e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(9); 1213-1218

Original Research Article

Incidence and Severity of Postoperative Nausea and Vomiting After General Anaesthesia in Elective Surgeries

Arshid Rasool Wani[1], Deeksha kaila[2], Iqra Majid[3]

[1]Senior Resident, GMC, Baramulla
[2]Senior Resident, GMC, Jammu
[3]Senior Resident, Skims, Soura

Received: 01-08-2025 / Revised: 25-08-2025 / Accepted: 04-09-2025
Corresponding Author: Dr. Deeksha kaila
Conflict of interest: Nil

Abstract

Introduction: Postoperative nausea and vomiting (PONV) is a frequent and distressing complication after general anaesthesia, especially in elective surgeries. Despite improvements in anaesthetic techniques and antiemetic use, PONV still negatively affects patient recovery, satisfaction, and healthcare costs. Its incidence ranges from 20–30% in the general population and up to 70–80% in high-risk patients, with most cases occurring within the first 24 hours postoperatively, particularly during the first 6 hours.

Aims: The primary aim of this study is to evaluate the incidence and severity of postoperative nausea and vomiting (PONV) in adult patients undergoing elective surgeries under general anaesthesia. Additionally, the study seeks to identify key patient-related, surgical, and anaesthetic risk factors associated with PONV, and to assess the effectiveness of current prophylactic measures. The findings are intended to guide the development of targeted strategies for prevention and management of PONV in high-risk patients.

Methods: This was a prospective observational cohort study conducted in the Department of Anaesthesiology, Acharya Shri Chander College of Medical Sciences and Hospital, Jammu, over six months, including a total of 180 participants.

Result: In this study of 180 adult patients undergoing elective surgeries under general anaesthesia, the overall incidence of postoperative nausea and vomiting (PONV) was 36.1%. Female patients, non-smokers, those with a history of motion sickness, and patients receiving intraoperative opioids or undergoing prolonged surgeries (>2 hours) had a significantly higher risk of PONV. Surgical specialty influenced incidence, with gynaecological (50%) and general surgery (41.7%) showing the highest rates. Sevoflurane use was associated with increased PONV incidence and severity compared to other volatile agents. Overall, 22% of patients experienced moderate-to-severe PONV, highlighting its multifactorial nature and the importance of identifying high-risk patients for targeted prophylaxis.

Conclusion: The overall incidence of PONV was 36.1%, with moderate-to-severe symptoms in 22% of patients. Female gender, non-smoking status, history of motion sickness, use of intraoperative opioids, prolonged anaesthesia, and certain surgical specialties (gynaecology and general surgery) were significant risk factors. Sevoflurane was associated with higher incidence and severity. These findings emphasize that PONV is a common, multifactorial complication after general anaesthesia, underscoring the need for risk-based prophylactic strategies to improve patient comfort and outcomes.

Keywords: Postoperative nausea and vomiting, PONV, general anaesthesia, elective surgery, incidence, severity, risk factors, sevoflurane, opioids, prophylaxis.

Introduction

Postoperative nausea and vomiting (PONV) remains one of the most common and distressing complications following general anaesthesia, particularly in elective surgical procedures. Despite advances in anaesthetic techniques and the use of prophylactic antiemetics, PONV continues to significantly impact patient satisfaction, recovery time, and healthcare costs [1]. The incidence of PONV ranges from 20% to 30% in the general surgical population, but can increase to 70%–80% in high-risk individuals [2]. It typically occurs within the first 24 hours post-surgery, with the first 6 hours being the most critical period [3]. PONV is not only uncomfortable but may also lead to serious complications such as wound dehiscence, dehydration, electrolyte imbalance, aspiration, and delayed recovery, particularly in outpatient settings [4]. Consequently, the prevention and effective management of PONV are essential components of perioperative care, especially in elective surgeries

where optimal patient outcomes and satisfaction are prioritized.

Numerous patient-related, surgical, and anaesthesia-related factors contribute to the development of PONV. Patient-related risk factors include female gender, non-smoking status, history of motion sickness or previous PONV, and younger age [5]. Anaesthetic factors such as the use of volatile anaesthetics (e.g., sevoflurane, isoflurane), nitrous oxide, and postoperative opioids are strongly associated with increased risk [6]. Surgical procedures involving the abdomen, breast, middle ear, and eye, as well as laparoscopic and gynaecological surgeries, are more commonly associated with higher rates of PONV [7].

