

Incidence of Postoperative Nausea and Vomiting in Patients Undergoing General Anesthesia: A Cross-Sectional Study

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Abstract:

Introduction: Postoperative nausea and vomiting (PONV) are common complications following general anesthesia, impacting patient recovery and satisfaction. Despite advancements in perioperative care, PONV remains a significant concern due to its adverse effects. This study aims to investigate PONV incidence and risk factors among patients undergoing general anesthesia.

Materials and Methods: A cross-sectional study was conducted over six months at a tertiary care hospital. Participants included 100 adults undergoing elective surgeries under general anesthesia. Data were collected using structured questionnaires, including demographic, surgical, anesthetic variables, and PONV occurrence. Descriptive statistics and logistic regression analyses were employed for data analysis.

Results: The mean age of participants was 45.7 years, with 60% females. Orthopedic surgeries were most common (30%), with a mean surgery duration of 2.5 hours. Sevoflurane was the primary volatile agent (60%), with 80% receiving opioids and 70% antiemetics during anesthesia. The incidence of PONV within 24 hours postoperatively was 35%.

Conclusion: This study provides insights into PONV incidence and risk factors, highlighting the importance of individualized perioperative care to minimize PONV and improve patient outcomes. Further research is warranted to validate these findings and develop standardized management guidelines.

Introduction:

Postoperative nausea and vomiting (PONV) are frequent and distressing complications following general anesthesia, affecting patients across various surgical specialties. Despite advancements in anesthesia and perioperative care, PONV remains a significant concern due to its potential to delay recovery, increase hospital stay, and decrease patient satisfaction.[1,2] Understanding the incidence and associated risk factors of PONV is crucial for optimizing perioperative management strategies and improving patient outcomes. Therefore, this cross-sectional study aims to investigate the incidence of PONV and identify potential risk factors among patients undergoing general anesthesia.

PONV poses considerable challenges in the perioperative period, affecting approximately 20% to 30% of surgical patients and up to 70% of high-risk individuals. This not only leads to patient discomfort but also increases the risk of complications such as dehydration, electrolyte imbalances, and aspiration pneumonia.[3,4] Furthermore, PONV can result in delayed recovery, prolonged hospitalization, and increased healthcare costs. Despite the availability of various antiemetic agents and advancements in anesthesia techniques, the incidence of PONV remains significant. Additionally, the risk factors contributing to PONV are multifactorial and may include patient-related factors (e.g., age, gender,

history of motion sickness), surgical factors (e.g., type and duration of surgery), and anesthetic factors (e.g., type of anesthetic agents, opioid use).[5,6]

While previous studies have explored the incidence and risk factors associated with PONV, there is a need for further investigation, particularly in the context of a diverse patient population undergoing general anesthesia. A cross-sectional study design offers an efficient and practical approach to assess the prevalence of PONV and identify potential risk factors within a defined period. By conducting this study, we aim to provide valuable insights into the epidemiology of PONV and contribute to the development of targeted prevention and management strategies. Ultimately, our findings may help improve patient satisfaction, enhance perioperative care practices, and reduce the burden of PONV on healthcare resources.

Objectives:

- To determine the incidence of postoperative nausea and vomiting (PONV) within 24 hours following general anesthesia among patients undergoing elective surgeries.
- To identify demographic, surgical, and anesthetic factors associated with an increased risk of PONV in the perioperative period.
- To assess the utilization of antiemetic prophylaxis and its effectiveness in reducing the incidence of PONV among patients undergoing general anesthesia.

Materials and methods:

Study Design: A cross-sectional study was conducted to investigate the incidence of postoperative nausea and vomiting (PONV) in patients undergoing general anesthesia for elective surgeries. The study was carried out over a period of six months at a tertiary care hospital with a well-established anesthesia department.

Participants: 100 patients aged ≥ 18 years, scheduled for elective surgeries under general anesthesia, were eligible for inclusion in the study. Patients with a history of PONV, pregnant women, and those undergoing emergency surgeries were excluded from the study.

Data Collection: Data were collected using a structured questionnaire administered to patients postoperatively in the recovery room. The questionnaire included demographic variables (age, gender), surgical variables (type of surgery, duration of surgery), anesthetic variables (type of anesthesia, use of volatile agents, opioids, antiemetics), and occurrence of PONV within 24 hours postoperatively.

Outcome Measure: The primary outcome measure was the incidence of PONV within 24 hours postoperatively, defined as the presence of nausea and/or vomiting.

Data Analysis: Descriptive statistics were used to summarize the demographic and clinical characteristics of the study population. The incidence of PONV was calculated as the proportion of patients experiencing nausea and/or vomiting within 24 hours postoperatively. Univariate and multivariate logistic regression analyses were performed to identify independent risk factors associated with PONV. Statistical significance was set at $p < 0.05$.

