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THE IMPACT OF SIMPLE CIGARETTE SMOKING ON POST OPERATIVE NAUSEA AND VOMITING IN ELECTIVE SURGERY UNDER GENERAL ANESTHESIA AT DISTRICT HEADQUATER HOSPITAL PARACHINAR

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Abstract

Background:
Post-operative Nausea and Vomiting (PONV) is a common complication after GA. Evidence suggests cigarette smoking may have a complex effect on PONV incidence.

Objectives:
To assess the impact of simple cigarette smoking on Post operative Nausea in patients undergoing Elective Surgery under GA at DHQ Hospital Parachinar and also to assess the impact of simple cigarette smoking on Post operative Vomiting in patients undergoing Elective Surgery under GA at DHQ Hospital Parachinar.

Material and Methods:
A Descriptive cross-sectional study of 70 current smokers under GA, using purposive sampling, assessed smoking history and 24 hrs postoperative PONV via descriptive statistics.

Result:
Among 70 smokers, 61.4% had no PONV, 38.6% developed symptoms (most commonly both nausea and vomiting at 20%). The middle aged group (31-45 yrs) showed the highest symptom free rate (62.2%).

Conclusion:
Cigarette smoking was associated with a reduced incidence of PONV in this study population. However, this finding is not intended to promote cigarette use, given it well-documented overall health risks. Smoking status should be considered a significant variable in preoperative risk assessment.

INTRODUCTION

General anesthesia (GA) is a pharmacologically induced reversible state of unconsciousness, analgesia, amnesia, and muscle relaxation that enables patients to undergo surgical procedures without pain perception or awareness (1). Although advances in anesthetic techniques and perioperative care have significantly improved surgical safety and patient outcomes, postoperative complications continue to represent a major concern in clinical practice. Among these complications, postoperative nausea and vomiting (PONV) remains one of the most common and distressing adverse effects experienced after surgery under general anesthesia (4).

Postoperative nausea and vomiting refers to episodes of nausea, retching, or vomiting occurring within the first 24 hours after surgery and anesthesia (9). Globally, PONV affects approximately 30% of all surgical patients, while its incidence may rise to 70–80% in high-risk populations depending upon patient-related and surgery-related risk factors (10). The occurrence of PONV significantly decreases patient satisfaction, prolongs post-anesthesia care unit stay, delays hospital discharge, and increases healthcare expenditures (11,12). In severe cases, persistent vomiting may result in dehydration, electrolyte imbalance, aspiration pneumonia, wound dehiscence, and delayed recovery following surgery (12).

The pathophysiology of PONV is multifactorial and involves complex interactions between the central nervous system, vestibular apparatus, gastrointestinal tract, and several neurotransmitter systems. The vomiting center located in the medulla oblongata integrates afferent signals originating from the chemoreceptor trigger zone (CTZ), vestibular system, vagal pathways, and higher cortical centers (13). Neurotransmitters including serotonin (5-HT3), dopamine (D2), histamine (H1), acetylcholine, and substance P (NK-1) play central roles in mediating emetic pathways and vomiting reflexes (14,15). Volatile anesthetic agents and opioids are among the major anesthetic contributors to postoperative nausea and vomiting because they stimulate emetic receptor pathways either directly or indirectly (10,15).

Recent developments in anesthesia practice have improved the understanding and management of PONV. Total intravenous anesthesia (TIVA) using propofol has been associated with reduced incidence of PONV compared with inhalational anesthetics (6). Similarly, enhanced recovery after surgery (ERAS) protocols focusing on opioid-sparing analgesia and multimodal perioperative care have contributed to lower postoperative emetic complications (8,44). Modern antiemetic strategies using multimodal prophylaxis targeting multiple receptor pathways have also shown improved outcomes in preventing postoperative nausea and vomiting (41).