The Apfel simplified risk score, which incorporates four key predictors—female sex, history of PONV or motion sickness, nonsmoking status, and postoperative opioid use—remains a widely used tool for identifying at-risk patients and guiding prophylactic antiemetic use [8]. Management strategies often involve multimodal approaches that include pharmacological agents such as 5-HT3 antagonists (ondansetron), corticosteroids (dexamethasone), dopamine antagonists (droperidol), and NK1 receptor antagonists (aprepitant), as well as non-pharmacological methods like adequate hydration, regional anaesthesia, and acupuncture [9].

Despite these measures, variability in the incidence and severity of PONV remains high across different populations and surgical settings. This underscores the importance of continued research to understand the risk profile of specific patient groups, refine prediction models, and evaluate the effectiveness of both preventive and therapeutic interventions [10].

Furthermore, elective surgeries provide a relatively controlled environment to assess these variables, making them ideal for studying PONV outcomes. This study aims to evaluate the incidence and severity of PONV following general anaesthesia in elective surgical cases, identify associated risk factors, and assess the adequacy of prophylactic measures. Such insights can inform the development of targeted strategies to minimize PONV, improve perioperative care, and enhance patient recovery and satisfaction.

Materials and Methods

Study Design: Prospective Observational Cohort Study

Study Place: Department of Anaesthesiology, Acharya Shri Chander College of Medical Sciences and Hospital, Jammu, Jammu and Kashmir 180017.

Study Duration: 06 Months.

Sample Size: 180.

Inclusion Criteria

1. Adult patients aged 18–65 years.
2. ASA physical status I–III.
3. Undergoing elective surgery under general anaesthesia with planned postoperative observation at the study site.
4. Able to understand and provide written informed consent.

Exclusion Criteria

1. Emergency surgeries.
2. Patients with pre-existing nausea/vomiting or active gastrointestinal obstruction.
3. Known allergy or contraindication to study-used antiemetics.
4. Chronic antiemetic use or chronic opioid therapy.
5. Pregnant or lactating women.
6. Inability to give informed consent or to communicate nausea severity (e.g., severe cognitive impairment).

Statistical Analysis: Data were initially entered into Microsoft Excel and subsequently analyzed using SPSS software (version 27.0; SPSS Inc., Chicago, IL, USA) and GraphPad Prism (version 5). Numerical variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages.

Comparisons between independent groups were performed using the independent samples t-test, whereas paired t-tests were applied for correlated (paired) data. Categorical variables were analyzed using the Chi-square test, and Fisher's exact test was employed when expected frequencies were small. A p-value ≤ 0.05 was considered statistically significant.

Results

Table 1: Demographic Distribution of Patients

Parameter	Group with PONV (n=65)	Group without PONV (n=115)	Total (N=180)	p-value
Age (years, Mean ± SD)	38.6 ± 12.4	40.1 ± 13.0	39.6 ± 12.7	0.42
Sex (Male/Female)	22 / 43	68 / 47	90 / 90	0.03*
BMI (kg/m², Mean ± SD)	25.4 ± 3.2	24.9 ± 3.5	25.1 ± 3.4	0.28

Table 2: Type of Surgery and Incidence of PONV

Type of Surgery	No. of Patients (n)	PONV Present (n, %)	PONV Absent (n, %)	p-value
General Surgery	60	25 (41.7%)	35 (58.3%)	0.021*
Gynaecological	40	20 (50.0%)	20 (50.0%)	0.013*
Orthopaedic	45	10 (22.2%)	35 (77.8%)	0.085
ENT	35	10 (28.6%)	25 (71.4%)	0.071
Total	180	65 (36.1%)	115 (63.9%)	—

Table 3: Distribution According to Duration of Anaesthesia

Duration of Anaesthesia	Patients (n)	PONV Present (n, %)	PONV Absent (n, %)	p-value
<1 hour	40	8 (20%)	32 (80%)	0.038*
1–2 hours	85	28 (32.9%)	57 (67.1%)	0.044*
>2 hours	55	29 (52.7%)	26 (47.3%)	0.009*

Table 4: Incidence Based on Type of Volatile Agent Used

Volatile Agent	Patients (n)	PONV Present (n, %)	Mean Severity Score (0–3)	p-value
Sevoflurane	75	32 (42.7%)	1.8 ± 0.6	0.028*
Isoflurane	55	18 (32.7%)	1.4 ± 0.7	0.15
Desflurane	50	15 (30.0%)	1.2 ± 0.5	0.11

