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Comparative Study Between Oral Pregabalin 150mg And Gabapentin 300mg in Patients Undergoing Laparoscopic Cholecystectomy

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ABSTRACT

Background: Postoperative pain management is crucial with laparoscopic cholecystectomy, which is minimally invasive surgery. Pregabalin and gabapentin are commonly used for pain control, but their relative merits in the control of postoperative pain are unknown. This study compares the safety and efficacy of oral pregabalin (150 mg) with oral gabapentin (300 mg), administered preoperatively, for the control of pain following laparoscopic cholecystectomy. **Objective:** To compare the post-operative pain between oral pregabalin 150mg and gabapentin 300mg in patients undergoing laparoscopic cholecystectomy. **Study Design:** Randomized controlled trial. **Duration and Place of Study:** The study was conducted from September 2024 to 15 Jan 2025 at the Department of Anesthesia. **Methodology:** A total of 78 patients, aged 18-70 years, who were undergoing laparoscopic cholecystectomy, were assigned randomly to two groups. One received a single, oral dose of pregabalin, 150 mg, and the other received a single, oral dose of gabapentin, 300 mg, 60 min prior to the operation. The Visual Analog Scale (VAS) was employed to evaluate the pain at 24 hours' post-surgery. **Results:** The mean postoperative pain score was significantly lower in the gabapentin group (1.905 ± 0.21) compared to the pregabalin group (2.085 ± 0.24), with a p-value of 0.001. Stratified analysis showed that age, gender, BMI, dizziness, and residence type significantly affected the pain scores in both groups. **Conclusion:** Gabapentin provided superior pain relief with fewer side effects than pregabalin in patients undergoing laparoscopic cholecystectomy.

INTRODUCTION

In the setting of gallstone disease, cholecystitis and other gallbladder abnormalities, laparoscopic cholecystectomy is the most commonly performed minimally invasive technique for removal of the gallbladder.[1] Laparoscopic cholecystectomy involves the creation of small abdominal incisions through which the instruments and the laparoscope are placed.[2] Laparoscopic cholecystectomy is preferred over open cholecystectomy owing to its advantages of less postoperative pain, faster recovery, and shorter postoperative hospitalization.[3] Despite it being minimally invasive, the procedure is not entirely free from postoperative discomfort and requires effective postoperative pain management to achieve optimal recovery.

Postoperative pain from the laparoscopic cholecystectomy is of varying intensity and duration.[4] The sources of the pain are most frequently the insufflation of carbon dioxide gas in the abdominal cavity to create the working space to operate in, the procedure's incisions, and the tissue manipulation.[5] Most of the patients also experience shoulder pain as the diaphragm is irritated from the CO_2. Although the use of the laparoscopic procedure tends to result in less postoperative pain than the open procedure, the discomfort is of significant intensity to affect the patient's recovery.[6] Successful control of the pain is therefore a critical factor in the postoperative management of the patient.

Pregabalin is commonly utilized for its analgesic properties, particularly in the case of neuropathic pain and post-op recovery.[7] Regarding the process of laparoscopic cholecystectomy, pregabalin is utilized to control post-op pain through the modulation of the function of the central nervous system. Through the binding of pregabalin to spinal cord and brain calcium channels, the release of neurotransmitters that transmit the sensation of pain is minimized.[8] This avoids the development of central sensitization that would lead to chronic pain. The use of pregabalin in the post-op case has been shown to reduce the consumption of opioid analgesics, lower the intensity of the pain, and improve the overall post-op recovery of the patient.[9]

Other anticonvulsant medication that is also important in the treatment of postoperative pain is gabapentin.[10] Gabapentin has special use in relieving neuropathic pain and in preventing chronic pain.[11] Gabapentin is an inhibitory inhibitor of other excitatory neurotransmitter release and a calcium channel modulator in central nervous system, dampens excitability of neurons. For additional analgesic relief of other medications employed in analgesic care of patients undergoing laparoscopic cholecystectomy, gabapentin is used as an adjuvant.[12] It has been reported to decrease the intensity of pain as well as the necessity of any opioid analgesic in the postoperative period, with earlier recovery and less opioid-induced side effects.[13]

A study documented the average post-operative pain levels following laparoscopic cholecystectomy in patients administered oral pregabalin and gabapentin, reporting mean values of 2.09 ± 0.29 and 1.92 ± 0.24, respectively.[14]

Effective relief of pain after laparoscopic cholecystectomy is critical to facilitate recovery and comfort in patients. Pregabalin and gabapentin, both neuropathic pain modifiers, have been shown to be effective in reducing pain after surgery, but relative efficacy is not well established. The present study aims to evaluate and compare oral analgesic efficacy of pregabalin (150 mg) and oral gabapentin (300 mg) to determine the optimal drug to treat postsurgical pain, improve patients' outcomes, and reduce the need for additional analgesics.

