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ASSESSING THE IMPACT OF PROPOFOL ANESTHESIA ON PAIN MANAGEMENT AND POST- OPERATIVE OUTCOMES IN LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT

Cholelithiasis is a prevalent condition that is often treated with laparoscopic cholecystectomy due to its shorter recovery time and fewer complications. Postoperative issues like pain management and ADRs may still arise. Propofol is an excellent anaesthetic with rapid onset and recovery, but its role in analgesia and recovery requires further investigation. Factors such as age, co- morbidities, and psychosocial status may influence postoperative recovery and overall patient satisfaction. **Materials and Methods:** A prospective observational study was conducted in the surgery department of Krishna Rajendra Hospital, Mysuru. The study included patients undergoing laparoscopic cholecystectomy, of either gender, who received propofol anaesthesia. These patients were analysed for hemodynamic stability, recovery profile, pre-operative and post- operative pain, and the prevalence, causality and severity of adverse drug reactions associated with propofol anaesthesia. **Results:** A total of 111 patients were included with more predominance among females. Most patients were diagnosed with cholelithiasis (95.49%). 96.39% of patients had pre-operative systolic blood pressure between 91-140 mmHg, with similar results observed post-operatively. 81.98% of patients had diastolic blood pressure between 61-80 mmHg pre- operatively with 78.38% post-operatively. Pulse rates were stable, with 64.86% of patients having a pre-operative pulse rate of 81-100 bpm. A Propofol dose of 100 mg was given to 67.56% of patients. Adverse drug reactions were occurred in 72.07% of patients, with tachycardia being the most common (16.25%). Majority of ADRs were mild (65%), and 87.5% were categorized based on the Naranjo Scale. Conclusion: This study examined the effects of propofol anesthesia on pain management and recovery in patients undergoing laparoscopic cholecystectomy. Results indicated that propofol effectively reduced postoperative pain and led to quicker recoveries. Most adverse drug reactions (ADRs) were mild to moderate, highlighting the importance of individualized anesthesia protocols and continuous monitoring to enhance patient safety and outcomes.

KEYWORDS: Cholelithiasis, Laparoscopic Cholecystectomy, Propofol anaesthesia, Pain management, Postoperative outcomes, Adverse drug reactions (ADRs).

INTRODUCTION

Cholelithiasis (gallstones) are solid masses that form in the gallbladder, commonly made of bilirubin or cholesterol. Cholecystitis (inflammation of gallbladder) which can be acute or chronic and gallbladder polyps, which are usually benign but may require removal if it is greater than 10mm in size. Gallbladder cancer, though rare, is aggressive and often diagnosed late. Other conditions include choledocholithiasis (bile duct obstruction), biliary dyskinesia (abnormal gallbladder motility), and primary sclerosing cholangitis, which affects the bile ducts and may lead to liver failure.[1] Laparoscopic cholecystectomy is indicated for conditions like symptomatic cholelithiasis, acute and chronic cholecystitis, biliary dyskinesia, gallstone pancreatitis, and gallbladder polyps.[2] This procedure involves insufflation, trocar insertion, gallbladder dissection, and retrieval through small incisions, offering advantages like minimal invasion, shorter hospital stays, fast recovery time and better cosmetic outcomes. However, potential complications include bile duct injury, bleeding, infection, conversion to open surgery, postoperative pain, and diarrhoea. Laparoscopic cholecystectomy is usually done under general anaesthesia with endotracheal intubation and positive pressure ventilation. Intravenous drugs, inhalation agents, and muscle relaxants are combined to provide balanced anesthetic technique.[3][4] Propofol is an intravenous anaesthetic known for its favourable pharmacokinetic and pharmacodynamic properties, providing easy induction and prompt recovery. It acts rapidly due to high lipid solubility, allowing rapid penetration into the brain and distribution to tissues.[5] Typically administered via target-controlled or manually adjusted infusion, propofol is often used in

balanced anaesthetic technique alongside with opioids and muscle relaxants.[6][7] Its side effect profile is very favourable, causing minimal respiratory depression and cardiovascular effects at appropriate doses.[8] Studies on propofol's postoperative analgesic effects show mixed results. Some found lower pain scores and reduced opioid requirements with propofol compared to inhalational anaesthetics, while others found no significant differences in pain or opioid use postoperatively.[9] Pharmacists play a key role in post-operative medication safety by reconciling medications, identifying adverse drug events, and optimizing therapy based on patient-specific factors. They provide education on safe medication use, collaborate with healthcare teams, and lead medication safety programs to enhance patient outcomes and minimize risks.[10] Laparoscopic cholecystectomy, though less painful than open surgery, still causes significant discomfort from various sources like somatic, visceral, and referred pain. Multimodal analgesia, including paracetamol, NSAIDs, and local anaesthetic infiltration, has proven effective in reducing both abdominal and shoulder pain, aiding faster recovery and enhancing patient satisfaction.[11],[12],[13] Proper pain management also reduces hospitalization time and improves postoperative outcomes.[14] Pharmacists educate patients on pain management, monitor for side effects, and collaborate with healthcare teams to enhance overall quality of care and they plays a major role in opioid stewardship programs to prevent misuse and optimize safety.[15]