Several patient-related and surgery-related risk factors have been associated with PONV. Female gender, younger age, prolonged surgery duration, postoperative opioid use, previous history of motion sickness, and nonsmoking status are among the most established predictors incorporated into validated risk stratification models such as the Apfel simplified risk score (11). Interestingly, cigarette smoking has consistently shown an inverse relationship with postoperative nausea and vomiting in numerous studies (24,25,29). Current smokers are generally observed to have a lower risk of developing PONV compared with nonsmokers, although the exact mechanisms responsible for this phenomenon remain incompletely understood.

Cigarette smoke contains nicotine along with thousands of toxic chemicals including polycyclic aromatic hydrocarbons (PAHs), carbon monoxide, formaldehyde, and nitrosamines (20). Nicotine rapidly enters the bloodstream and binds to nicotinic acetylcholine receptors within the central and peripheral nervous systems (17,18). Chronic exposure to nicotine may produce desensitization of central emetic pathways involving serotonin and dopamine neurotransmission, thereby reducing susceptibility to nausea and vomiting (27). In addition, cigarette smoke induces cytochrome P450 enzymes, particularly CYP1A2 and CYP2E1, which accelerate the metabolism and clearance of anesthetic drugs and antiemetic agents (25,31). Faster elimination of volatile anesthetics may reduce the duration of emetogenic stimulation and contribute to reduced PONV among smokers (26).

Despite these observations, smoking should not be regarded as clinically beneficial because of its well-established harmful effects on nearly every organ system. Cigarette smoking remains a major cause of cardiovascular disease, respiratory illness, malignancy, impaired wound healing, and perioperative morbidity worldwide (22). Furthermore, the relationship between smoking and PONV appears to be influenced by smoking intensity, duration, genetic polymorphism, age, and anesthetic technique, making this association highly complex (29,30).

Several contemporary studies have highlighted the importance of individualized perioperative risk assessment and personalized antiemetic management strategies. Genetic polymorphisms affecting neurotransmitter receptors and drug metabolism may alter susceptibility to PONV and response to antiemetic therapy (7,30,43). Additionally, abrupt preoperative smoking cessation may trigger nicotine withdrawal responses and altered neurotransmitter levels that can influence postoperative nausea and vomiting (35).

In Pakistan, limited local studies have explored the association between cigarette smoking and postoperative nausea and vomiting, particularly in resource-limited healthcare settings. DHQ Hospital Parachinar serves a large surgical population where understanding local determinants of postoperative complications can improve perioperative management and patient outcomes. Therefore, the present study was conducted to assess the impact of simple cigarette smoking on postoperative nausea and vomiting among patients undergoing elective surgery under general anesthesia at DHQ Hospital Parachinar. The findings of this study may contribute valuable local evidence and assist anesthesiologists in improving risk stratification and antiemetic management strategies in surgical patients.

MATERIALS AND METHODS

STUDY DESIGN

A descriptive cross-sectional study design was used to assess the impact of simple cigarette smoking on postoperative nausea and vomiting among patients undergoing elective surgery under general anesthesia.

STUDY SETTING

The study was conducted at DHQ Hospital Parachinar, which provides surgical and anesthesia services to a large and diverse patient population.

STUDY DURATION

The study was carried out over a period of four months from December 2025 to March 2026.

SAMPLE SIZE

The required sample size was initially calculated using Epi Tool for descriptive cross-sectional studies with a 95% confidence interval and 5% margin of error. Although the calculated sample size was approximately 323 participants, due to limited patient flow, logistical limitations, and time constraints, a feasible sample size of 70 participants was included during the study period.

SAMPLING TECHNIQUE

Purposive non-randomized sampling technique was used for participant recruitment.

INCLUSION CRITERIA

- Adult male patients aged 18–60 years.
- Current smokers undergoing elective surgery under general anesthesia.
- Patients willing to provide informed consent.

EXCLUSION CRITERIA

- Female patients.
- Patients undergoing emergency surgeries.
- Patients with preexisting nausea and vomiting.
- Patients unable to provide informed consent.

DATA COLLECTION PROCEDURE

Ethical approval was obtained from the Institutional Review Board of Khyber Medical University, and administrative permission was secured from DHQ Hospital Parachinar. Eligible patients were identified preoperatively and informed written consent was obtained.