METHODOLOGY

This randomized controlled trial was conducted from September 2024 to 15 January 2025 at the Department of Anesthesia, Lady Reading Hospital Peshawar. The study included 78 participants, divided into two groups of 39 each. The sample size was calculated using the World Health Organization's sample size calculator, considering a power of 80% and a 95% confidence level using mean values of 2.09 ± 0.29 and 1.92 ± 0.24, respectively.[14]

Patients were selected through a consecutive non-probability sampling method. Inclusion criteria comprised male and female patients aged between 18 and 70 years, who were scheduled for laparoscopic cholecystectomy, a minimally invasive surgery involving small incisions for the removal of the gallbladder using a camera-assisted laparoscope. Exclusion criteria excluded patients with psychiatric disorders, peripheral vascular disease, or other significant medical conditions that could impact the outcome of the study. Once consent had been gained, detailed demographic and clinical information were then recorded, including age, gender, and medical history.

The study involved administering oral pregabalin (150 mg) to one group and oral gabapentin (300 mg) to the other, 60 minutes prior to the surgical procedure. Both medications were given with sips of water, and intravenous access was secured for all patients to initiate fluid infusion. Post-operative pain was assessed 24 hours after surgery using the Visual Analog Scale (VAS), which rated pain intensity from 0 (no pain) to 10 (worst possible pain).

The data were collected and processed using the assistance of IBM SPSS version 21. Continuous data in terms of pain level and age were described using mean ± standard deviation, and categorical data were described using frequency and percentages. Independent Sample T-tests were used to evaluate the comparison of the two groups on the post-operative pain, where a p-value of less than 0.05 represented statistical significance.

RESULTS

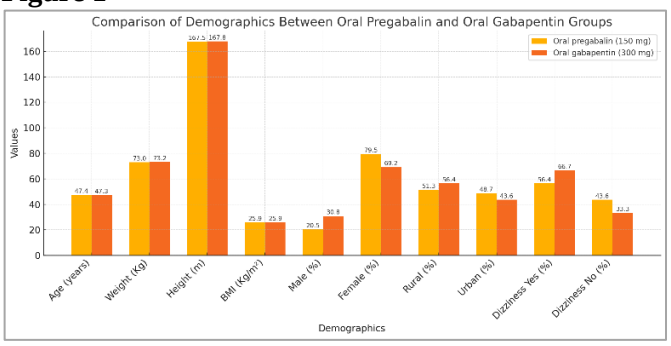
The demographic characteristics of both groups (oral pregabalin 150 mg and oral gabapentin 300 mg) were quite similar, as shown in Table-I. The mean age for both groups was approximately 47 years (pregabalin: 47.435±12.35, gabapentin: 47.333±11.88). The weight, height, and BMI were also comparable, with the pregabalin group having a mean weight of 73.046±8.20 kg, a height of 167.512±7.29 cm, and a BMI of 25.933±0.86, while the gabapentin group had a mean weight of 73.151±8.50 kg, a height of 167.769±7.28 cm, and a BMI of 25.874±0.87. Gender distribution showed that 79.5% of the pregabalin group were female compared to 69.2% in the gabapentin group. The residence type showed 51.3% of the pregabalin group and 56.4% of the gabapentin group lived in rural areas. In terms of dizziness, 56.4% of the pregabalin group and 66.7% of the gabapentin group experienced dizziness.

Table I

Demographics in both groups **(n=78)**

Demographics	Oral pregabalin (150 mg) n=39 Mean±SD	Oral gabapentin (300 mg) n=39 Mean±SD
Age (years)	47.435±12.35	47.333±11.88
Weight (Kg)	73.046±8.20	73.151±8.50
Height (m)	167.512±7.29	167.769±7.28
BMI (Kg/m^2)	25.933±0.86	25.874±0.87
Gender		
Male	8 (20.5%)	12 (30.8%)
Female	31 (79.5%)	27 (69.2%)
Residence		
Rural	20 (51.3%)	22 (56.4%)
Urban	19 (48.7%)	17 (43.6%)
Dizziness		
Yes	22 (56.4%)	26 (66.7%)
No	17 (43.6%)	13 (33.3%)

Figure 1



The postoperative pain results (Table-II) indicated that the mean pain score, measured on the Visual Analog Scale (VAS), was significantly lower in the gabapentin group (1.905±0.21) compared to the pregabalin group (2.085±0.24), with a p-value of 0.001, suggesting a significant difference in pain levels between the two groups.