Table 5: Influence of Opioid Use on PONV

Intraoperative Opioid Use	Patients (n)	PONV Present (n, %)	Mean Nausea Score	p-value
Yes	110	48 (43.6%)	1.9 ± 0.8	0.002*
No	70	17 (24.3%)	1.1 ± 0.6	—

Table 6: Severity of Postoperative Nausea and Vomiting

Severity Grade	Score Definition	Patients (n)	Percentage (%)
None	0	115	63.9%
Mild	1	25	13.9%
Moderate	2	20	11.1%
Severe	3	20	11.1%
Total	—	180	100%

Table 7: Correlation Between Risk Factors and PONV

Risk Factor	PONV Present (n=65)	PONV Absent (n=115)	p-value
Female Gender	43 (66.2%)	47 (40.9%)	0.01*
Non-smoker	50 (76.9%)	65 (56.5%)	0.02*
History of Motion Sickness	20 (30.8%)	12 (10.4%)	0.004*
Use of Opioids	48 (73.8%)	62 (53.9%)	0.03*
Duration >2 hr	29 (44.6%)	26 (22.6%)	0.01*

A total of 180 adult patients undergoing elective surgeries under general anaesthesia were evaluated for the incidence and severity of postoperative nausea and vomiting (PONV). Of these, 65 patients (36.1%) experienced PONV within the first 24 hours postoperatively, while 115 patients (63.9%) remained free of symptoms. The demographic and clinical characteristics of both groups were compared and are summarized in Tables 1–7. As shown in Table 1, the mean age of patients with PONV (38.6 ± 12.4 years) was comparable to those without PONV (40.1 ± 13.0 years) ($p = 0.42$). However, a significant association was observed with sex distribution—female patients had a higher incidence of PONV compared to males ($p = 0.03$). The mean BMI did not differ significantly between the two groups ($p = 0.28$). The incidence of PONV varied significantly according to the surgical specialty (Table 2). The highest rates were seen in gynaecological (50%) and general surgery (41.7%) cases, both showing statistically significant associations with PONV ($p = 0.013$ and $p = 0.021$, respectively). Orthopaedic and ENT procedures showed lower incidences (22.2% and 28.6%, respectively) with non-significant p-values. A clear positive correlation was noted between the duration of anaesthesia and occurrence of PONV (Table 3). Patients undergoing surgeries lasting more than 2 hours had the highest incidence (52.7%, $p = 0.009$), followed by those between 1–2 hours (32.9%, $p = 0.044$). Surgeries lasting less than 1 hour showed the lowest incidence (20%, $p = 0.038$). The choice of volatile anaesthetic agent influenced the incidence and severity of PONV (Table 4). Sevoflurane was associated with a higher PONV incidence (42.7%) and mean severity score of 1.8 ±

0.6, which was statistically significant (p = 0.028). Patients who received isoflurane and desflurane had comparatively lower incidences (32.7% and 30.0%, respectively), though these differences were not statistically significant.

Use of intraoperative opioids had a strong association with PONV (Table 5). Among 110 patients who received opioids, 43.6% experienced PONV, whereas only 24.3% of those who did not receive opioids developed symptoms. The difference was highly significant (p = 0.002). The mean nausea score was also higher in the opioid group (1.9 ± 0.8) compared to the non-opioid group (1.1 ± 0.6).

The overall severity of PONV is summarized in Table 6. Among all patients, 63.9% had no symptoms, 13.9% experienced mild nausea, 11.1% had moderate, and 11.1% had severe nausea and/or vomiting. Thus, about 22% of all surgical patients experienced moderate-to-severe PONV, requiring additional antiemetic therapy.

Analysis of patient-related and anaesthetic risk factors (Table 7) revealed that female gender (p = 0.01), non-smoking status (p = 0.02), history of motion sickness (p = 0.004), use of intraoperative opioids (p = 0.03), and prolonged duration of surgery >2 hours (p = 0.01) were significantly associated with a higher likelihood of developing PONV.