Demographic and clinical information including age, smoking status, duration of smoking, and number of cigarettes smoked per day were recorded using a structured questionnaire. Intraoperative details including duration of surgery and postoperative opioid use were obtained from anesthesia records.

All patients were monitored for 24 hours following surgery for the occurrence of postoperative nausea and vomiting. The postoperative outcomes were categorized into:

- Postoperative nausea only (PON)
- Postoperative vomiting only (POV)

- Both nausea and vomiting (PONV)
- No postoperative nausea and vomiting

Episodes of vomiting and use of rescue antiemetic medications were also documented.

DATA ANALYSIS

Collected data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 24. Descriptive statistics including frequencies, percentages, means, and mean proportions were calculated. Results were presented using tables and figures. A p-value of ≤0.05 was considered statistically significant.

RESULTS

GROUP 1

Age Group: 18–30 Years

Table 4.1: PONV Outcome in Elective Surgery

Outcome	Frequency (n)	Percentage (%)	Mean
PON	3	14.29	0.14
POV	1	4.76	0.05
Both PONV	4	19.5	0.19
No PONV	13	61.9	0.61

The results presented in Table 4.1 demonstrate that the majority of younger adult smokers undergoing elective surgery did not develop postoperative nausea or vomiting. More than sixty percent of participants remained symptom free during the first 24 postoperative hours. Combined nausea and vomiting occurred in a smaller proportion of patients, while isolated nausea and isolated vomiting were comparatively less common. The findings suggest that younger smokers may have relatively reduced susceptibility to postoperative emetic symptoms despite exposure to general anesthesia and surgical stress.

Figure 4.1: PONV outcome in elective surgery

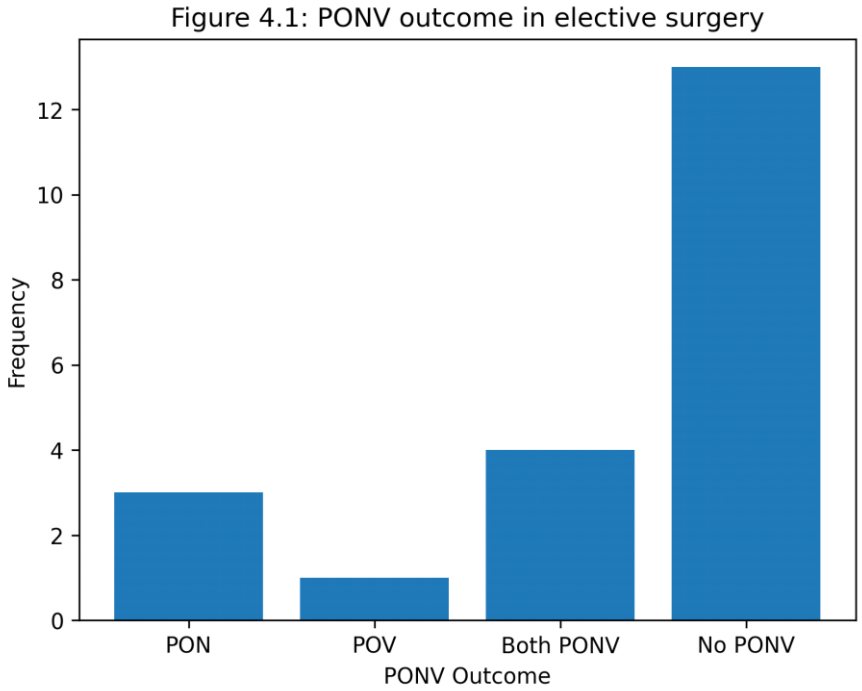

Figure 4.1 graphically represents the distribution of PONV outcomes among the study participants.