Table II

Comparison of mean Postoperative Pain in both groups

	Oral pregabalin (150 mg) n=39 Mean±SD	Oral gabapentin (300 mg) n=39 Mean±SD	t	P value
Postoperative Pain (VAS)	2.085±0.24	1.905±0.21	3.468	0.001

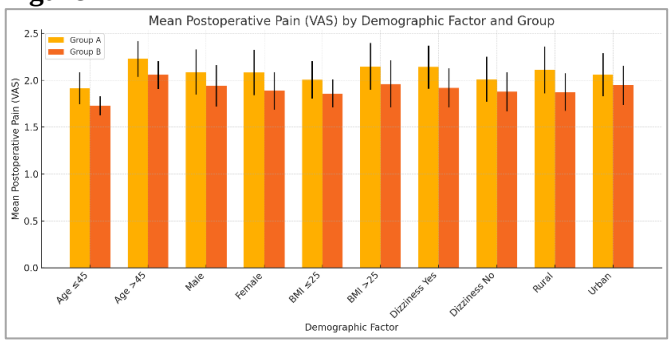
Stratified analysis (Table-III) further explored postoperative pain across various demographic factors. For participants aged ≤45 years, the pregabalin group (1.916±0.17) experienced significantly higher pain than the gabapentin group (1.727±0.10), with a p-value of 0.000. In participants aged >45 years, pregabalin also resulted in higher pain scores (2.228±0.19) compared to gabapentin (2.057±0.15), with a p-value of 0.002. Gender-wise, females in the pregabalin group (2.083±0.24) experienced significantly more pain than those in the gabapentin group (1.888±0.20), with a p-value of 0.002, while the results were not significant for males. In terms of BMI, those with a BMI ≤25 had significantly more pain in the pregabalin group (2.005±0.20) compared to the gabapentin group (1.857±0.15), with a p-value of 0.013, and similar results were observed for those with BMI >25 (pregabalin: 2.145±0.25 vs gabapentin: 1.961±0.25, p-value = 0.026). For participants reporting dizziness, those in the pregabalin group had significantly higher pain scores (2.140±0.23) than the gabapentin group (1.919±0.21), with a p-value of 0.001, but no significant difference was observed in participants without dizziness. Finally, for those living in rural areas, pregabalin resulted in significantly higher pain scores (2.110±0.25) compared to gabapentin (1.872±0.20), with a p-value of 0.001, while no significant difference was found in the urban population.

Table III

Stratification of mean Postoperative Pain with respect to demographic factors in both groups

Demographic factors	Group		Mean Postoperative Pain (VAS) Mean	SD	p Value
Age (years)	≤45	A (n=18)	1.916	0.17	0.000
		B (n=18)	1.727	0.10	
	>45	A (n=21)	2.228	0.19	0.002
		B (n=21)	2.057	0.15	
Gender	Male	A (n=8)	2.087	0.24	0.178
		B (n=12)	1.941	0.22	
	Female	A (n=31)	2.083	0.24	0.002
		B (n=27)	1.888	0.20	
BMI (Kg/m^2)	≤25	A (n=17)	2.005	0.20	0.013
		B (n=21)	1.857	0.15	
	>25	A (n=22)	2.145	0.25	0.026
		B (n=18)	1.961	0.25	
Dizziness	Yes	A (n=22)	2.140	0.23	0.001
		B (n=26)	1.919	0.21	
	No	A (n=17)	2.011	0.24	0.119
		B (n=13)	1.876	0.21	
Residence	Rural	A (n=20)	2.110	0.25	0.001
		B (n=22)	1.872	0.20	
	Urban	A (n=19)	2.057	0.23	0.145
		B (n=17)	1.947	0.21	

Figure 2



DISCUSSION

The results demonstrate that pregabalin, at the administered dose in this trial, led to higher postoperative pain scores when compared to gabapentin.

The pregabalin group had a higher mean pain score when compared with the gabapentin group, which contradicts previous findings that suggested that gabapentin may be more effective in providing pain relief because it has a more pronounced action on central nervous system excitability and has the ability to suppress hyperalgesia and allodynia after surgery. This may be explained by the distinct pharmacological profile of gabapentin, which, as an anticonvulsant, has been shown to modulate the release of excitatory neurotransmitters, giving better analgesic outcomes. The variables age, gender, BMI, and dizziness, as found by the stratification analysis, all had an effect on the extent of the postoperative pain, which demonstrates that the variables interact with the drugs in different ways and that the analgesic action of gabapentin has more relevance in certain subgroups in the population.

