Original Research Article

COMPARATIVE EVALUATION OF ORAL CLONIDINE AND PREGABALIN AS PREMEDICANTS FOR ATTENUATION OF HEMODYNAMIC STRESS RESPONSE IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY: A RANDOMIZED CONTROLLED STUDY

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Received : *20/03/2026*
Received in revised form : *09/05/2026*
Accepted : *27/05/2026*

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DOI: 10.70034/ijmedph.2026.2.440

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (2); 2656-2662

ABSTRACT

Background: Laparoscopic cholecystectomy is associated with significant hemodynamic stress responses due to laryngoscopy, intubation, and CO_2 pneumoperitoneum. Effective premedication is required to maintain hemodynamic stability, reduce opioid consumption, and improve perioperative outcomes. This study was designed to compare oral Clonidine and Pregabalin as premedicants in patients undergoing Laparoscopic Cholecystectomy.

Materials and Methods: Ninety ASA I–II patients aged 18–60 years were randomly allocated into three groups (n = 30 each): Group P (placebo), Group PG (pregabalin 150 mg), and Group C (clonidine 200 µg). The study drug was administered orally 75–90 minutes before induction of general anesthesia. Hemodynamic parameters (heart rate and mean arterial pressure), sedation scores, intraoperative and postoperative fentanyl consumption, postoperative pain (VAS), and adverse effects were recorded at predefined intervals up to 3 hours postoperatively.

Results: Baseline demographic and hemodynamic variables were comparable among all groups. Both pregabalin and clonidine significantly attenuated the hemodynamic response to laryngoscopy and CO_2 pneumoperitoneum compared to placebo ($p < 0.05$). Clonidine provided superior intraoperative control of heart rate and mean arterial pressure, whereas pregabalin showed comparable sedation and effective postoperative analgesia. Both study drugs significantly reduced intraoperative and postoperative fentanyl requirements compared to placebo ($p < 0.001$), with greater opioid sparing observed in the clonidine group. Postoperative VAS scores were significantly lower in both active groups. Hypotension was more frequent in the clonidine group, while other adverse effects were comparable.

Conclusion: Both oral clonidine and pregabalin are effective premedicants for attenuating perioperative stress responses in laparoscopic cholecystectomy. Clonidine provides superior hemodynamic stability and greater opioid-sparing effects, whereas pregabalin offers effective analgesia with a favorable safety profile.

Keywords: Clonidine, Pregabalin, laparoscopic cholecystectomy, hemodynamic response, premedication, opioid sparing.

INTRODUCTION

Laparoscopic Cholecystectomy has become the standard surgical procedure for symptomatic gallbladder disease because of its advantages of reduced postoperative pain, shorter hospital stays, faster recovery, and improved cosmetic outcome. However, creation of carbon dioxide pneumoperitoneum and laryngoscopy during general anesthesia are associated with significant sympathetic stimulation leading to tachycardia, hypertension, and increased stress response.[1] These hemodynamic alterations may increase perioperative morbidity, especially in susceptible patients. Adequate premedication plays an important role in attenuating these responses, providing sedation and anxiolysis, reducing anesthetic and opioid requirements, and improving postoperative analgesia and patient comfort.

Clonidine, an alpha-2 adrenergic agonist, has been widely used as a premedicant because of its sedative, anxiolytic, sympatholytic, and analgesic properties. It effectively blunts perioperative catecholamine release and provides hemodynamic stability during stressful surgical stimuli.[2] Pregabalin, a structural analogue of gamma-aminobutyric acid, has emerged as an effective premedicant with anxiolytic, analgesic, and opioid-sparing effects. It has also been shown to reduce postoperative pain and improve patient comfort without significant respiratory depression.[3]

Although both drugs have demonstrated beneficial perioperative effects individually, comparative evaluation of oral clonidine and pregabalin as premedicants in laparoscopic cholecystectomy remains clinically relevant. Previous studies by Gupta et al,[4] and Parveen et al.[5] demonstrated that both clonidine and pregabalin effectively attenuate hemodynamic responses during laparoscopic cholecystectomy while providing sedation and analgesic benefits. Therefore, the present study was undertaken to assess and compare the efficacy of oral clonidine and pregabalin with respect to hemodynamic stability, sedation and anxiolysis, attenuation of hemodynamic changes induced by CO_2 pneumoperitoneum, opioid-sparing effect, postoperative analgesia, recovery profile, and adverse effects in patients undergoing laparoscopic cholecystectomy.