The overall incidence of PONV in this study was 36.1%. Female gender, non-smoking status, prior history of motion sickness, opioid use, and prolonged anaesthesia duration emerged as major determinants. Gynaecological and general surgical procedures carried a higher risk compared to orthopaedic and ENT surgeries. Sevoflurane-based anaesthesia and intraoperative opioid administration further increased both the incidence and severity of symptoms. These results reaffirm that PONV remains a multifactorial and clinically significant problem, emphasizing the need for tailored prophylactic strategies in high-risk groups.

Discussion

The present study found an overall incidence of postoperative nausea and vomiting (PONV) of 36.1% among adult patients undergoing elective surgeries under general anaesthesia, consistent with previously reported rates ranging between 20% and 40% in the general surgical population [11, 12]. This reinforces the continuing clinical relevance of PONV, despite advancements in anaesthetic techniques and the availability of effective antiemetic regimens. A strong association between female gender and increased incidence of PONV was observed (p = 0.03), aligning with numerous studies that have consistently identified female sex as an independent risk factor [13, 14]. Apfel et al. notably included female gender as one of the four major predictors in the widely used simplified PONV risk score [15]. The influence of hormonal differences and increased central nervous system sensitivity to emetogenic stimuli in women has been proposed as a potential explanation [16].

Another significant patient-related factor was non-smoking status, which was associated with a higher likelihood of PONV (p = 0.02). This inverse relationship has been well documented in literature and is believed to reflect adaptive changes in hepatic enzyme activity or neuroreceptor sensitivity among smokers [17]. Additionally, a previous history of motion sickness showed a strong correlation with PONV (p = 0.004), echoing the findings of Sinclair et al., who identified this as a major predisposing factor [18].

Anaesthesia-related variables also played a crucial role. Notably, the use of intraoperative opioids was associated with a significantly higher incidence (43.6%) and severity of PONV (mean nausea score 1.9 ± 0.8; p = 0.002). This agrees with the findings of Kovac et al., who highlighted opioid-induced delayed gastric emptying and direct stimulation of the chemoreceptor trigger zone as key mechanisms [19]. Furthermore, the duration of anaesthesia emerged as a critical determinant, with surgeries exceeding two hours demonstrating significantly higher PONV rates (52.7%, p = 0.009). Longer exposure to volatile anaesthetics and opioids during prolonged procedures likely contributes to this trend.

Surgical specialty was another important determinant. Gynaecological (50%) and general surgical (41.7%) cases had the highest incidence of PONV. Similar trends were reported by Kranke et al., who found that intra-abdominal and gynaecologic procedures were associated with increased vagal stimulation and peritoneal irritation, leading to heightened emetogenic responses [20]. In contrast, orthopaedic and ENT procedures showed lower PONV rates, consistent with their relatively less invasive nature and shorter duration.

The choice of volatile anaesthetic agent also affected outcomes. Patients receiving sevoflurane experienced a significantly higher incidence of PONV (42.7%, p = 0.028) and higher severity scores. Apfel et al. similarly reported a higher emetogenic potential of sevoflurane compared to other inhalational agents such as desflurane and isoflurane[5]. Although these agents differ in pharmacodynamics, the increased lipid solubility and potency of sevoflurane may account for its higher association with PONV. When compared with a similar study conducted by Eberhart et al., which reported a 38% incidence of PONV and identified female sex, opioid use, and volatile

anaesthetic choice as significant predictors, the current findings are in close agreement . Both studies underscore the multifactorial nature of PONV and emphasize the importance of individualized risk stratification. The current study further contributes to this body of evidence by quantifying severity, identifying duration of anaesthesia as a key modifiable factor, and confirming surgical specialty as a meaningful determinant. In conclusion, this study corroborates existing literature that identifies PONV as a significant postoperative complication, particularly in female, non-smoking patients with prior history of motion sickness, undergoing longer surgeries with volatile agents and opioid use. Tailored prophylactic strategies, such as multimodal antiemetic protocols and opioid-sparing anaesthesia, should be considered in these high-risk patients to improve postoperative outcomes and patient satisfaction.

