

Semi-Fowler Versus Lateral Positioning for Pain Management in Patients with Cholelithiasis: A Quasi-Experimental Study

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Abstract

Cholelithiasis may cause abdominal pain that affects patients' comfort and daily activities. In addition to pharmacological therapy, positioning is a simple non-pharmacological nursing intervention that may help reduce pain intensity. The semi-Fowler and lateral positions are commonly used to improve patient comfort; however, their comparative effectiveness in patients with cholelithiasis remains unclear. This study aimed to compare the effectiveness of the semi-Fowler and lateral positions in reducing pain intensity among patients with cholelithiasis. A quasi-experimental study with a two-group pretest-posttest design was conducted in the inpatient ward of RSUD Siti Fatimah Az-Zahra, South Sumatra Province, in May 2026. A total of 34 patients with cholelithiasis were recruited using total sampling and allocated into the semi-Fowler group (n=17) and lateral group (n=17). The semi-Fowler group was positioned with the head of the bed elevated at 30–45°, while the lateral group was positioned in a side-lying posture supported with pillows for 15 minutes. Pain intensity was measured using the Numeric Rating Scale (NRS) before and after the intervention. Data were analyzed using the Wilcoxon Signed-Rank Test and Mann-Whitney U test. The mean pain score decreased from 6.59 ± 1.18 to 3.65 ± 0.93 in the semi-Fowler group and from 6.47 ± 1.01 to 3.53 ± 1.01 in the lateral group. Both groups demonstrated significant reductions in pain intensity ($p < 0.001$), with no significant difference between the two positions ($p = 0.984$). Both positions may be considered simple non-pharmacological nursing interventions for pain management in patients with cholelithiasis.

Keywords: cholelithiasis, pain, lateral position, semi-fowler position, non-pharmacological therapy.

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INTRODUCTION

Cholelithiasis is a common biliary disorder that may remain asymptomatic but can become clinically significant when gallstones cause biliary symptoms. Symptomatic gallstone disease commonly manifests as sudden-onset pain in the right upper quadrant or epigastric region and may

progress to complications such as acute cholecystitis, choledocholithiasis, or gallstone pancreatitis. Current clinical guidelines emphasize evidence-based approaches for the diagnosis and management of cholelithiasis, particularly among patients presenting with symptomatic disease (Fujita *et al.*, 2023; Patel & Jepsen, 2024). Symptomatic cholelithiasis represents an important clinical concern because recurrent biliary pain can reduce patient comfort, interfere with daily activities, and increase healthcare utilization. Although definitive management may involve cholecystectomy, treatment strategies for symptomatic gallstone disease remain individualized according to symptom severity, clinical conditions, and patient preferences (Sauerland & Langenbach, 2023; Shenoy *et al.*, 2022).

Pain management is therefore a fundamental component of nursing care for patients with cholelithiasis. Pharmacological analgesics remain the primary approach for managing acute biliary pain; however, complementary non-pharmacological interventions may provide additional strategies to improve comfort and support patient-centered care. Previous nursing studies have demonstrated that nurse-led non-pharmacological interventions can reduce pain intensity, particularly in the short term, although their effectiveness may vary depending on the type of intervention and clinical context (Park & Lee, 2022). Furthermore, a systematic review and Bayesian network meta-analysis reported that various non-pharmacological approaches could contribute to pain reduction, supporting their role as complementary strategies alongside conventional analgesic therapy (Liu *et al.*, 2023).

Patient positioning represents one of the simplest non-pharmacological interventions that can be independently implemented by nurses to enhance comfort during pain episodes. Appropriate positioning may assist patients in maintaining a more tolerable posture, reducing physical discomfort, and minimizing pain associated with prolonged or inappropriate body positions. A randomized controlled trial demonstrated that positional support was associated with improved postoperative pain outcomes, indicating that proper positioning may contribute to effective comfort management (Erdemir & Şenturan, 2020). Nevertheless, the effectiveness of positioning interventions may depend on the underlying disease condition, anatomical involvement, and clinical circumstances of individual patients.