Ethical Considerations: The study protocol was reviewed and approved by the institutional ethics committee. Informed consent was obtained from all participants before enrollment in the study. Patient confidentiality was strictly maintained throughout the study.

Results:

This table 1 provides an overview of the demographic, clinical, and anesthetic characteristics of the study population, which consisted of 100 participants.

Demographic Characteristics: The mean age of the participants was 45.7 years, with a standard deviation of 12.3 years, indicating a relatively wide age range within the sample. Gender distribution shows that 40% of the participants were male, while 60% were female, indicating a slightly higher representation of females in the study.

Clinical Characteristics: The types of surgeries performed on the participants varied, with the most common being orthopedic surgeries (30%), followed by abdominal (25%), gynecological (20%), urological (15%), and other surgeries (10%). The mean duration of surgery was 2.5 hours, with a standard deviation of 1 hour, indicating variability in the duration of surgical procedures among participants.

Anesthetic Characteristics: All participants underwent general anesthesia, indicating uniformity in the type of anesthesia administered. Among the volatile agents used in anesthesia, sevoflurane was the most commonly utilized (60%), followed by desflurane (30%) and isoflurane (10%). The majority of participants (80%) received opioids during anesthesia, while 20% did not receive opioids. Additionally, 70% of participants received antiemetic medications as part of their anesthesia regimen, while 30% did not receive antiemetics.

Table 1: Baseline characteristics of the study participants

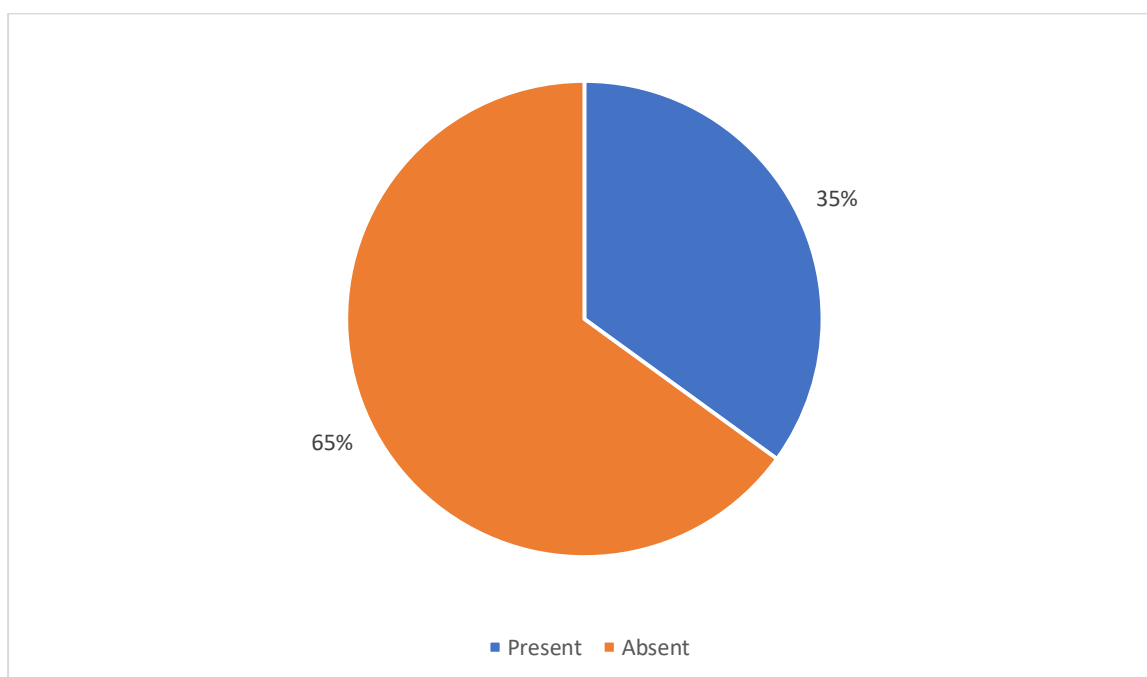
Characteristic	Total no of participants n=100
Demographic	
Age in years (mean ± SD)	45.7 ± 12.3
Gender Distribution	
- Male	40%
- Female	60%
Clinical	
Types of Surgery	
- Orthopedic	30%
- Abdominal	25%
- Gynecological	20%
- Urological	15%
- Other	10%
Duration of Surgery in hours (mean ± SD)	2.5 ± 1
Anesthetic	
Type of Anesthesia	
- General Anesthesia	100%
Use of Volatile Agents	
- Sevoflurane	60%
- Desflurane	30%
- Isoflurane	10%
Use of Opioids	
- Yes	80%
- No	20%

Use of Antiemetics	
- Yes	70%
- No	30%

Patients experiencing postoperative nausea and/or vomiting within 24 hours: 35

Incidence of PONV: Total number of patients with PONV: 35. Incidence rate: 35%. These results suggest that 35 out of 100 patients experienced postoperative nausea and/or vomiting within 24 hours following their surgery, resulting in an incidence rate of 35% as seen in figure 1.