Conclusion

This study identified a 36.1% incidence of postoperative nausea and vomiting (PONV) within the first 24 hours following elective surgeries under general anaesthesia. A detailed analysis revealed that several demographic, clinical, and anaesthetic factors significantly influenced the incidence and severity of PONV. Female gender, non-smoking status, history of motion sickness, prolonged surgical duration (>2 hours), and intraoperative opioid use were statistically significant predictors of PONV. Among surgical specialties, gynaecological and general surgery cases exhibited higher PONV rates, while orthopaedic and ENT procedures showed comparatively lower risk. Additionally, the choice of anaesthetic agent played a role, with sevoflurane being associated with the highest PONV incidence and severity compared to isoflurane and desflurane. Approximately 22% of patients experienced moderate-to-severe symptoms, highlighting the clinical impact of PONV on postoperative recovery and the need for therapeutic intervention. These findings reaffirm that PONV is a multifactorial complication influenced by both modifiable and non-modifiable factors. The results support the continued use of risk stratification tools and emphasize the need for individualized, multimodal prophylactic strategies, particularly in high-risk groups. Optimizing intraoperative opioid use, selecting less emetogenic anaesthetic agents, and shortening anaesthesia duration where feasible can help reduce the burden of PONV and improve overall patient satisfaction and outcomes in elective surgical settings.

References

1. Gan TJ. Risk factors for postoperative nausea and vomiting. Anesth Analg. 2006; 102(6): 1884–98.
2. Apfel CC, Läärä E, Koivuranta M, Greim CA, Roewer N. A simplified risk score for predicting postoperative nausea and vomiting. Anesthesiology. 1999;91(3):693–700.
3. Kovac AL. Update on the management of postoperative nausea and vomiting. Drugs. 2013;73(14):1525–47.
4. Eberhart LH, Morin AM. Risk scores for predicting postoperative nausea and vomiting are clinically useful tools and should be used in every patient. Curr Opin Anaesthesia. 2011;24(3):388–93.
5. Pierre S, Whelan R. Nausea and vomiting after surgery. ContinEducAnaesthCrit Care Pain. 2013;13(1):28–32.
6. Apfel CC, Korttila K, Abdalla M, Kerger H, Turan A, Vedder I, et al. A factorial trial of six interventions for the prevention of postoperative nausea and vomiting. N Engl J Med. 2004;350(24):2441–51.
7. Sinclair DR, Chung F, Mezei G. Can postoperative nausea and vomiting be predicted? Anaesthesiology. 1999;91(1):109–18.
8. Apfel CC, Greim CA, Haubitz I, Goepfert C, Usadel J, Sefrin P, et al. A risk score to predict the probability of postoperative vomiting in adults. Acta Anaesthesiol Scand. 1998; 42(5):495–501.
9. Kranke P, Eberhart LH, Roewer N, Tramer MR. Pharmacological treatment of postoperative nausea and vomiting: an evidence-based review of the literature. Eur J Anaesthesiol. 2002;19(8):565–87.
10. Gan TJ, Diemunsch P, Habib AS, Kovac A, Kranke P, Meyer TA, et al. Consensus guidelines for the management of postoperative nausea and vomiting. AnesthAnalg. 2014;118(1):85–113.
11. Gan TJ. Risk factors for postoperative nausea and vomiting. AnesthAnalg. 2006; 102(6): 1884–98.
12. Eberhart LH, Morin AM. Risk scores for predicting postoperative nausea and vomiting are clinically useful tools and should be used in every patient. Curr Opin Anaesthesiol. 2011; 24(3):388–93.
13. Pierre S, Whelan R. Nausea and vomiting after surgery. Contin Educ Anaesth Crit Care Pain. 2013;13(1):28–32.
14. Watcha MF, White PF. Postoperative nausea and vomiting: its etiology, treatment, and prevention. Anesthesiology. 1992;77(1):162–84.
15. Apfel CC, Läärä E, Koivuranta M, Greim CA, Roewer N. A simplified risk score for predicting postoperative nausea and vomiting. Anesthesiology. 1999;91(3):693–700.
16. Chimbira WT, Anderson AB, Turnbull AC. Relation between timing of menstruation and

response to motion sickness. Br Med J. 1979;1(6165):1081–3.
17. Sinclair DR, Chung F, Mezei G. Can postoperative nausea and vomiting be predicted? Anesthesiology. 1999;91(1):109–18.
18. Kovac AL. Prevention and treatment of postoperative nausea and vomiting. Drugs. 2000; 59(2):213–43.
19. Kranke P, Eberhart LH, Apfel CC, Roewer N. Patient-specific predictors of postoperative nausea and vomiting. Anaesthesia. 2001; 56(6): 547–59.
20. Apfel CC, Kranke P, Eberhart LH, Roos A, Roewer N. Comparison of predictive models for postoperative nausea and vomiting. Br J Anaesth. 2002;88(2):234–40.