GROUP 2
Age Group: 31–45 Years
Table 4.2: PONV Outcome in Elective Surgery

Outcome	Frequency (n)	Percentage (%)	Mean
PON	4	10.8	0.11
POV	3	8.1	0.08
Both PONV	7	18.9	0.19
No PONV	23	62.2	0.62

The findings shown in Table 4.2 indicate that the middle-aged group demonstrated the highest proportion of patients without postoperative nausea and vomiting among all study groups. More than sixty percent of participants remained symptom free, while combined nausea and vomiting represented the most common symptomatic presentation. The lower occurrence of isolated nausea and vomiting may reflect smoking-related adaptive neurochemical and metabolic effects that reduce postoperative emetic sensitivity in this age category.

Figure 4.2: PONV Outcome in Elective Surgery

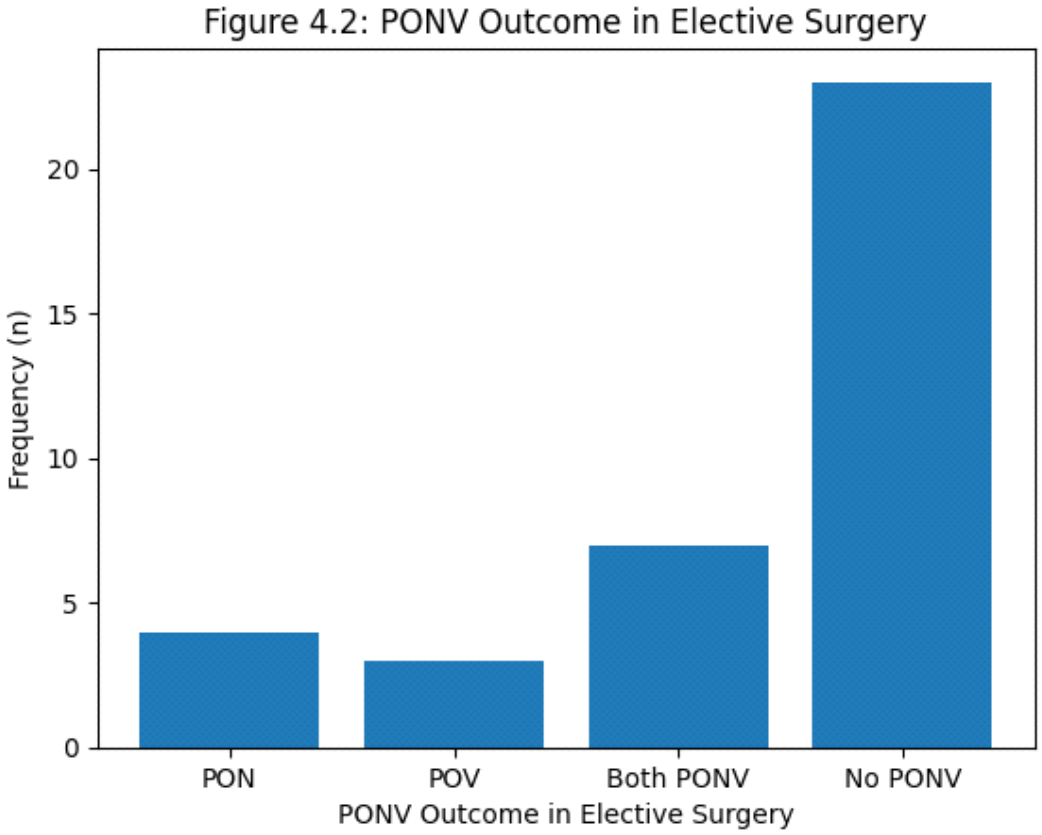

Figure 4.2 graphically represents the distribution of PONV outcomes among the study participants.

GROUP 3
Age Group: 46–60 Years
Table 4.3: PONV Outcome in Elective Surgery

Outcome	Frequency (n)	Percentage (%)	Mean
PON	0	0.0	0.00
POV	2	16.1	0.16
Both PONV	3	25.0	0.25
No PONV	7	58.3	0.58

Table 4.3 demonstrates that although most older smokers remained free from postoperative nausea and vomiting, this age group showed relatively higher rates of combined nausea and vomiting compared with younger groups. No cases of isolated nausea were observed. Age-related physiological changes, altered drug metabolism, and reduced compensatory mechanisms may explain the comparatively increased occurrence of postoperative symptoms in older patients.

