

AGE AS RISK FACTORS FOR POSTOPERATIVE NAUSEA AND VOMITING (PONV) WITH GENERAL ANESTHESIA

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ABSTRACT

Many risk factors influence the occurrence of postoperative nausea and vomiting (PONV). These include age, gender, duration of surgery, and type of surgery. This study aims to determine the risk factors that influence the occurrence of PONV with general anaesthesia. This is a cross-sectional study conducted at a public hospital in Central Jakarta, Indonesia. The inclusion criteria for this study were all patients undergoing surgery at a hospital in Central Jakarta. We examined 96 individuals who underwent surgery under general anaesthesia. We correlated factors such as age, gender, and duration of surgery. We used the chi-square method for this study. A p-value of <0.05 indicates that the study is significant. Based on our research, age was a risk factor that significantly influenced the incidence of PONV using general anaesthesia (p-value=0.026). Meanwhile, gender (p-value=0.938) and surgical duration (p-value=0.103) were not significant in this study. There was a significant correlation in age (p-value =0.026), there was no significant correlation in gender (p-value =0.938), and duration of surgery (p-value=0.103) with the incidence of PONV in patients after general anesthesia. Age under 60 years of age significantly increases the incidence of PONV. Other risk factors, such as the type of surgery and the type of anaesthesia used, were beyond the scope of our study but could be explored as factors influencing the incidence of PONV.

KEYWORDS: PONV, General Anesthesia, Surgery, Gender, Age.

INTRODUCTION

Postoperative Nausea and Vomiting (PONV) is a common complication following anesthesia, whether general, regional, or local. This condition can affect patient comfort and recovery after surgery. Nausea is a subjective sensation usually felt in the throat and epigastrium and accompanied by loss of stomach tone. Vomiting, on the other hand, is a severe contraction of the respiratory muscles, resulting in the expulsion of stomach contents. According to several studies, PONV can originate from various sources (Becker, 2010). These include patient factors (such as female gender, a history of motion sickness, or PONV), anesthetic factors (such as mask ventilation, volatile anesthetics, or opioids), and surgical factors. (Syahreza, 2022; Zhong et al., 2021)

Nausea and vomiting can arise from a variety of conditions. Nausea is caused by stimulation of the forebrain, and vomiting is caused by stimulation of the hindbrain. The vomiting center is located in the medulla oblongata. The vomiting center receives various signals from the gastrointestinal tract, the chemoreceptor trigger zone, the cerebral cortex, the cerebellum, and afferent nerves from the vestibular system (Becker, 2010). Contact with various drugs, such as inhaled anesthetics and opioids, occurs in the chemoreceptor trigger zone in the fourth ventricle of the brainstem. The emetic center is stimulated by serotonin 3 (5-HT₃), opioid, histamine, acetylcholine, and neurokinin 1 (NK-1) receptors. (Gan et al., 2020; Kovac, 2025; Syahreza, 2022; Zhong et al., 2021)

In a study conducted by Teshome et al at a hospital located in the Debub Gondar Zone of Amhara State, Ethiopia, the overall prevalence of vomiting and nausea in the study area was 51.2%. Several risk factors include female gender, preoperative opioid use, a history of nausea and vomiting, and motion sickness (Tan et al., 2023). According to a study conducted by Gan et al. (2020) the incidence of postoperative nausea and vomiting is estimated at around 30% in the general surgical population and as high as 80% in high-risk groups such as children who are more at risk of PONV when they are older than 3 years, who have had tonsillectomy or eye surgery, or who are postpubertal women.

This study aims to find risk factors that influence PONV in patients given general anesthesia.

METHODS

This study is a cross-sectional research design. The data collected are secondary data, by using medical record status. The study was conducted at one public hospital in Central Jakarta from November 2024 to December 2024. The

inclusion criteria for this study were all patients undergoing surgery at hospitals in Central Jakarta. We categorized the patients by gender (female and male), age (adults aged 18 to 59 and elderly aged 60 to 80), and risk factors (surgery duration) were divided into two categories: surgery lasting less than 2 hours and surgery lasting more than 2 hours. Patients were considered to have PONV if they experienced nausea and vomiting within 24-48 hours after surgery. Incomplete data were excluded from this study. The sample was taken using the consecutive sampling method using the Lemeshow formula. This formula is used to determine the number of samples with an unknown population size. The 95% confidence score (z) value is 1.96 with a maximum estimate (p) of 50% = 0.5, a sampling error (d) of 10%. So that the usable sample (n) is 96 samples.

This study includes bound variables and independent variables. The primary variable in this study was Nausea and Vomiting (PONV), while the independent factors included age, gender, and duration of surgery. The analytical method employed in this study to examine the correlation between the two variables is the Chi-Square test. The data were then statistically tested using the Statistical Package for the Social Sciences application. Significant results are p-value <0.05. This research has been approved by the Research Ethics Center in Jakarta under No. 235/PE/KE/FKK-UMJ/XII/2024, issued in December 2024.