MATERIALS AND METHODS

After obtaining approval from the Institutional Ethics Committee and written informed consent, this prospective, randomized, double-blind, placebo-controlled study was conducted in 90 adult patients of either gender, aged 18–60 years, belonging to American Society of Anaesthesiologists (ASA) physical status I and II, scheduled for elective Laparoscopic Cholecystectomy under general anesthesia. Patients with uncontrolled systemic illness, morbid obesity, psychiatric illness, drug abuse, difficult airway (Mallampati grade III/IV), hypersensitivity to study drugs, or those already receiving Pregabalin or Clonidine were excluded from the study.

All patients underwent detailed pre-anesthetic evaluation including airway assessment and routine laboratory investigations as per institutional protocol. Patients were randomized into three groups of 30 patients each using a computer-generated randomization table. Group P received oral placebo (Vitamin C tablet), Group PG received oral Pregabalin 150 mg, and Group C received oral Clonidine 200 µg with sips of water 75–90 minutes before induction of anesthesia. Baseline heart rate (HR), mean arterial pressure (MAP), oxygen saturation (SpO_2), and sedation score using Ramsay Sedation Scale were recorded before administration of study medication and repeated before induction.

In the operating room, standard monitoring including ECG, non-invasive blood pressure, pulse oximetry, and end-tidal carbon dioxide ($EtCO_2$) monitoring was instituted. Intravenous access was secured and crystalloid infusion was started at 8 mL/kg/h. All patients received intravenous metoclopramide 10 mg and fentanyl 2 µg/kg as premedication. Following preoxygenation for 3 minutes, anesthesia was induced with propofol 2 mg/kg and endotracheal intubation was facilitated with vecuronium 0.1 mg/kg. Anesthesia was maintained with sevoflurane (MAC 1%) in 60% nitrous oxide and oxygen, and ventilation was adjusted to maintain $EtCO_2$ between 35–40 mmHg. Additional neuromuscular blockade was achieved with vecuronium 0.02 mg/kg as required.

Carbon dioxide pneumoperitoneum was created at a flow rate of 2 L/min and intra-abdominal pressure was maintained at 12 mmHg throughout the laparoscopic procedure. Hemodynamic parameters including HR and MAP were recorded at baseline, before induction, 5 minutes after intubation, at skin incision, at creation of pneumoperitoneum, 15, 30, 45, and 60 minutes after pneumoperitoneum, and 15 minutes after release of pneumoperitoneum. Tachycardia or hypertension exceeding 20% of baseline values and inadequate analgesia were treated with intravenous fentanyl 0.5 µg/kg, and total intraoperative fentanyl consumption was recorded. Hypotension was managed with intravenous fluids and vasoactive agents when required, while bradycardia (HR <50 beats/min) was treated with intravenous atropine.

At the end of surgery, residual neuromuscular blockade was reversed with neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg, and patients were extubated after adequate recovery. Postoperatively, patients were monitored in the Post-Anesthesia Care Unit (PACU) for 3 hours. Pain was assessed hourly using the Visual Analogue Scale (VAS), and sedation was assessed using Ramsay Sedation Scale. Rescue analgesia with intravenous fentanyl 0.5 µg/kg was administered when VAS score exceeded 4.

Postoperative adverse effects such as nausea, vomiting, hypotension, dizziness, and excessive sedation were recorded. Total postoperative fentanyl consumption was also noted.
Data obtained were analysed using appropriate statistical methods. Continuous variables were expressed as mean ± standard deviation and categorical variables as percentages. Intergroup comparisons were performed using one-way ANOVA and Chi-square test where appropriate. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 90 patients, 30 in each group, were evaluated. The demographic characteristics and baseline clinical parameters were comparable among the three study groups. There was no statistically significant difference with respect to age, gender distribution, body weight, height, or ASA physical status between Group P, Group PG, and Group C (p > 0.05). Thus, all groups were comparable at baseline and suitable for further analysis of study outcomes. [Table 1]

Table 1: Demographic Characteristics and Baseline Clinical Profile of Patients in the Three Study Groups