Figure 4.3: PONV outcome in elective surgery

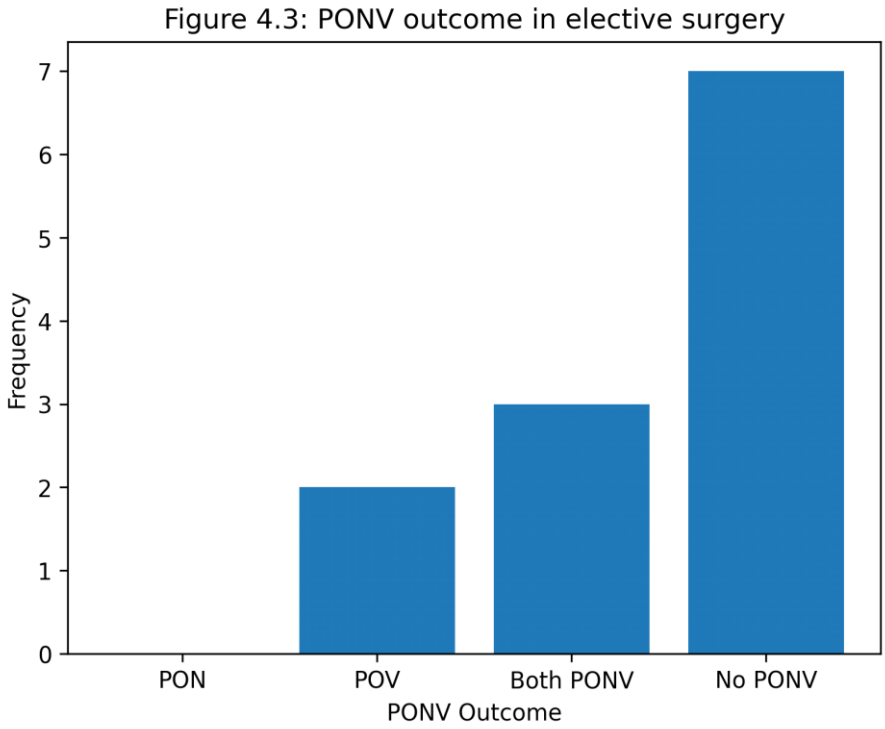

Figure 4.3 graphically represents the distribution of PONV outcomes among the study participants.

COMBINED ANALYSIS
Age Group: 18–60 Years
Table 4.4: Overall PONV Outcome in Elective Surgery

Outcome	Frequency	Percentage (%)	Mean
PON	7	10.0	0.1
POV	6	8.57	0.09
Both PONV	14	20.0	0.2
No PONV	43	61.43	0.61

The overall findings presented in Table 4.4 demonstrate that the majority of cigarette smokers undergoing elective surgery under general anesthesia did not develop postoperative nausea or vomiting. More than sixty percent of participants remained symptom free, while combined nausea and vomiting represented the most frequent symptomatic presentation. These findings support existing evidence suggesting a comparatively lower incidence of PONV among smokers and highlight the importance of smoking status in perioperative risk assessment.