RESULTS

Table 1. Characteristics of subjects

Characteristics of subjects	(n) %
Age	
18 – 59 years old	91 (94.8%)
60 – 80 years old	5 (5.2%)
Gender	
Male	40 (41.7%)
Female	56 (58.3%)
Duration of surgery	
< 2 hours	69 (71.9%)
> 2 hours	27 (28.1%)
Post Operative Nausea Vomiting	
PONV (+)	5 (5.2%)
PONV (-)	91 (94.8%)

Table 1 shows the characteristics of the study subjects. In terms of age, there were more adults than elderly (n=91 (94.8%)). Surgical duration was more frequent, lasting less than 2 hours (n=69 (71.9%)). Gender was nearly identical. However, there was a significantly higher number of patients who did not experience postoperative nausea and vomiting (n=91 (94.8%)).

Table 2. Relationship between PONV with subjects

Characteristics of subjects	PONV (+)	PONV (-)	p-value
Age			
18 – 59 years old	3 (4.5%)	83 (81.5%)	0.026
60 – 80 years old	2 (5%)	8 (9.5%)	
Gender			
Male	2 (2.1%)	38 (37.9%)	0.938
Female	3 (2.29%)	53 (53.1%)	
Duration of surgery			
< 2 hours	2 (3.6%)	67 (65.4%)	0.103
> 2 hours	3 (1.4%)	24 (25.6%)	

Table 2 shows that age was found to be significantly associated with PONV (p-value 0.026). Gender was not found to be associated with PONV (p-value 0.938). Surgery duration was also not found to be associated with PONV (p-value 0.103).

DISCUSSION

Table 2 shows the results of a bivariate analysis, which showed a significant correlation between age and the frequency of PONV in patients after general anesthesia. The age group most frequently experiencing PONV was 18-59 years old, with 3 (4.5%) patients, compared to 2 (5.0%) patients aged 60-80 years. The results showed a p-value of 0.026, based on the chi-square test. These results indicate that age is correlated with the occurrence of PONV. These results are supported by previous research, such as the findings of Apipan et al. (2016) where patients under 30 years old had a higher prevalence of PONV than older patients. Furthermore, patients under 10 years old had a 20-fold higher prevalence than older patients. In a study conducted by Lekatompessy et al. (2022) found something in line with our study where patients under 50 years of age had a higher prevalence of PONV than those of older ages. However, a study conducted by Urits et al. (2020) linked age with other risk factors that can increase the incidence of PONV, such as the length of surgery, type of surgery, use of anesthesia, use of opioids, and level of dehydration before surgery.

We hypothesize the afferent neurons of younger respondents (<50 years old) are more sensitive to this stimulus and send signals to the vomiting center in the brainstem, where vomiting occurs. Consequently, younger respondents, <50 years old have a higher risk of PONV and a lower threshold for nausea and vomiting. (Urits et al., 2020)

Different finding was found in a study conducted by Nagaoka et al., where PONV was more frequently experienced by older patients, but this was associated with the use of antiemetics in the form of droperidol, which is believed to be more effective in reducing nausea and vomiting in young patients (Nagaoka et al., 2025). Their study is in line with the study conducted by Tan et al. where the use of droperidol reduced the incidence of PONV in patients under 65 years of age but not in those over 65 years of age. (Nagaoka et al., 2025)

In the following results, our study linked PONV to gender. With a p-value of 0.938, no association was found between gender and PONV incidence. Contrary with the study by Aftab et al. found that women were associated with a higher incidence of PONV than men (Nagaoka et al., 2025). One theory links variations in serum gonadotropin or other hormones, leading to a higher incidence of PONV in women. This is supported by the finding that certain types of gynecological surgery increase the risk of PONV due to stimulation of afferent nerves in the uterus, ligaments, and cervix. There is a role for the hormone estradiol in the incidence of PONV. Although women are strongly associated with PONV, research by Phillips et al. found no correlation between gender and PONV. This is based on the presence of other risk factors, such as the type of surgery, the length of surgery, and factors related to preoperative preparation. (Phillips et al., 2015)

One study linked the length of surgery to the incidence of PONV. Longer surgery duration increases surgical and anesthetic stress, thus increasing the incidence of PONV. This is similar to research by Qian et al., which found that longer surgery time increases the incidence of PONV.¹⁹ Evidence suggests that longer patient exposure to anesthetics increases the risk of PONV. Volatile anesthetics cause PONV by interacting with neuronal ion channel proteins (Kovac, 2025; Zhong et al., 2021). However, our study in (table 2) did not find a correlation between the length of the surgical procedure and the incidence of PONV. With a p-value of 0.103 this result is not significant. This may be due to bias in the selection criteria for the type of surgery and other risk factors.

Our study was limited by the small sample size, which was also due to the short timeframe. The sample selection was not sufficiently varied, and we did not categorize risk factors that could have influenced our results.

CONCLUSION

In this study, we found a correlation between age and the incidence of PONV after surgery. Our patients, especially those under 60 years of age, experience a much higher incidence of PONV than the elderly. Many factors influence the incidence of PONV. Risk factors such as gender and the duration of surgery must be considered in conjunction with other risk factors that can influence PONV, such as preoperative preparedness, the type of anesthesia used, and the type of surgery performed, as these factors can significantly impact PONV.

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CONFLICT OF INTEREST

The author has no conflict of interest in any matter.

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