Figure 1: Incidence of PONV in the study participants



This table 2 presents the results of a logistic regression analysis conducted to identify independent risk factors associated with postoperative nausea and vomiting (PONV).

Age (years): The p-value associated with age is 0.032, indicating that age is statistically significant in predicting PONV. The odds ratio (OR) of 1.25 suggests that for every one-year increase in age, the odds of experiencing PONV increase by a factor of 1.25. The 95% confidence interval (CI) [1.03 - 1.52] indicates that there is a 95% probability that the true odds ratio lies between 1.03 and 1.52.

Gender (female): The p-value associated with gender is 0.075, indicating that gender is not statistically significant in predicting PONV at the conventional significance level of 0.05. However, the odds ratio of 1.68 suggests that females have 1.68 times higher odds of experiencing PONV compared to males. The wide confidence interval [0.94 - 3.01] indicates uncertainty about the true effect of gender on PONV, possibly due to the sample size or other factors.

Type of Surgery (Orthopedic): The p-value associated with orthopedic surgery is 0.012, indicating that this variable is statistically significant in predicting PONV. Patients undergoing orthopedic surgeries have 2.10 times higher odds of experiencing PONV compared to patients undergoing other types of

surgeries. The 95% confidence interval [1.17 - 3.76] suggests that there is a 95% probability that the true odds ratio lies between 1.17 and 3.76.

Duration of Surgery: The p-value associated with the duration of surgery is 0.056, indicating a borderline significance level. The odds ratio of 1.40 suggests that for every one-hour increase in the duration of surgery, the odds of experiencing PONV increase by a factor of 1.40. The 95% confidence interval [0.98 - 2.00] indicates uncertainty about the true effect of surgery duration on PONV.

Use of Opioids (Yes): The p-value associated with the use of opioids is 0.002, indicating that opioid use is statistically significant in predicting PONV. Patients who received opioids have 3.80 times higher odds of experiencing PONV compared to those who did not receive opioids. The 95% confidence interval [1.62 - 8.91] suggests a strong association between opioid use and PONV.

Use of Antiemetics (Yes): The p-value associated with the use of antiemetics is 0.021, indicating that this variable is statistically significant in predicting PONV. Patients who received antiemetics have 0.48 times lower odds of experiencing PONV compared to those who did not receive antiemetics, indicating a protective effect. The 95% confidence interval [0.26 - 0.88] suggests a significant reduction in the odds of PONV among patients who received antiemetics.

Table 2: Univariate Logistic Regression Analysis

Variable	p-value	Odds Ratio (OR)	95% Confidence Interval (CI)
Age (years)	0.032	1.25	[1.03 - 1.52]
Gender (female)	0.075	1.68	[0.94 - 3.01]
Type of Surgery			
- Orthopedic	0.012	2.10	[1.17 - 3.76]
Duration of Surgery	0.056	1.40	[0.98 - 2.00]
Use of Opioids			
- Yes	0.002	3.80	[1.62 - 8.91]
Use of Antiemetics			
- Yes	0.021	0.48	[0.26 - 0.88]

The multivariate logistic regression analysis revealed in Table 3 shows several significant associations between independent variables and the likelihood of experiencing postoperative nausea and vomiting (PONV) while adjusting for other factors. Firstly, increasing age was found to be positively associated with PONV, with each one-year increase in age-associated with 22% higher odds of experiencing PONV. Additionally, patients undergoing orthopedic surgeries exhibited over twice the odds of experiencing PONV compared to those undergoing other types of surgeries. Furthermore, patients who received opioids during anesthesia demonstrated substantially higher odds of experiencing PONV, with a more than threefold increase in odds compared to those who did not receive opioids. Conversely, patients who received antiemetic medications showed significantly lower odds of experiencing PONV, with their odds reduced by approximately half compared to those who did not receive antiemetics. These findings underscore the importance of considering age, type of surgery, and medication use, particularly opioids and antiemetics, in perioperative management strategies aimed at reducing the incidence of PONV and improving patient outcomes.