The *semi-Fowler* and lateral positions are among the commonly applied positioning techniques in nursing practice to promote patient comfort. The *semi-Fowler* position involves elevating the upper body at a specific angle, whereas the lateral position places patients in a side-lying posture with appropriate support. Both approaches are simple, require no specialized equipment, and can be easily integrated into routine bedside nursing care. However, evidence regarding the effectiveness of these positions for reducing pain specifically among patients with cholelithiasis remains limited. Previous studies involving the *semi-Fowler* position have primarily focused on physiological and respiratory outcomes in other patient populations; therefore, its potential application for pain management in patients with cholelithiasis requires further investigation (Puspita *et al.*, 2022).

Recent studies have increasingly explored complementary and non-pharmacological approaches for pain management among patients with cholelithiasis. Several interventions, including early mobilization combined with lemon aromatherapy and other complementary therapies, have been investigated to reduce postoperative pain among patients undergoing cholelithiasis-related treatment (Azizah & Awaludin, 2025; Rahmila *et al.*, 2025). These findings highlight the potential contribution of simple nursing interventions in improving pain management. However, existing studies have predominantly focused on postoperative conditions or interventions other than therapeutic positioning. Direct comparative evidence regarding the effectiveness of *semi-*

Fowler and lateral positions in reducing pain intensity among patients with cholelithiasis remains scarce. This evidence gap is clinically relevant because positioning interventions are inexpensive, non-invasive, readily available, and aligned with the scope of independent nursing practice.

The novelty of this study lies in the direct comparison of *semi-Fowler* and lateral positioning as non-pharmacological nursing interventions for short-term pain reduction specifically in patients with cholelithiasis. This comparative approach provides evidence regarding the relative effectiveness of two practical positioning strategies that can be implemented in routine clinical care. Therefore, this study aimed to compare the effectiveness of the *semi-Fowler* and lateral positions in reducing pain intensity among patients with cholelithiasis.

METHODS

A quantitative quasi-experimental study with a two-group pretest-posttest design was conducted to compare the effectiveness of *semi-Fowler* and lateral positioning in reducing pain intensity among patients with cholelithiasis. The study was conducted in the inpatient ward of Siti Fatimah Az-Zahra Regional Hospital, South Sumatra Province, Indonesia, in May 2026. The study was reported according to the Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) statement (Francisco *et al.*, 2021). Pain intensity was assessed before and immediately after the intervention using the Numeric Rating Scale (NRS).

The study involved 34 hospitalized patients with cholelithiasis who experienced pain. Participants were recruited using a total sampling technique and equally assigned to the *semi-Fowler* group ($n = 17$) and the lateral group ($n = 17$). The inclusion criteria were patients aged 18–70 years, diagnosed with cholelithiasis and experiencing pain, fully conscious with a Glasgow Coma Scale status of *compos mentis*, willing to participate, and able to perform physical mobility. Patients with spinal disorders, impaired consciousness, or fractures were excluded from the study.

Prior to the intervention, baseline pain intensity was measured using the NRS, which ranges from 0 (no pain) to 10 (worst possible pain). Participants in the *semi-Fowler* group were positioned with the head of the bed elevated at 30–45° and supported with pillows, whereas participants in the lateral group were positioned in a side-lying posture with pillow support to maintain proper body alignment. Both interventions were maintained for 15 minutes, after which pain intensity was reassessed using the same NRS instrument.

Data analysis was performed using IBM SPSS Statistics. Descriptive statistics were applied to summarize participant characteristics and pain intensity scores. The Shapiro–Wilk test was used to assess the normality distribution of pretest–posttest difference scores. Within-group differences before and after the intervention were analyzed using the Wilcoxon signed-rank test, while differences in pain reduction between groups were analyzed using the Mann–Whitney U test. A two-tailed p -value < 0.05 was considered statistically significant.