MATERIALS AND METHODS

Study Site

The study was conducted in surgery department of Krishna Rajendra Hospital Mysuru, Karnataka. It is a tertiary referral care centre and teaching hospital (with the total of 13330 beds) attached to Mysore Medical College and Research Institute Mysuru, Karnataka, India.

Study Design

The study was a Prospective Observational study.

Study period

The study was carried out for a period of six months.

Ethical Approval

Ethical Clearance for this study was obtained from the Institutional Ethics Committee, Mysore Medical college and Research Institute (Ref no CR/157/03/2024) the same will be submitted to RGUHS University after obtaining the clearance.

Sources for data

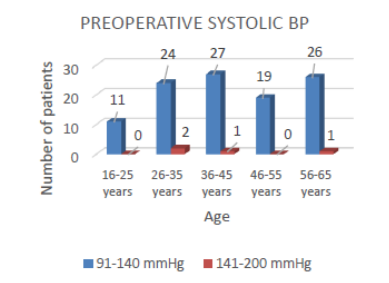
All the relevant and necessary data will be collected from Interviewing patients and caretaker, Prescription of the patient, Communicating with concerned clinicians and health care professionals, Medical and Medication records of the patient.

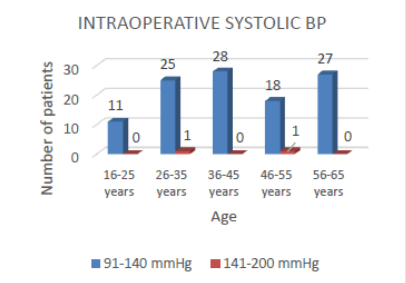
Study procedure

This Prospective Cross-sectional study was conducted in surgery department of Krishna Rajendra Hospital Mysore, Karnataka. Ethical approval obtained from the ethical committee of Mysore Medical College and Research Institute. Total 111 patients were enrolled in the study over a period of 6 months. An Informed consent form was suitably designed in English as well as in Kannada to obtain consent form patients who volunteered for the study and fulfilled the study criteria. Data collection form with all the necessary fields was suitably designed. The patients were interviewed once when they are attending IPD to gather information regarding pain intensity using Numerical rating scale. Post anesthesia recovery score was recorded using Modified Aldrete scoring system and ADRs associated with propofol anesthesia were evaluated for causality, severity using Naranjo's Algorithm, Modified Hartwig severity scale respectively. Data was gathered from patient case profile and documented electronically in specially designed database using Microsoft excel. Microsoft Office 2016 was used to conduct a statistical analysis and evaluate the data. To represent the outcomes, descriptive statistics like percentage, tables, and graphs were used. In our investigation, we used the chi-square test.

RESULTS AND DISCUSSION

Out of 111 subjects, majority of patients had pre-operative systolic blood pressure range of 91-140 mmHg (n=107, 96.39), followed by 141-200 mmHg (n=4, 3.6%). During Intra-operative monitoring 98.2% of patients had systolic blood pressure of 91-140 mmHg (n=109), followed by 141-200 mmHg (n=2, 1.8%). In Post-operative phase 88.29% of patients had systolic blood pressure range of 91-140 mmHg (n=98), followed by 141-200 mmHg (n=13, 11.71%).





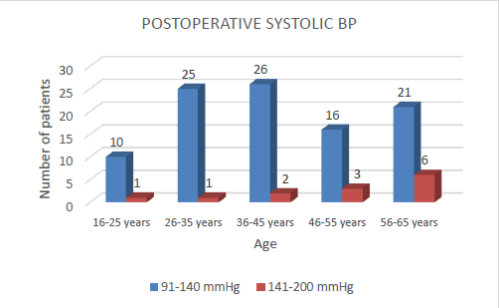


Figure 1: Distribution of systolic BP based on age groups.

Majority of patients had pre-operative diastolic blood pressure range of 60-81 mmHg (n=91, 81.98%), followed by 81-100 mmHg (n=20, 18.02%). During Intra-operative monitoring 80.18% of patients had diastolic blood pressure range of 60-81 mmHg (n=89), followed by 81-100 mmHg (n=22, 19.82%). In Post-operative phase 78.38% of patients had diastolic blood pressure range of 60-81 mmHg (n=87), followed by 81-100 mmHg (n=24, 21.62%).