Figure 4.4: PONV outcome in elective surgery

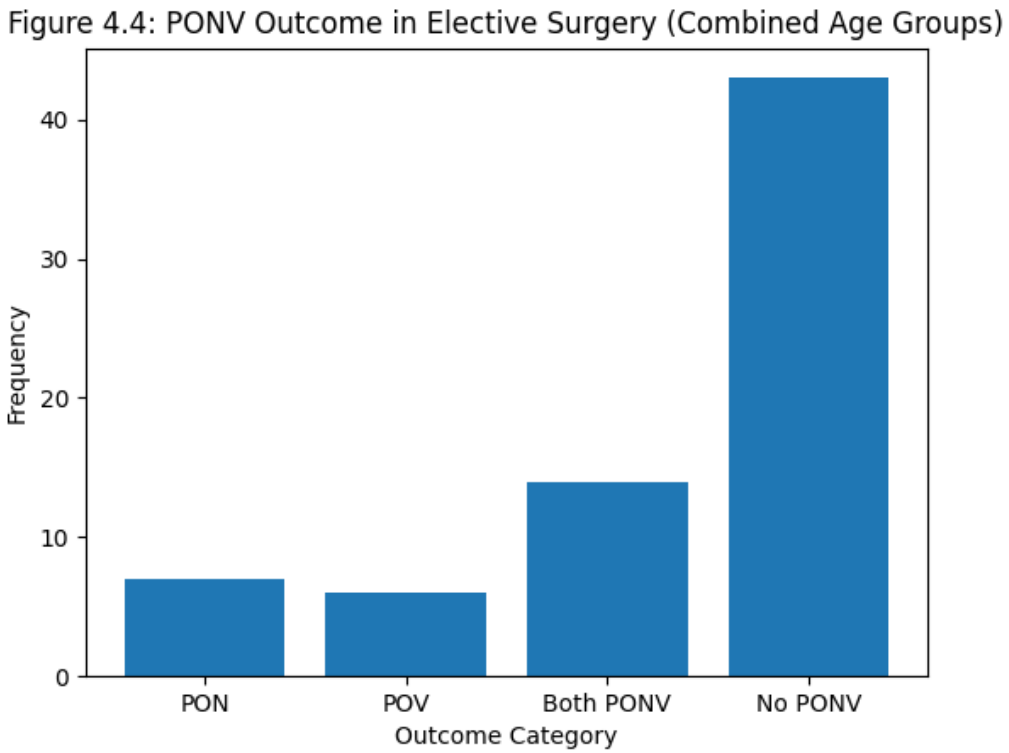

Figure 4.4 graphically represents the distribution of PONV outcomes among the study participants.

DISCUSSION

The present study assessed the impact of simple cigarette smoking on postoperative nausea and vomiting among patients undergoing elective surgery under general anesthesia at DHQ Hospital Parachinar. Postoperative nausea and vomiting remains one of the most common and distressing complications associated with anesthesia and surgery worldwide (4,11). Despite improvements in anesthetic techniques and antiemetic prophylaxis, PONV continues to significantly affect patient recovery, prolong hospital stay, and increase healthcare burden (12).

The findings of the present study revealed that the majority of smokers did not experience postoperative nausea or vomiting. Overall, 61.43% of participants remained symptom free during the postoperative period, while 38.57% developed some form of PONV. These findings are consistent with previous international studies demonstrating that smokers generally have a lower incidence of postoperative nausea and vomiting compared with nonsmokers (24,25,29). Smoking status is also included in the Apfel simplified risk score, where nonsmoking status is recognized as an important independent predictor of PONV (11).

Several mechanisms have been proposed to explain the reduced occurrence of PONV among smokers. Chronic exposure to nicotine may produce desensitization of central emetic pathways involving serotonin, dopamine, and acetylcholine neurotransmission (17,18,27). Nicotine interacts with nicotinic acetylcholine receptors within the central nervous system and may alter sensitivity to emetogenic stimuli over time (18). Additionally, chronic smoking induces cytochrome P450 enzymes such as CYP1A2 and CYP2E1, leading to faster metabolism and clearance of volatile anesthetic agents and opioids that are commonly associated with postoperative nausea and vomiting (25,31). Reduced duration of exposure to these

anesthetic agents may contribute to lower postoperative emetic symptoms among smokers.

The present study demonstrated that combined nausea and vomiting represented the most common symptomatic category among affected patients. Similar findings have been reported in previous studies indicating that when PONV occurs, combined symptoms are more frequent than isolated nausea or vomiting alone (10,12). This observation suggests that smokers who develop PONV may experience a more pronounced emetic response involving multiple neurochemical pathways.

Age-related variations were also observed in the current study. The middle-aged group (31–45 years) demonstrated the highest proportion of patients without postoperative symptoms, while the older age group (46–60 years) showed comparatively higher rates of combined nausea and vomiting. These findings may be explained by age-associated changes in autonomic responsiveness, hepatic metabolism, and neurotransmitter activity affecting postoperative recovery and emetic sensitivity (45). Older patients may also exhibit altered pharmacokinetics and pharmacodynamics of anesthetic agents, increasing susceptibility to postoperative complications.