Ethical approval was obtained from the Research Ethics Committee of Universitas Muhammadiyah Ahmad Dahlan Palembang (No. 005558/KEP Universitas Muhammadiyah Ahmad Dahlan Palembang/2026). Written informed consent was obtained from all participants prior to data collection. Participant confidentiality and data protection were maintained throughout the study.

RESULTS AND DISCUSSION

A total of 34 patients with cholelithiasis participated in this study, with 17 patients (50.0%) assigned to the *semi-Fowler* group and 17 patients (50.0%) assigned to the lateral group. The majority of participants were male (70.6%), while females accounted for 29.4% of the sample. Regarding age

distribution, 10 participants (29.4%) were aged 40–49 years, 12 participants (35.3%) were aged 50–59 years, and 12 participants (35.3%) were aged 60–70 years (Table 1).

Table 1. Characteristics of Participants (n = 34)

Characteristics	Frequency (n)	Percentage (%)
Age group (years)		
40–49	10	29.4
50–59	12	35.3
60–70	12	35.3
Sex		
Male	24	70.6
Female	10	29.4
Intervention group		
Semi-Fowler	17	50.0
Lateral	17	50.0
Total	34	100.0

Before the intervention, the mean pain intensity score was 6.59 ± 1.18 in the *semi-Fowler* group and 6.47 ± 1.01 in the lateral group. Following the 15-minute positioning intervention, the mean pain intensity decreased to 3.65 ± 0.93 in the *semi-Fowler* group and 3.53 ± 1.01 in the lateral group. The mean reduction in pain intensity was 2.94 points in both groups (Table 2).

Table 2. Pain Intensity Before and After Positioning

Group	n	Pretest, Mean $\pm$ SD	Posttest, Mean $\pm$ SD	Mean Reduction
Semi-Fowler	17	6.59 ± 1.18	3.65 ± 0.93	2.94
Lateral	17	6.47 ± 1.01	3.53 ± 1.01	2.94

The Shapiro–Wilk test showed that the pretest–posttest difference scores did not meet the assumption of normal distribution; therefore, non-parametric analyses were performed. The Wilcoxon signed-rank test revealed a significant reduction in pain intensity after the intervention in both the *semi-Fowler* group ($Z = -3.716$, $p < 0.001$) and the lateral group ($Z = -3.779$, $p < 0.001$) (Table 3).

Table 3. Wilcoxon Signed-Rank Test of Pain Intensity Before and After Positioning

Group	Pretest, Mean $\pm$ SD	Posttest, Mean $\pm$ SD	Z	p-value
Semi-Fowler	6.59 ± 1.18	3.65 ± 0.93	-3.716	<0.001
Lateral	6.47 ± 1.01	3.53 ± 1.01	-3.779	<0.001

The Mann–Whitney U test indicated no significant difference in pain reduction between the *semi-Fowler* and lateral groups ($U = 144.000$, $Z = -0.020$, $p = 0.984$). The mean rank of pain reduction was 17.47 in the *semi-Fowler* group and 17.53 in the lateral group, indicating comparable effects between the two positioning interventions (Table 4).

Table 4. Mann–Whitney U Test of Pain Reduction Between Groups

Group	n	Mean Rank	Mann–Whitney U	Z	p-value
Semi-Fowler	17	17.47	144.000	-0.020	0.984
Lateral	17	17.53			

The present study demonstrated that both *semi-Fowler* and lateral positioning were associated with significant short-term reductions in pain intensity among patients with cholelithiasis. Both groups experienced an identical mean reduction of 2.94 points after the 15-minute intervention, with significant within-group differences ($p < 0.001$). These findings suggest that therapeutic positioning may serve as a useful complementary nursing intervention to support pain management in patients with cholelithiasis. Previous studies have also reported the potential benefits of appropriate positioning in improving pain relief and physical comfort among patients with various clinical conditions (Erdemir & Şenturan, 2020). However, comparisons with previous findings should be interpreted cautiously because earlier studies involved different patient populations and clinical contexts.