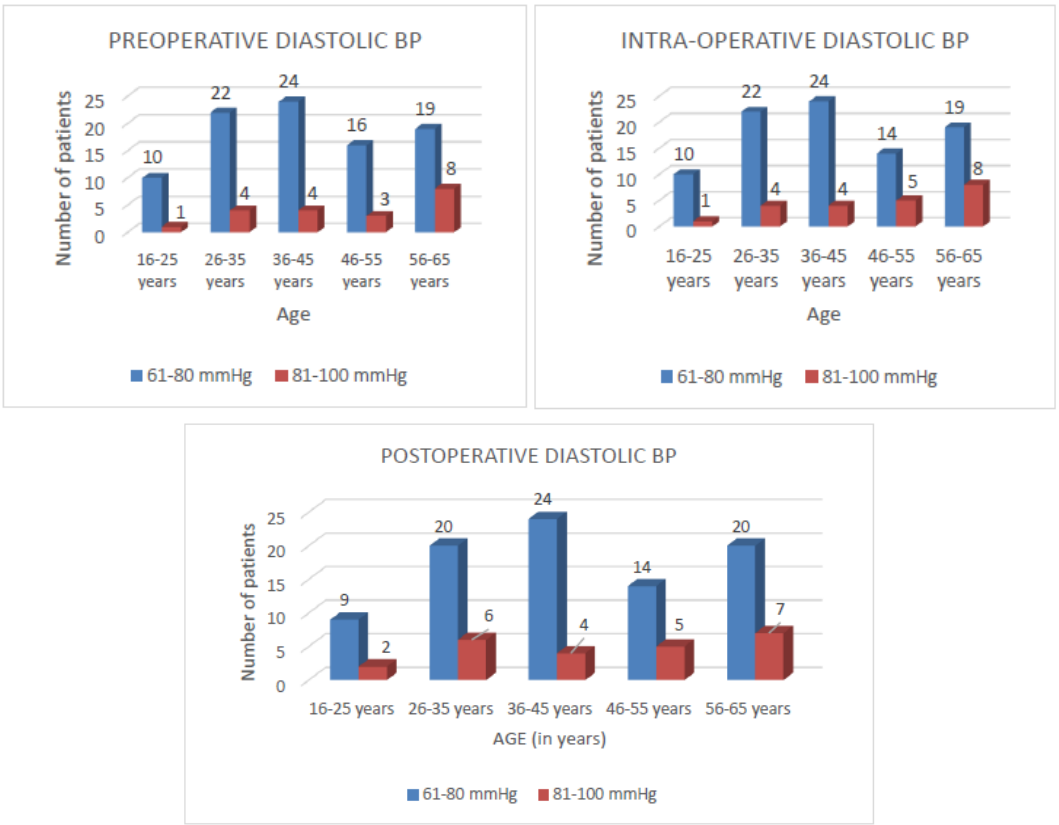


Figure 2: Distribution of diastolic BP based on age groups.

A higher percentage of patients had a pre-operative pulse rate of 81-100bpm (n=72;64.86%), followed by those in 61-80bpm(n=31;27.92%), 101-120bpm of pulse rate(n=8;7.20%) and no patients were in the 41-60bpm pulse rate. During Intra-operative monitoring 59.45% of patients had a pulse rate of 81-100bpm (n=66;59.45%), followed by those in 61-80bpm (n=35;31.53%), 101-120bpm of pulse rate(n=8;7.20%) and 41-60bpm of pulse rate (n=1;0.9%). In Post-operative phase 45.94% of patients had a pulse rate of 81-100bpm range (n=51), followed by those in 61- 80bpm(n=38;34.23%), 101-120bpm of pulse rate (n=17;15.31%) and 41-60bpm of pulse rate(n=5;4.50%). In our study population, most patients had a pulse rate of 81-100 bpm during surgery, but we observed a notable drop in pulse rate between 41-60 bpm due to the effects of anesthesia. When compared to the findings from **Jigna Shah, Niraj Varma et.al.**[16] which offer additional context, our results highlight the importance of closely monitoring of heart rate throughout the procedure to ensure patient safety.

