphine as an additive adjuvant in lower doses has a considerable effect in providing analgesia and prolonging duration of anaesthesia with minimal hemodynamic response. Further investigations with larger sample sizes and diverse patient populations are essential to validate these findings and refine the optimal dose of intrathecal nalbuphine for improved clinical outcomes.

REFERENCES

- Brull, R., Macfarlane, A. J. R., & Chan, V. W. S. (2015.). Spinal, Epidural and Caudal Anesthesia. In: Miller, R., Cohen, N., Erikson, L., Fleisher, L., editors. Miller's Anesthesia. 8th ed. p. 1685.
- Brull, R., Macfarlane, A. J. R., & Chan, V. W. S. (2015.). Spinal, Epidural and Caudal Anesthesia. 8th ed. Miller, R., Cohen, N., Erikson, L., Fleisher, L., editors. Miller's Anesthesia. Philadelphia; 1697 p.
- Gomaa, H. M., Mohamed, N. N., Zoheir, H. A. H., & Ali, M. S. (2014). A comparison between post-operative analgesia after intrathecal nalbuphine with bupivacaine and intrathecal fentanyl with bupivacaine after cesarean section. *Egyptian Journal of Anaesthesia*, 30(4), 405-410.
- Cummings III, K., & Naguib, M. A. (2017). Opioid Agonists and Antagonists. In: Flood, P., Rathmell, P., Shafer, S., editors. Stoelting's Pharmacology & Physiology in Anesthetic Practice. 5th ed. Wolters Kluwer Health, p. 217.
- Mao, Y., Cao, Y., Mei, B., Chen, L., Liu, X., Zhang, Z., & Gu, E. (2018). Efficacy of Nalbuphine with Flurbiprofen on Multimodal Analgesia with Transverse Abdominis Plane Block in Elderly Patients Undergoing Open Gastrointestinal Surgery: A Randomized, Controlled, Double-Blinded Trial. *Pain research and management*, 2018(1), 3637013.
- Purohit, A., & Sharma, H. C. (2018). A Comparison of Analgesic Effect of Different Doses of Intrathecal Nalbuphine Hydrochloride with Bupivacaine and Bupivacaine Alone for Infraumbilical Surgeries. *Int J Sci Res*, 7(11), 1918-1921.
- Saad, S., Afifi, E., Abd El-Azim, E. S., & Mofteh, W. (2018). Intrathecal nalbuphine as an adjuvant to bupivacaine in spinal anesthesia for lower-limb surgeries: intraoperative and postoperative effects. *Benha Medical Journal*, 35(3), 297.

8. Ibrahim, A. S., Aly, M. G., Thabet, M. E., & Abdelaziz, M. R. (2018). Effect of adding nalbuphine to intrathecal bupivacaine with morphine on postoperative nausea and vomiting and pruritus after elective cesarean delivery: a randomized double blinded study. *Minerva Anestesiologica*, 85(3), 255-262.
9. Chole, M. P., Bhalke, A., Nandanvankar, N. K., & Yennawar, S. D. (2019). Evaluation of Intrathecal Bupivacaine with Bupivacaine and Nalbuphine For Post-Operative Analgesia in Inguinal Hernia Repair Surgery. *Ann Int Med Den Res*, 5(6), 10-16.
10. Babu, R., Vadigeri, P., Lohit, M., Kumar, S., & Mudaraddi, R. (2019). Comparative study of intrathecal bupivacaine (3.5ml) with nalbuphine (0.6mg) and intrathecal bupivacaine (3.5ml) with nalbuphine (1.2mg) in lower abdominal surgeries. *Medpulse Int J Anaesthesiol*, 10(1).