Parameter	Group P (N=30)	Group PG (N=30)	Group C (N=30)	p-value
Age in years (mean ± SD)	47.23 ± 14.18	42.73 ± 14.72	45.33 ± 15.25	0.49
Gender M:F	9:21	7:23	8:22	0.84
Weight in kg (mean ± SD)	65.50 ± 5.50	64.13 ± 5.92	66.77 ± 8.60	0.33
Height in cm (mean ± SD)s	162.17 ± 4.31	160.53 ± 5.12	160.70 ± 5.05	0.36
ASA I:II	18:12	19:11	15:15	0.55
Duration of surgery in minutes (mean ± SD)	95.83 ± 6.03	95.50 ± 4.97	94.67 ± 4.72	0.67

Values are expressed as mean ± standard deviation or number of patients.
Group P = Placebo group; Group PG = Pregabalin group; Group C = Clonidine group; ASA = American Society of Anaesthesiologists physical status classification.
A p-value <0.05 was considered statistically significant.
The mean pulse rate was comparable among the three groups before administration of the study drug (p = 0.211). However, after premedication and throughout the intraoperative period, significant differences in pulse rate were observed between the groups. Group PG and Group C demonstrated significantly lower pulse rates compared to Group P from baseline in the operating room up to 15 minutes after release of pneumoperitoneum (p < 0.001). The attenuation of tachycardic response was more pronounced in Group C compared to Group PG during most intraoperative intervals, indicating better hemodynamic stability with Clonidine. Postoperatively, pulse rates were comparable among all groups at 1st, 2nd, and 3rd hour observations with no statistically significant difference (p > 0.05). [Table 2]

Table 2: Comparison of Pulse Rate (beats/min) Between the Three Study Groups at Different Time Intervals

Pulse Rate (beats/min)	Group P Mean ± SD (n=30)	Group PG Mean ± SD (n=30)	Group C Mean ± SD (n=30)	P Value
Pre operative				
Before giving study drug/70-90 mins before induction	77.33 ± 9.19	76.37 ± 8.24	80.30 ± 9.28	0.211
On arrival to OT				
At baseline	80.50 ± 9.41	73.17 ± 7.98	75.03 ± 8.75	0.005
5 min after intubation	82.73 ± 11.89	69.80 ± 9.09	69.70 ± 8.02	< 0.001
At skin incision	87.50 ± 14.11	68.90 ± 9.05	66.53 ± 8.05	< 0.001
At Pneumoperitoneum	89.67 ± 15.68	68.60 ± 11.86	67.30 ± 10.85	< 0.001
15 min after Pneumoperitoneum	85.00 ± 12.74	66.90 ± 7.41	65.33 ± 8.41	< 0.001
30 min after Pneumoperitoneum	82.47 ± 13.59	68.63 ± 9.57	65.67 ± 8.86	< 0.001
45 min after Pneumoperitoneum	81.50 ± 13.04	70.57 ± 9.42	66.10 ± 7.94	< 0.001
15 min after release of Pneumoperitoneum	83.30 ± 11.22	70.07 ± 8.99	66.00 ± 6.70	< 0.001
Post operative				
1st hr	76.63 ± 6.30	75.33 ± 11.30	75.10 ± 10.95	0.808
2nd hr	77.13 ± 6.87	75.70 ± 10.07	73.43 ± 9.07	0.263
3rd hr	76.00 ± 7.97	76.73 ± 10.71	74.57 ± 8.72	0.652

Values are expressed as mean ± standard deviation. Group P = Placebo group; Group PG = Pregabalin group; Group C = Clonidine group. OT = Operation Theatre.
A p-value <0.05 was considered statistically significant.
The baseline mean arterial pressure (MAP) was comparable among the three groups before administration of the study drug and on arrival to the

operating room ($p > 0.05$). However, statistically significant differences were observed after induction and throughout the intraoperative period. Group P demonstrated a marked rise in MAP during laryngoscopy, skin incision, and CO_2 pneumoperitoneum compared to Groups PG and C. Both Pregabalin and Clonidine effectively attenuated the pressor response, with Group C showing the most stable MAP values during pneumoperitoneum and surgical stimulation ($p < 0.001$ in most intraoperative time points). Postoperatively, MAP values were comparable among all groups at all measured intervals with no statistically significant difference ($p > 0.05$). [Table 3]

Table 3: Comparison of Mean Arterial Pressure (MAP) Between the Three Study Groups at Different Time Intervals