The findings of the current study further support the multifactorial nature of postoperative nausea and vomiting. In addition to smoking status, factors such as duration of surgery, anesthetic technique, postoperative opioid administration, and individual patient susceptibility may influence postoperative outcomes (6,10,11). Modern perioperative approaches including total intravenous anesthesia, multimodal antiemetic prophylaxis, and enhanced recovery after surgery protocols have been shown to reduce postoperative emetic complications significantly (6,8,41,44).

Although smoking appeared to be associated with reduced postoperative nausea and vomiting in the present study, smoking must never be considered beneficial clinically because of its harmful systemic consequences. Cigarette smoking remains a major risk factor for cardiovascular disease, pulmonary complications, malignancy, impaired wound healing, and perioperative morbidity (22). Therefore, smoking should only be regarded as a variable influencing perioperative outcomes rather than a protective clinical factor.

Recent evidence suggests that the relationship between smoking and PONV is highly complex and may be influenced by smoking intensity, duration, genetic variability, and perioperative management strategies (29,30). Heavy smokers may lose the protective association because of increased inflammatory responses and systemic toxicity induced by cigarette smoke constituents (29). Genetic polymorphisms affecting neurotransmitter receptors and drug-metabolizing enzymes may also alter susceptibility to postoperative nausea and vomiting and response to antiemetic therapy (7,30,43).

The current study provides important local evidence regarding smoking and postoperative nausea and vomiting in a Pakistani healthcare setting where limited regional data are available. The findings may assist anesthesiologists in improving perioperative risk assessment and tailoring antiemetic management strategies according to smoking status and patient characteristics.

However, several limitations must be acknowledged. The study was conducted at a single center with a relatively small sample size and included only male smokers. No nonsmoker comparison group was included. Furthermore, smoking intensity and duration were not stratified in detail. Future multicenter studies involving larger sample sizes and comparative analysis between smokers and nonsmokers are recommended to further clarify the relationship between cigarette smoking and postoperative nausea and vomiting.

CONCLUSION

This study assessed the impact of cigarette smoking on postoperative nausea and vomiting (PONV) among patients undergoing elective surgery under general anesthesia at DHQ Hospital Parachinar. The findings showed that most smokers (61.43%) did not develop PONV, while 38.57% experienced postoperative symptoms, with combined nausea and vomiting being the most common presentation. These results are consistent

with international literature suggesting a relatively lower incidence of PONV among smokers compared with the general surgical population.

The reduced occurrence of PONV among smokers may be related to chronic nicotine-induced neuroadaptation and increased hepatic metabolism of anesthetic agents through cytochrome P450 enzyme induction. Age-related differences were also observed, as middle-aged patients demonstrated the highest proportion of symptom-free outcomes, whereas older patients showed relatively higher susceptibility to postoperative symptoms.

The findings highlight the importance of considering smoking status during preoperative risk assessment and perioperative management. However, smoking should not be considered clinically beneficial because of its harmful systemic effects and adverse impact on overall health. This study provides useful baseline local data and emphasizes the need for further large-scale studies involving diverse patient populations to better understand the relationship between smoking and PONV.

RECOMMENDATIONS

1. Smoking status should be routinely included in preoperative PONV risk assessment protocols.
2. Risk stratification should consider additional factors such as age, anesthetic technique, duration of surgery, and postoperative opioid use.
3. Multi-modal antiemetic prophylaxis should be considered for high-risk patients.
4. Older smokers may require enhanced postoperative monitoring and targeted antiemetic management.
5. Future multicenter studies with larger sample sizes are recommended to validate these findings.
6. Comparative studies involving smokers and non-smokers, including female participants, should be conducted.
7. Further research should explore the dose-response relationship between smoking intensity and PONV.
8. Genetic studies investigating neurotransmitter receptors and drug-metabolizing enzymes may improve understanding of individual susceptibility to PONV.

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