The reduction in pain intensity observed in this study may be associated with improved body alignment, reduced physical discomfort, and increased patient comfort during positioning. Maintaining a more tolerable body posture may minimize mechanical stress and discomfort associated with painful conditions, thereby helping patients manage acute pain more effectively. This interpretation is consistent with previous evidence supporting non-pharmacological interventions as complementary approaches for pain management (Leung *et al.*, 2024; Park & Lee, 2022; Saragih *et al.*, 2023; van Veen *et al.*, 2024). Nevertheless, the present study did not directly evaluate physiological responses, muscle tension, or subjective comfort levels; therefore, the specific mechanisms responsible for pain reduction remain uncertain.

Although significant reductions were observed within both groups, the between-group analysis revealed no significant difference in pain reduction between the *semi-Fowler* and lateral positioning groups ($p = 0.984$). The identical mean reduction of 2.94 points and comparable mean ranks indicate that neither positioning technique demonstrated superior effectiveness for short-term pain reduction. These findings suggest that the improvement in pain intensity may be attributed more broadly to therapeutic repositioning and enhanced physical comfort rather than to a specific positioning method. Therefore, both positions may be considered appropriate options depending on patient preference, comfort level, mobility, and clinical condition (Avallin *et al.*, 2023; Tsegaye *et al.*, 2023).

From a nursing perspective, the findings support patient positioning as a simple, non-invasive, and cost-effective complementary intervention for pain management. Both *semi-Fowler* and lateral positions can be incorporated into routine nursing care alongside prescribed analgesics and other appropriate medical treatments rather than being considered substitutes for pharmacological therapy. This approach aligns with the concept of multimodal pain management, in which non-pharmacological strategies are integrated with conventional analgesic interventions to optimize patient outcomes (Bourgeois *et al.*, 2024; Hannigan *et al.*, 2024). Furthermore, the flexibility of these positioning techniques allows nurses to select interventions based on individual patient needs without requiring specialized equipment.

Several limitations should be considered when interpreting the findings of this study. The quasi-experimental design, relatively small sample size, single-center setting, short intervention duration (15 minutes), and immediate post-intervention assessment limit causal interpretation and the generalizability of the findings. In addition, pain intensity was assessed using the subjective Numeric Rating Scale (NRS), while potential confounding factors, including analgesic use and disease severity, were not fully controlled. Nevertheless, the NRS remains a practical and widely applied clinical tool for evaluating changes in pain intensity (Kim & Jung, 2020; Nugent *et al.*, 2021). Future studies should consider randomized controlled designs with larger multicenter samples,

standardized analgesic protocols, longer follow-up periods, and additional outcomes, such as patient comfort, functional status, and quality of recovery, to further clarify the role of therapeutic positioning in pain management among patients with cholelithiasis.

CONCLUSION

Both *semi-Fowler* and lateral positioning were associated with significant short-term reductions in pain intensity among patients with cholelithiasis. However, no significant difference was observed in the magnitude of pain reduction between the two positioning techniques, indicating that neither position demonstrated superior effectiveness. Therefore, both positions may be considered simple, non-invasive complementary nursing interventions that can be selected based on patient comfort, tolerance, and clinical condition. Further randomized controlled studies with larger sample sizes, standardized analgesic protocols, and longer follow-up periods are recommended to validate these findings and further clarify the clinical effectiveness of therapeutic positioning in pain management.

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AUTHOR CONTRIBUTION STATEMENT

The authors declare that the contribution of each author to the preparation of this manuscript is as follows: SNW contributed to the conceptualization of the study, development of the research methodology, participant recruitment, data collection, data analysis, interpretation of the findings, and preparation of the manuscript. DE contributed to the development of the research methodology, supervision of data collection, interpretation of the findings, and critical revision of the manuscript. ACW contributed to the conceptualization of the study, methodological review, statistical analysis, interpretation of the findings, and critical revision of the manuscript. CS contributed to participant recruitment, data collection, review of the research data, interpretation of the findings, and critical revision of the manuscript. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest related to the publication of this article.

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