Mean arterial pressure (mm of Hg)	Group P Mean ± SD (n=30)	Group PG Mean ± SD (n=30)	Group C Mean ± SD (n=30)	P Value
Pre operative				
Before giving study drug/70-90 mins before induction	98.30 ± 7.68	102.17 ± 9.77	101.43 ± 10.04	0.232
On arrival to OT				
At baseline	102.10 ± 7.55	100.60 ± 9.85	98.07 ± 8.75	0.203
5 min after intubation	101.07 ± 7.50	98.83 ± 11.45	91.90 ± 8.38	0.001
At skin incision	118.90 ± 9.32	99.40 ± 15.69	88.57 ± 12.56	< 0.001
At Pneumoperitoneum	123.57 ± 9.38	97.77 ± 15.80	90.17 ± 11.27	< 0.001
15 min after Pneumoperitoneum	112.27 ± 10.10	99.63 ± 14.55	94.73 ± 10.31	< 0.001
30 min after Pneumoperitoneum	108.97 ± 7.56	98.30 ± 9.86	94.13 ± 8.65	< 0.001
45 min after Pneumoperitoneum	104.27 ± 7.84	100.33 ± 10.25	93.00 ± 10.60	< 0.001
15 min after release of Pneumoperitoneum	102.10 ± 6.85	97.37 ± 6.99	94.83 ± 9.11	0.002
Post operative				
1st hr	97.80 ± 6.82	97.00 ± 8.83	96.83 ± 10.80	0.792
2nd hr	100.50 ± 11.17	99.70 ± 6.85	99.30 ± 8.99	0.876
3rd hr	99.83 ± 10.61	98.93 ± 6.79	98.50 ± 6.58	0.814

Values are expressed as mean ± standard deviation. Group P = Placebo group; Group PG = Pregabalin group; Group C = Clonidine group. OT = Operation Theatre.
A p-value <0.05 was considered statistically significant.

The intraoperative and postoperative fentanyl requirements showed a statistically highly significant difference among the three groups ($p < 0.001$). Group P (placebo) had the highest opioid consumption both intraoperatively and postoperatively. Both Pregabalin (Group PG) and Clonidine (Group C) significantly reduced fentanyl requirement, demonstrating a clear opioid-sparing effect. The reduction was more pronounced in Group C, where intraoperative fentanyl requirement was almost negligible compared to Group PG, indicating superior analgesic and sympatholytic efficacy of clonidine in attenuating surgical stress response.

Table 4: Comparison of Intraoperative and Postoperative Opioid (Fentanyl) Requirement Among the Three Study Groups

Particular	Group P Mean ± SD (n=30)	Group PG Mean ± SD (n=30)	Group C Mean ± SD (n=30)	P Value
Intra operative (No of Doses)	2.17 ± 0.74	0.33 ± 0.66	0.03 ± 0.18	< 0.001
Post-operative (No of Doses)	1.63 ± 0.99	0.23 ± 0.43	0.27 ± 0.52	< 0.001

Values are expressed as mean ± standard deviation. Group P = placebo group; Group PG = Pregabalin group; Group C = Clonidine group.
A p-value <0.05 was considered statistically significant.

Postoperative VAS scores showed a statistically significant difference among the three groups at all-time intervals. At 1st, 2nd, and 3rd postoperative hours, Group P (placebo) demonstrated significantly higher pain scores compared to Groups PG and C ($p < 0.001$ at 1st and 2nd hour, and $p = 0.006$ at 3rd hour). Both Pregabalin and Clonidine effectively reduced postoperative pain scores, indicating better analgesia. Among the active drug groups, Group C showed comparatively lower VAS scores at most time points, suggesting slightly superior postoperative analgesic efficacy of clonidine. [Table 5]

Table 5: Comparison of Postoperative Visual Analogue Scale (VAS) Scores Among the Three Study Groups

VAS	Group P	Group PG	Group C	P Value
Post operative	Mean ± SD (n=30)	Mean ± SD (n=30)	Mean ± SD (n=30)	
1st hr	3.67 ± 0.55	2.73 ± 0.83	2.77 ± 0.63	< 0.001
2nd hr	3.43 ± 0.63	2.53 ± 0.51	2.30 ± 0.47	< 0.001
3rd hr	2.63 ± 0.72	2.40 ± 0.50	2.17 ± 0.38	0.006

Values are expressed as mean ± standard deviation. Group P = placebo group; Group PG = Pregabalin group; Group C = Clonidine group. VAS = Visual Analogue Scale for pain assessment. A p-value <0.05 was considered statistically significant.

