

# A Study on the Comparison of Analgesic Efficacy of Pregabalin Versus Gabapentin in Patients Undergoing Laparoscopic Cholecystectomy

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## Abstract

Laparoscopic cholecystectomy is one of the most commonly performed surgical procedures for the treatment of gallbladder diseases, especially cholelithiasis. It has largely replaced open cholecystectomy due to advantages such as smaller incisions, reduced tissue trauma, shorter hospital stay, faster recovery, and better cosmetic results. However, despite being minimally invasive, postoperative pain remains a significant concern and can negatively affect patient comfort, early mobilization, and overall recovery.

**Keywords:** Laparoscopic, Open Cholecystectomy, Pre-emptive Analgesia, General Anesthesia, Pre-oxygenated, Dissection, Incision.

## INTRODUCTION:

Laparoscopic cholecystectomy is one of the most commonly performed surgical procedures for the treatment of gallbladder diseases, especially cholelithiasis. It has largely replaced open cholecystectomy due to advantages such as smaller incisions, reduced tissue trauma, shorter hospital stay, faster recovery, and better cosmetic results. However, despite being minimally invasive, postoperative pain remains a significant concern and can negatively affect patient comfort, early mobilization, and overall recovery.

Postoperative pain following laparoscopic cholecystectomy is multifactorial, arising from trocar site incisions, visceral pain due to gallbladder bed dissection, and referred shoulder pain caused by diaphragmatic irritation from carbon dioxide pneumoperitoneum. Poorly controlled pain may lead to delayed ambulation, prolonged hospitalization, increased pulmonary complications, enhanced stress response, and reduced patient satisfaction. Hence, effective perioperative pain management is essential for optimal surgical outcomes.

Conventional postoperative analgesia mainly includes opioids and non-steroidal anti-inflammatory drugs (NSAIDs). Although opioids provide effective analgesia, their use is associated with adverse effects such as nausea, vomiting, sedation, respiratory depression, and risk of dependence. NSAIDs may cause

gastrointestinal irritation, renal impairment, and increased bleeding risk. These drawbacks have encouraged the use of multimodal analgesia, which combines different classes of drugs to improve pain control while minimizing opioid-related side effects.

Pre-emptive analgesia involves administering analgesic agents before surgical stimulation to prevent central sensitization and reduce postoperative pain intensity. This approach has been shown to decrease postoperative analgesic requirements and improve recovery. Gabapentinoids, particularly gabapentin and pregabalin, have gained attention as effective pre-emptive analgesic agents.

Gabapentin and pregabalin are structural analogues of gamma-aminobutyric acid (GABA) that act by binding to the alpha-2-delta subunit of voltage-gated calcium channels, thereby reducing excitatory neurotransmitter release and modulating pain transmission. Gabapentin has been shown to reduce postoperative pain and opioid consumption but has limitations such as variable bioavailability and dose-related side effects. Pregabalin, with better bioavailability and faster onset of action, offers more predictable analgesia and may provide superior postoperative pain control with comparable or fewer adverse effects.

## AIM OF THE STUDY

A Study on the Comparison of Analgesic Efficacy of Pregabalin Versus Gabapentin in Patients Undergoing Laparoscopic Cholecystectomy.

## OBJECTIVES OF THE STUDY

1. To evaluate the analgesic efficacy of pregabalin versus gabapentin for pre-emptive analgesia in adult patients scheduled for laparoscopic surgeries under general anesthesia.
2. To differentiate hemodynamic stability in the perioperative period between the two groups.
3. To compare patient satisfaction with the analgesic regimen used in the postoperative period.
4. To assess and compare the incidence of adverse effects.

## MATERIAL AND METHODS

A prospective comparative study was conducted for a period of 6 months in the department of anesthesiology at Amina Nursing Home Nowgam, Srinagar. The study was started after getting the approval from the institutional ethical committee and the informed consent was obtained from all the study subjects involved in the study. All the patients posted for elective laparoscopic cholecystectomy in the age group between 20 and 60 years with ASA score of either 1 or 2 were included as our study subjects. Patients having history of hypersensitivity to our test drugs, pregabalin or gabapentin were excluded from the study.

A total of 90 study subjects were included in our study; the sample was taken following quota sampling which is a type of non-random sample technique. The entire study subjects were randomized into three groups of 30 each following a computer-generated random number table and a double blinding technique was followed where both the patient and the investigator were not aware of which drug was used on the patient.

Group B subjects received 3 tablets of Beplex forte (as placebo), Group G subjects received 3 tablets of Gabapentin 300mg (total 900mg) and Group P subjects received 3 tablets of Pregabalin 50mg (total 150mg). Pre-medication tablet Alprazolam 0.5 mg, Pantoprazole 40 mg was given to all the patients involved in the study. Along with it 3 tablets of Beplex Forte, Gabapentin or Pregabalin depending on the

group they belong to was given 60 min before the start of the surgery with sips of water. Standard monitors like pulse oximetry, NIBP, and electrocardiography were connected, and baseline heart rate, systolic blood pressure, diastolic blood pressure, and mean arterial pressure were recorded – before and 15 mins after giving the premedication drugs. General anaesthesia was started with intravenous injection of Midazolam (0.02mg/Kg) and Fentanyl (2mcg/kg).