Our findings demonstrate that the pregabalin group had higher pain scores than the gabapentin group, as has been shown in other research work. For instance, Kaur et al.'s [15] research revealed the same, with pregabalin and gabapentin groups having lower pain scores when compared with the control group but with pregabalin showing more significant reduction in the intensity of pain and intake of opioids when compared with gabapentin, showing its superiority in the management of postoperative pain. Our work also revealed lower mean postoperative pain score in the gabapentin group (1.905±0.21) when compared with the pregabalin group (2.085±0.24), with the p-value being 0.001, as revealed by Eidy et al. [16] who similarly found pregabalin to be better in the control of pain when compared with gabapentin in the postoperative environment.

Our results showed that the age, gender, BMI, and dizziness-based stratification revealed interesting trends regarding the pain scores in the different subgroups. In the ≤45 years subgroup, pregabalin had higher pain scores (1.916±0.17) when compared to gabapentin (1.727±0.10), with p=0.000, as has been reported in the past as well. Specifically, Singh et al. [17] found that pregabalin 300 mg had more analgesia when compared to gabapentin 600 mg but more sedation, which might be the cause of the different pain scores. In the >45 years subgroup, pregabalin had higher pain scores (2.228±0.19) when compared with gabapentin (2.057±0.15), with p=0.002, again proving the hypothesis that pregabalin might be providing strong analgesic action, but with some demographics-related factors influencing the findings.

Our study further examined the interaction between gender and BMI on the pain postoperatively. For female patients, pregabalin had higher pain scores (2.083±0.24) compared with gabapentin (1.888±0.20), with p = 0.002, but in the case of men, the findings were not significant. This finding is similar to that in Singh et al. [17] where pregabalin had better pain relief in certain populations, but the higher side effects (e.g., sedation) in women could be the cause of the higher pain in the pregabalin arm in our study. Similarly, for patients with BMI ≤25, pregabalin had higher pain scores (2.005±0.20) as compared with gabapentin (1.857±0.15), with p = 0.013, but BMI >25 had the same trend (pregabalin: 2.145±0.25 vs gabapentin: 1.961±0.25, p = 0.026). These results are similar to findings in other papers, e.g., Eidy et al. [16] where better analgesia with pregabalin but with the potential for increased side effects in patients with higher body mass index was reported.

In addition, the finding in the current research that the patients with dizziness had higher pain scores in the pregabalin group (2.140±0.23) as opposed to the gabapentin group (1.919±0.21), with p=0.001, supports the findings by Kaur et al. [15] where pregabalin and gabapentin both had a greater likelihood to cause side effects that included dizziness. This may be the explanation why the patients with dizziness had higher pain scores, as dizziness and sedation may lead to increased perceived pain.

Finally, when rural versus urban living was taken into account, we found that patients who were living in rural environments and received pregabalin had higher pain scores (2.110±0.25) when compared with those who received gabapentin (1.872±0.20), with p=0.001. This supported the research by Eidy et al. [16] where regional and lifestyle factors may be the cause for influencing pain perception and the analgesic effect, although the two populations did not demonstrate any significant difference in the two environments. This could be attributed to different lifestyle habits, accessibility to healthcare, and the general pain sensitivity in the populations.

The higher pain scores in the pregabalin-treated subgroup are a result of the multifactorial interaction of drug action, patient factors, and side effects. These results contribute valuable information to the discussion on the proper use of these medications in the clinical setting, reinforcing the necessity for individualized pain management plans. Optimization of the treatment regimens for the control of postoperative pain and further validation by larger, multicenter populations in future studies would be beneficial.

A limitation of this research is that it was conducted at one site, which might restrict the applicability of the findings to more generalized populations. The relatively few patients included in the sample might also fail to capture the range of responses in a more heterogeneous patient population. The long-term effects on recovery and postoperative pain of pregabalin and gabapentin also were not measured because the duration of follow-up was only 24 hours. Multicenter, larger trials with extended follow-up are necessary to confirm these findings and to establish the long-term benefits and

adverse consequences of these medications in the perioperative setting.

CONCLUSION

Our study has shown that pregabalin and gabapentin are both effective in the management of laparoscopic cholecystectomy postoperative pain, but that gabapentin offered more pain relief with fewer side effects than pregabalin. The findings underscore the importance of individualized pain control, as age, gender, and BMI influenced the analgesic outcomes. Based on the different side effect and efficacy profiles, gabapentin might be a more balanced agent to control postoperative pain, although more work with larger and more heterogeneous populations has to be done to confirm these results.

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Author's Contributions:

The authors have significantly contributed to various aspects of this manuscript, as outlined below: **Dr. Alamgir Khan** was responsible for the conceptualization of the study, drafting the article, and collecting hospital data.

Dr. Roheena Wadood played a key role in the development of the article, study conceptualization, as well as the analysis and interpretation of the data.

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