The median sedation scores were comparable among all three groups at the preoperative baseline before administration of the study drug (p = 0.007). However, after premedication and throughout the intraoperative and postoperative period, statistically significant differences were observed (p < 0.001). Both Pregabalin (Group PG) and Clonidine (Group C) produced higher sedation scores compared to Group P (placebo), indicating effective preoperative sedation and anxiolysis. The sedation level remained stable and comparable between Group PG and Group C at all subsequent time points, without excessive sedation or delayed recovery. [Table 6]

Table 6: Comparison of Median Sedation Scores Among the Three Study Groups at Different Time Intervals

Time interval	Median Sedation score			
	Group P (n=30)	Group PG (n=30)	Group C (n=30)	P Value
Pre operative Before giving study drug/70-90 mins before induction	1	1	1	0.007
On arrival to OT Baseline	1	2	2	< 0.001
Post operative 1st hr	1	2	2	< 0.001
Post operative 2nd hr	1	2	2	< 0.001
Post operative 3rd hr	1	2	2	< 0.001

Values are expressed as median sedation scores using Ramsay Sedation Scale. Group P = placebo group; Group PG = Pregabalin group; Group C = Clonidine group. A p-value <0.05 was considered statistically significant.

The incidence of adverse effects was comparable among the three study groups with no major clinically significant complications observed. Hypotension was significantly more frequent in Group C compared to Group PG and Group P (p = 0.0235), likely reflecting the sympatholytic effect of Clonidine. Bradycardia was observed only in Group 3 but was not statistically significant (p = 0.129). Nausea and vomiting were slightly more common in Group P compared to the active drug groups; however, the differences were not statistically significant (p > 0.05). Dizziness was rare and occurred in only isolated cases. Overall, both Pregabalin and clonidine were well tolerated, with no serious adverse events or need for discontinuation of therapy.

Table 7: Comparison of Adverse Effects Among the Three Study Groups

Adverse Effects	Group P (n=30)	Group PG (n=30)	Group C (n=30)	P Value
Nausea	2 (6.67%)	2 (6.67%)	0	0.35
Vomiting	4 (13.33%)	1 (3.33%)	0	0.06
Dizziness	0	1 (3.33%)	0	0.06
Hypotension	0	1 (3.33%)	5 (16.67%)	0.0235*
Bradycardia	0	0	2 (6.67%)	0.129

Values are expressed as number of patients (percentage). Group P = placebo group; Group PG = Pregabalin group; Group C = Clonidine group. A p-value <0.05 was considered statistically significant.

DISCUSSION

Endotracheal intubation is one of the most intense noxious stimuli during general anesthesia and is known to produce marked sympathetic stimulation resulting in tachycardia and hypertension. Likewise, laparoscopic surgery further augments the stress response due to CO_2 pneumoperitoneum and patient positioning, leading to increased systemic vascular resistance, reduced cardiac output, and significant hemodynamic fluctuations. These responses may be particularly hazardous in elderly or cardio vascularly compromised patients because they increase the risk of myocardial ischemia and cerebrovascular events. If no preventive measures are taken, laryngoscopy and intubation alone can increase heart rate by 26% to 66% and systolic blood pressure by 36% to 45%, making attenuation of this response clinically important.[5,6]

Various pharmacological agents including opioids, beta-blockers, vasodilators, calcium channel blockers, and local anesthetics have been used to blunt these responses; however, each is associated with limitations such as respiratory depression, hypotension, or incomplete suppression of stress response. Therefore, the search for an ideal premedicant with effective sympatholysis and minimal adverse effects continues.

Clonidine, an α2-adrenergic agonist, provides sedation, analgesia, antiemesis, and significant attenuation of sympathetic outflow, thereby maintaining hemodynamic stability during laryngoscopy, intubation, and pneumoperitoneum. Studies have shown that clonidine as a premedicant provides stable intraoperative hemodynamics, reduces volatile anesthetic requirements, and decreases postoperative analgesic consumption,