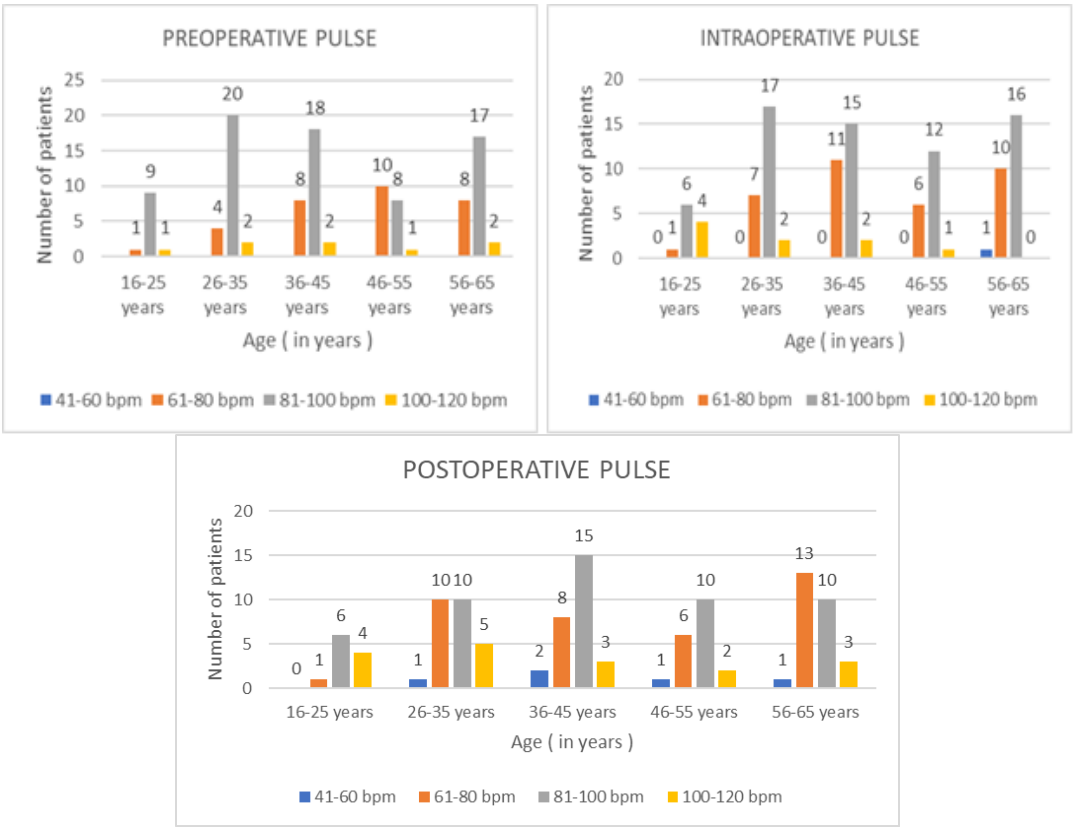


Figure 3: Distribution of pulse based on age groups.

A higher percentage of patients had a pre-operative respiratory rate of 11-15cpm(n=99;89.18%) followed by those with rates of 16-20cpm(n=12;10.81%), no patients had a respiratory rate in the 6-10cpm. During Intra-operative monitoring 93.69% of patients had a respiratory rate of 11- 15cpm (n=104;93.69%) followed by those with rates of 16-20cpm(n=5;4.50%) and respiratory rate of 6-10cpm(n=2;1.80%) and after the surgery, majority of patients had a post-operative respiratory rate of 11-15cpm(n=82;73.87%) followed by those with rates of 16- 20cpm(n=16;14.41%) and respiratory rate of 6-10cpm(n=13;11.71%).