Patients were pre-oxygenated with 100% oxygen for 3 minutes by anatomical face mask. Induction was done with iv propofol (2mg/kg) and vecuronium (0.08mg/kg) and after 3 minutes laryngoscopy was done and appropriate size endotracheal tube was placed in trachea. Anaesthesia was maintained with 66% N<sub>2</sub>O, 33% O<sub>2</sub> and 1% isoflurane. Repeat dose of muscle relaxant vecuronium (0.02mg/kg) were given as and when required. Patients were mechanically ventilated with ventilator settings titrated to maintain ETCO<sub>2</sub> at 30-40mmHg.

The blood pressure, heart rate and SpO<sub>2</sub> were measured every 5 minutes for the first half an hour after induction and then once every 15 minutes till the end of the surgery. Post-operatively degree of pain was measured based on the Visual Analogue Scale and when the patient experienced pain more than 4 on VAS, rescue analgesia was given in the form of Inj (**Peach et. al., 2007**). Tramadol (1mg/kg). The pain score was recorded every 30mins for the first 2 hours, then hourly for next four hours, then once every two hours till 12 hours post-operatively. The total amount of rescue analgesia required in each group was noted (**Ben-Menachem et. al., 2004**). Sedation score was measured using Ramsay sedation Scale at hourly intervals for 12 hours. Occurrence to adverse events were recorded and documented (**Pandey et. al., 2004**).

## RESULT AND ANALYSIS

The comparison of demographic variables between the two groups, including age, gender distribution, body weight, and ASA physical status, showed no significant differences, indicating that both groups were comparable at baseline.

The duration of surgery was also similar between the two groups, with no significant difference observed. Baseline hemodynamic parameters, including heart rate, systolic blood pressure, diastolic blood pressure, and mean arterial pressure, were comparable in both groups.

Additionally, post-induction hemodynamic parameters remained stable and comparable between the two groups at various time intervals, with no significant differences observed.

The incidence of side effects was higher in the Gabapentin group (Group II) compared to the Pregabalin group (Group I). Patients in the Gabapentin group experienced a greater frequency of cough, nausea, vomiting, and respiratory complications, whereas the Pregabalin group showed minimal to no such adverse effects. Overall, the Pregabalin group demonstrated a better side-effect profile.

The mean VAS scores were higher in the Gabapentin group compared to the Pregabalin group, indicating poorer analgesic outcomes in the Gabapentin group and better pain control in the Pregabalin group.

Overall, while both groups were comparable in terms of demographic characteristics, duration of surgery, and hemodynamic parameters, the Pregabalin group showed superior outcomes with fewer side effects and better postoperative pain relief compared to the Gabapentin group.

## DISCUSSION

Pre-emptive analgesia is an effective pain management strategy in which analgesic drugs are administered before surgical stimulus to prevent central and peripheral sensitization, thereby reducing postoperative pain and analgesic requirements. It is particularly beneficial in procedures such as laparoscopic

cholecystectomy, where adequate pain control promotes early recovery and patient satisfaction. Among the various agents used, gabapentinoids like pregabalin and gabapentin play an important role due to their ability to modulate central sensitization as part of a multimodal analgesic approach.

In the present study, demographic characteristics including age, gender, and body weight were comparable between the two groups, ensuring uniformity of baseline parameters. The duration of surgery was also similar between the groups. Baseline and post-induction hemodynamic parameters showed no significant differences, indicating comparable hemodynamic stability.

However, the incidence of side effects was higher in the Gabapentin group compared to the Pregabalin group, with the latter demonstrating a better safety profile. Additionally, postoperative pain scores were higher in the Gabapentin group, suggesting less effective analgesia, whereas the Pregabalin group provided better pain control.

Overall, the findings of this study suggest that pregabalin is more effective than gabapentin in providing postoperative analgesia with fewer side effects, making it a preferable option for pre-emptive analgesia in laparoscopic cholecystectomy.

## CONCLUSION

This study compared the effectiveness of pregabalin and gabapentin for pre-emptive analgesia in patients undergoing laparoscopic cholecystectomy. Both groups were comparable in baseline characteristics and intraoperative parameters. However, pregabalin was associated with better postoperative pain control and a lower incidence of side effects compared to gabapentin.

These findings suggest that pregabalin may be a more effective and safer option for pre-emptive analgesia. Further large-scale, multicentric studies are recommended to validate these results and to determine optimal dosing strategies and long-term outcomes.

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