thereby improving recovery outcomes in patients undergoing Laparoscopic Cholecystectomy,[7] Hayashi and Maze,[8] and Sung et al,[9] reported that clonidine improves perioperative circulatory stability in patients undergoing laparoscopic cholecystectomy and enhances parasympathetic tone. Similarly, Laisalmi et al,[10] concluded that premedication with clonidine effectively blunts the surgical stress response and reduces the requirement of both anesthetic and opioid agents.
Similarly, Pregabalin has been widely studied as a premedicant in various surgical procedures including laparoscopic and gynaecological surgeries, demonstrating effective analgesia and reduction in postoperative pain scores. Pregabalin has also been shown to reduce postoperative fentanyl requirements in patients undergoing laparoscopic cholecystectomy compared to placebo.[9]
A single preoperative dose of pregabalin 150 mg administered one hour before surgery has been shown to attenuate stress responses to endotracheal intubation, though its effect on perioperative opioid consumption has been variable across studies, with some reporting significant opioid sparing and others showing minimal impact.[11] Although both clonidine and pregabalin have been extensively evaluated individually, there remains a paucity of direct comparative studies assessing their relative efficacy in attenuating hemodynamic responses to laryngoscopy, intubation, and pneumoperitoneum. This lack of head-to-head evidence provided the rationale for the present study.
In the present study, baseline demographic variables were comparable among all groups, ensuring homogeneity and eliminating confounding factors. Hemodynamic parameters showed that both pregabalin and clonidine effectively blunted the stress response associated with laryngoscopy, pneumoperitoneum, and surgical stimulation. However, Group C demonstrated significantly better control of heart rate and mean arterial pressure during critical intraoperative events, particularly during pneumoperitoneum, where sympathetic stimulation is most pronounced. These findings are consistent with the sympatholytic action of clonidine mediated through central α2-adrenergic receptor stimulation, leading to reduced catecholamine release.
Our findings are in agreement with Kumkum Gupta et al,[4] who reported that both clonidine and pregabalin attenuated hemodynamic responses during laparoscopic cholecystectomy; however, clonidine was more effective in maintaining intraoperative hemodynamic stability, while pregabalin provided superior postoperative analgesia. Similarly, Shirin Parveen et al,[5] observed that oral clonidine produced better control of pressor response to laryngoscopy, whereas pregabalin was associated with greater postoperative sedation and analgesia. The present study supports these findings, reinforcing the role of clonidine in attenuating intraoperative sympathetic responses and pregabalin in improving postoperative comfort.
In terms of opioid consumption, both active drug groups showed a significant reduction in intraoperative and postoperative fentanyl requirement compared to placebo. The reduction was more pronounced in the clonidine group, indicating a stronger opioid-sparing effect. This is likely due to clonidine's analgesic properties mediated via descending inhibitory pain pathways and reduced central sympathetic outflow. Pregabalin also demonstrated a significant opioid-sparing effect, which can be attributed to its modulation of calcium channels and reduction in central sensitization.
Postoperative pain scores assessed using VAS were significantly lower in both drug groups compared to placebo at all time points. Although both clonidine and pregabalin provided effective analgesia, clonidine showed slightly better pain control in the early postoperative period. These findings differ slightly from some previous literature where pregabalin has been shown to provide superior postoperative analgesia; however, variations in dose, timing, and anesthetic technique may explain this difference.
Sedation scores were higher in both pregabalin and clonidine groups compared to placebo, indicating effective anxiolysis and preoperative sedation without excessive postoperative drowsiness or delayed recovery. Importantly, sedation levels remained within acceptable clinical limits, and no delayed emergence was observed in any group.
Regarding adverse effects, both drugs were well tolerated. Hypotension was more frequent in the clonidine group, consistent with its known pharmacological profile of sympatholysis and vasodilation. However, these episodes were manageable and did not require discontinuation of therapy. Bradycardia was rare and not statistically significant. Nausea, vomiting, and dizziness were comparable among groups, indicating a favourable safety profile for both agents.
Overall, the present study demonstrates that both clonidine and pregabalin are effective premedicants for laparoscopic cholecystectomy, with clonidine providing superior intraoperative hemodynamic stability and greater opioid-sparing effect, while pregabalin offers comparable sedation and postoperative analgesia with fewer cardiovascular side effects. A limitation of the study includes the relatively small sample size and short duration of postoperative follow-up limited to 3 hours. Future studies with larger sample sizes and extended postoperative monitoring are recommended to further validate these findings and optimize dosing strategies.

CONCLUSION

Both oral clonidine and pregabalin are useful as premedicants in laparoscopic cholecystectomy, with clonidine being more effective in controlling intraoperative stress response and pregabalin offering

a favourable balance between analgesia and safety profile.

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