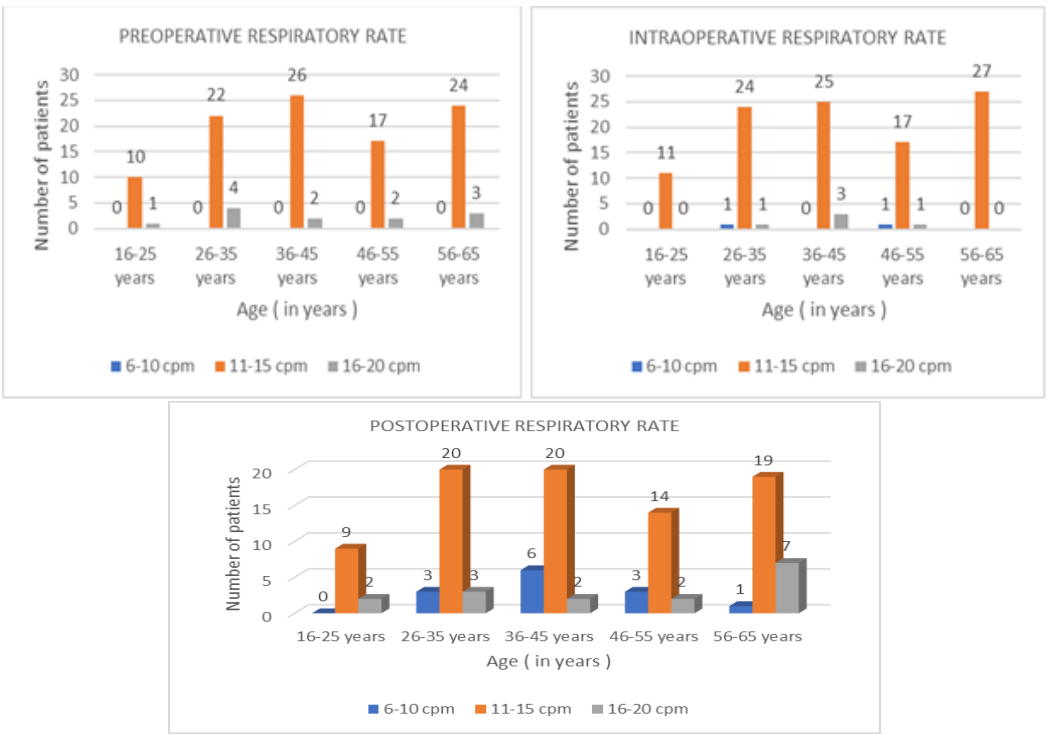


Figure 4: Distribution of respiratory rate based on age groups.

Modified aldrete scoring system is used to assess the post anesthesia recovery. On analysing the scores of activity, respiration, circulation, consciousness and oxygen saturation, majority of patients had score 8 (n=51,45.94%). Followed by score 7 and score 8 (n=29, 26.13%) and score 10 (n=2, 1.8%). In this study, it was observed that 55.85% of patients were able to move two extremities, while 44.14% could move all four extremities after surgery. **Dr. Priyanka Thakur Dr. Prteet Negi et.al.,**[17] research also observed quick recovery of motor function in their patient population. These findings suggest that effective post-operative care is crucial for rapid recovery.

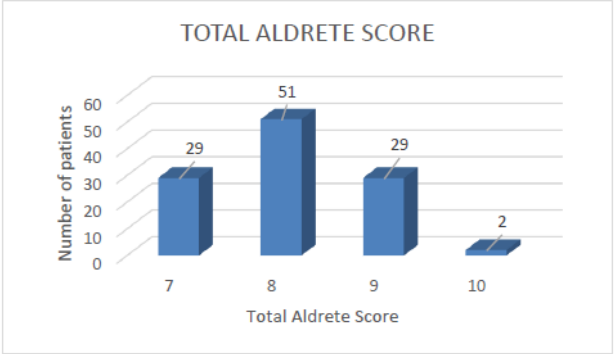


Figure 5: Total aldrete score.

Out of 111 study subjects, 109 patients experienced pain before surgery. The pain intensity of majority of them was moderate (n=57, 51.35%), followed by mild (n=41, 36.93%), severe (n=11, 9.9%) and none (n=2, 1.8%). In post-operative phase, the pain intensity of majority of them was moderate (n=60, 54.05%), Followed by severe (n=33, 29.73%), mild (n=18, 16.22%) and none (n=0, 0%).

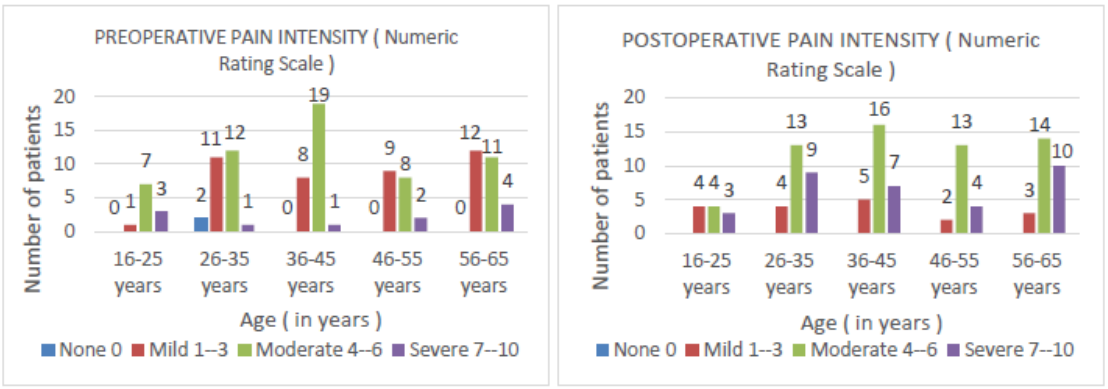


Figure 6: Pre-operative and Post-operative pain intensity.