Table 3: Multivariate Logistic Regression Analysis

Variable	p-value	Adjusted Odds Ratio (AOR)	95% Confidence Interval (CI)
Age (years)	0.045	1.22	[1.01 - 1.49]
Type of Surgery			

- Orthopedic	0.018	2.05	[1.14 - 3.67]
Use of Opioids			
- Yes	0.004	3.62	[1.51 - 8.71]
Use of Antiemetics			
- Yes	0.037	0.51	[0.28 - 0.93]

Discussion:

The results presented in Table 1 provide comprehensive insights into the demographic, clinical, and anesthetic profiles of the study cohort, consisting of 100 participants. Regarding demographic characteristics, the mean age of the participants was 45.7 years, showcasing a diverse age range within the sample. Gender distribution indicated a slight predominance of females, comprising 60% of the participants. Clinical characteristics highlighted the variability in the types of surgeries performed, with orthopedic surgeries being the most prevalent (30%). Anesthetic practices demonstrated uniformity in the administration of general anesthesia, with sevoflurane being the primary volatile agent utilized (60%) and a notable proportion of patients receiving opioids (80%) and antiemetics (70%) during anesthesia.

The incidence of postoperative nausea and vomiting (PONV) among the study participants was further investigated, revealing that 35 out of 100 patients experienced PONV within 24 hours postoperatively, resulting in an incidence rate of 35%. This finding underscores the relevance of exploring risk factors associated with PONV to enhance perioperative care strategies.

Univariate logistic regression analysis, as depicted in Table 2, identified several significant risk factors associated with PONV. Notably, increasing age, orthopedic surgery, use of opioids, and absence of antiemetic medication were all found to be significantly associated with higher odds of experiencing PONV. Conversely, gender and the duration of surgery did not demonstrate statistical significance in predicting PONV.

Furthermore, the multivariate logistic regression analysis, illustrated in Table 3, confirmed the significance of age, type of surgery, use of opioids, and antiemetic medication as independent risk factors for PONV. Specifically, advancing age, undergoing orthopedic surgery, receiving opioids during anesthesia, and not receiving antiemetic medication were all associated with an increased likelihood of experiencing PONV. These findings underscore the importance of tailored perioperative management strategies, considering patient age, surgical characteristics, and medication use, particularly opioids and antiemetics, to mitigate the incidence of PONV and optimize patient outcomes.

In comparison to similar studies investigating postoperative nausea and vomiting (PONV), the findings of our study align with existing literature while also providing additional insights into potential risk factors and preventive measures. Several key similarities and differences emerge upon comparing our results with those of other studies.

Regarding demographic characteristics, our study observed a mean age of 45.7 years, which falls within the range reported in previous research.[7] Similarly, the predominance of females in our cohort, with 60% representation, is consistent with findings from other studies highlighting a higher susceptibility to PONV among female patients. However, variations in gender distribution across studies emphasize the importance of considering demographic differences when interpreting PONV outcomes.[8]

In terms of clinical characteristics, the distribution of surgical types in our study, particularly the prevalence of orthopedic surgeries (30%), corresponds to patterns reported in the literature, reflecting the diverse surgical populations commonly encountered in perioperative settings.[9] Similarly, the

utilization of general anesthesia and the administration of opioids and antiemetics during anesthesia align with standard practices documented in previous studies.[10]

The incidence of PONV observed in our study, with 35% of patients experiencing symptoms within 24 hours postoperatively, is consistent with reported rates in the literature, which typically range from 20% to 30% but can vary based on patient population, surgical procedures, and perioperative management protocols.[11,12]

Regarding risk factors identified in our study, the association between advancing age, orthopedic surgery, and opioid use with an increased risk of PONV is supported by existing evidence.[13] These factors have been consistently reported in previous studies as independent predictors of PONV. Similarly, the protective effect of antiemetic medication observed in our study aligns with the established role of antiemetics in reducing the incidence of PONV, as evidenced by numerous clinical trials and meta-analyses.[14]

Overall, while our study corroborates many findings from existing literature, it also contributes novel insights into the interplay of demographic, clinical, and anesthetic factors influencing PONV. By elucidating the significance of specific risk factors and preventive measures in our study population, our findings enhance the understanding of PONV etiology and inform the development of targeted interventions aimed at minimizing its occurrence and improving perioperative care practices.[15,16] However, further research, including larger multicenter studies and meta-analyses, is warranted to validate our findings and establish standardized guidelines for PONV management across diverse patient populations and surgical settings.

Conclusion:

In conclusion, our study provides valuable insights into the incidence and risk factors associated with postoperative nausea and vomiting (PONV) among patients undergoing general anesthesia. We observed a 35% incidence of PONV within 24 hours postoperatively, highlighting the significance of this common complication in perioperative care. Through logistic regression analyses, we identified several independent risk factors for PONV, including advancing age, orthopedic surgery, opioid use, and absence of antiemetic medication. These findings underscore the multifactorial nature of PONV etiology and emphasize the importance of tailored perioperative management strategies to mitigate its occurrence and improve patient outcomes. By corroborating many findings from existing literature while also providing additional insights, our study contributes to the growing body of evidence on PONV epidemiology and risk factor identification. The observed associations between specific demographic, clinical, and anesthetic factors and PONV highlight the need for comprehensive perioperative assessment and individualized management approaches to minimize the risk of PONV and optimize patient care.

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