In pre-operative, patients were prescribed either Dexamethasone, Fentanyl or Diclofenac for pain management. The majority were prescribed two analgesics(n=71;63.96%), followed by one analgesic(n=33:29.72%).In post-operative, patients were prescribed either Tramadol, Diclofenac or Paracetamol for pain management. The majority were prescribed two analgesics(n=71;63.96%), followed by one analgesic(n=39:35.1%) and the least prescribed was three analgesics(n=1;0.9%).

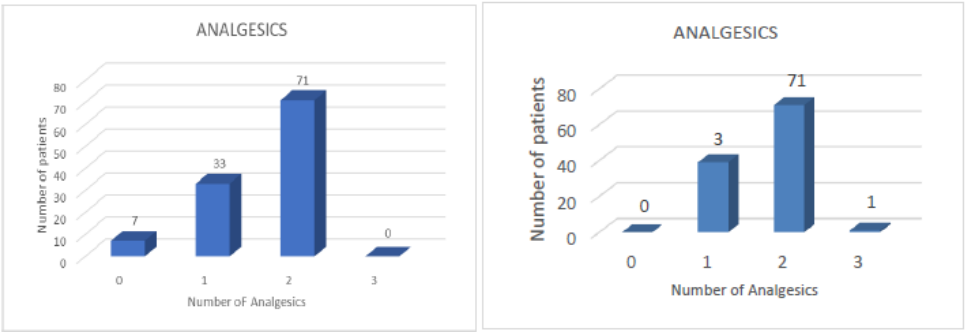


Figure 7: Pre-operative and Post-operative use of analgesics.

Out of 111 patients, 80(72.07%) patients developed an ADR. The percentage of patients developing ADRs was slightly more in females(n=52;65%) as compared to males(n=28;35%). The most common ADR observed was Tachycardia comprising 16.25% (n=13) of total ADRs. The other ADRs included are Respiratory Depression(n=11;13.75), Hypotension(n=11;13.75), Hypertension(n=11;13.75),PONV(n=10;12.5%),Insomnia(n=6;7.5%), Bradycardia(n=5;6.25%), Incisional Pain(n=4;5%), Restlessness(n=3;3.75), Abdominal Distention(n=3;3.75), Fatigue (n=2;2.5%), Urinary retention(n=1;1.25%).

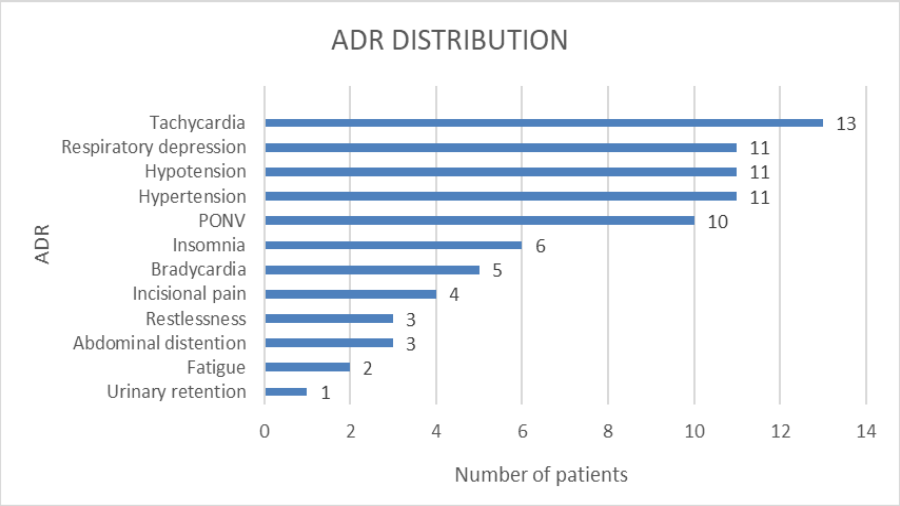


Figure 7: ADR Distribution among study population.

Out of 80 patients identified with ADRs, majority of ADR was found in the age group 36-45 years (n=22, 19.81%). Followed by 56-65 years (n=20, 18.01%), 26-35 years (n=16, 14.41%), 46-55 years (n=15, 13.51%) and 16-25 years (n=7, 6.31%).Majority of patients had Tachycardia (n=13, 11.71%). Followed by Hypertension, Hypotension, Respiratory depression each (n=11, 9.91%), Post-operative nausea and vomiting (n=10, 9%), Insomnia (n=6, 5.40%), Bradycardia (n=5, 4.5%), Incisional pain (n=4, 3.6%), Abdominal distension, Restlessness each (n=3, 2.7%), Fatigue (n=2, 1.8%) and Urinary retention (n=1, 0.9%). In our study population, PONV was reported in 12.5% of patients, which is significantly lower than the 50-80% incidence found by **Teena Bansal, Suresh Singhal et.al.,** in females undergoing laparoscopic surgeries.[18] Since our study included both males and females, this lower rate might be due to differences in the types of surgeries, patient demographics, or anesthesia techniques.

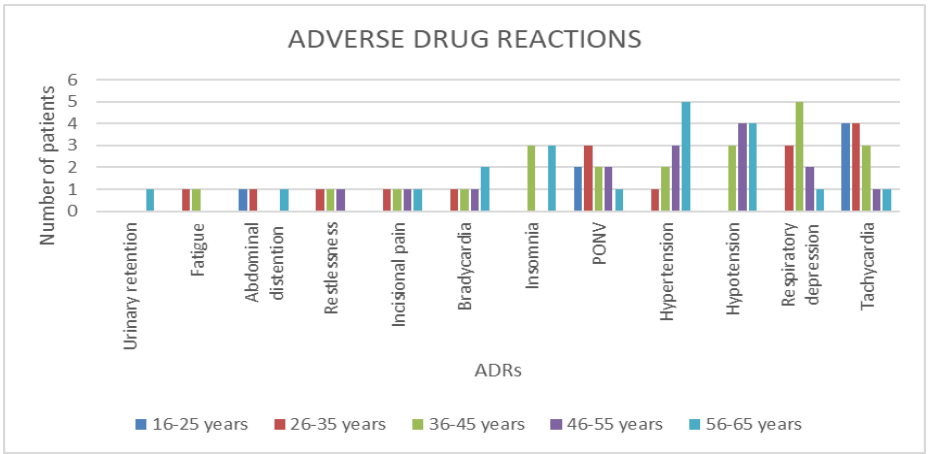


Figure 8: Naranjo ADR Interpretation based on age groups.

A higher percentage of females reported that the surgery helped them but they would not go through it again for the same outcome (n=38, 34.23%) compared to males(n=10;9%). Likewise, 33.33% of females (n=37) and 23.42% of males (n=37) reported that the surgery met their expectations and no patient reported that the surgery improved their condition enough so that they would go through it again for the same outcome (n=0, 0%) and no patient reported that they are the same or worse compared to before surgery (n=0, 0%).

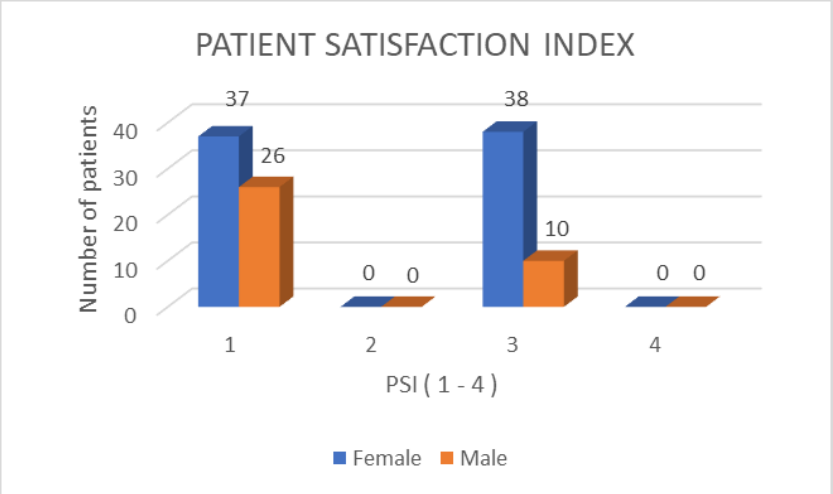


Figure 9: Patient Satisfaction Index score based on gender.

CONCLUSION

This study evaluated the impact of propofol anaesthesia on pain intensity, pain management, recovery time, and the duration of hospital stay in patients undergoing laparoscopic cholecystectomy. Based on our findings, propofol anaesthesia was effective in managing postoperative pain, with most patients reporting reduced pain intensity and shorter recovery times. A thorough analysis of patient records revealed that the majority of patients experienced faster recoveries, leading to shorter hospital stays. These results highlight the need for continuous monitoring and tailored anaesthetic management to optimize patient recovery and improve overall surgical outcomes.

Our study highlighted significant variations in pre-operative, intra-operative, and post-operative vital signs among patients undergoing laparoscopic cholecystectomy under propofol anaesthesia. Monitoring these changes offered valuable insights into the physiological effects of propofol throughout the surgical process. The incidence and severity of post-operative ADRs were evaluated, with most being mild to moderate. Patient satisfaction with the surgical experience was generally high, further affirming the effectiveness of propofol in pain management and smooth recovery. These findings will aid in refining anaesthesia protocols to improve patient outcomes and safety in similar procedures.

There is an importance in individualized anaesthesia protocols to improve outcomes and reduce the risk of adverse drug reactions (ADRs). Ensuring patient safety requires continuous monitoring of vital signs throughout the surgical phases. Further studies and collaboration among anaesthesiologists, clinical pharmacists, and healthcare providers are needed to refine anaesthesia practices, enhance pain management, and improve overall patient satisfaction in similar procedures.

REFERENCE

1. 9 types of gallbladder diseases and complications [Internet]. Whalen Clark, M.D. | Leading Robotics Surgeon in Tampa Bay. Whalen Clark, M.D., 2020 [cited 2024 Aug 4].
2. Hassler KR, Collins JT, Philip K, Jones MW. Laparoscopic Cholecystectomy. StatPearls Publishing, 2023.
3. Kim SS, Donahue TR. Laparoscopic cholecystectomy. JAMA [Internet], 2018 [cited 2024 Aug 4]; 319(17): 1834.
4. Swathi S, Nagaraj AV, Nataraj MS. Spinal anaesthesia for laparoscopic cholecystectomy: A comparison with general anaesthesia regarding haemodynamic and respiratory stability [Internet].
5. Ji F-H, Wang D, Zhang J, Liu H-Y, Peng K. Effects of propofol anesthesia versus sevoflurane anesthesia on postoperative pain after radical gastrectomy: a randomized controlled trial. J Pain Res [Internet], 2018 [cited 2024 Aug 4]; 11: 1247–54.
6. Lin W-L, Lee M-S, Wong C-S, Chan S-M, Lai H-C, Wu Z-F, et al. Effects of intraoperative propofol-based total intravenous anesthesia on postoperative pain in spine surgery: Comparison with desflurane anesthesia - a randomised trial. Medicine (Baltimore) [Internet], 2019 [cited 2024 Aug 4]; 98(13): e15074.
7. Bhatia A, Buvanendran A. Anesthesia and postoperative pain control—multimodal anesthesia protocol. J Spine Surg [Internet], 2019 [cited 2024 Aug 4]; 5(S2): S160–5.
8. Lundström S, Twycross R, Mihalyo M, Wilcock A. Propofol. J Pain Symptom Manage [Internet], 2010; 40(3): 466–70.
9. Peng K, Liu H-Y, Wu S-R, Liu H, Zhang Z-C, Ji F-H. Does propofol anesthesia lead to less postoperative pain compared with inhalational anesthesia?: A systematic review and meta-analysis. Anesth Analg [Internet], 2016 [cited 2024 Aug 4]; 123(4): 846–58.
10. Saine D, Larson CM. Medication safety officer: Getting started [Internet]. Ashp.org. [cited 2024 Aug 4].
11. Barazanchi AWH, MacFater WS, Rahiri J-L, Tutone S, Hill AG, Joshi GP, et al. Evidence-based

management of pain after laparoscopic cholecystectomy: a PROSPECT review update. Br J Anaesth [Internet], 2018; 121(4): 787–803.
12. Jabbour-Khoury SI, Dabbous AS, Gerges FJ, Azar MS, Ayoub CM, Khoury GS. Intraperitoneal and intravenous routes for pain relief in laparoscopic cholecystectomy. JSLS: Journal of the Society of Laparoendoscopic Surgeons, 2005; 9(3): 316.
13. Jiang B, Ye S. Pharmacotherapeutic pain management in patients undergoing laparoscopic cholecystectomy: A review. Adv Clin Exp Med [Internet], 2022 [cited 2024 Aug 4]; 31(11): 1275–88.
14. Jiménez Fuertes M, Costa Navarro D. Outpatient laparoscopic cholecystectomy and pain control: A series of 100 cases. Cir Esp (Engl Ed) [Internet], 2015; 93(3): 181–6.
15. Genord C, Frost T, Eid D. Opioid exit plan: A pharmacist's role in managing acute postoperative pain. J Am Pharm Assoc (2003) [Internet], 2017; 57(2): S92–8.
16. Shah J, Varma N. Comparison of hemodynamic stability and recovery profile with sevoflurane as inhalational agent versus propofol as total intravenous anesthesia during laparoscopic surgeries. Anaesth Pain Intensive Care [Internet]. 2018 [cited 2024 Sep 27]; 212–8.
17. View of a comparative study of ketofol (ketamine and propofol) with propofol alone for recovery in patients undergoing laparoscopic cholecystectomy [Internet]. [cited 2024 Sep 4].
18. Bansal T, Singhal S, Kundu K. Prospective randomized double-blind study to evaluate propofol and combination of propofol and sevoflurane as maintenance agents in reducing postoperative nausea and vomiting in female patients undergoing laparoscopic surgery. Med Gas Res [Internet], 2022; 12(4): 137–40.