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INCIDENCE OF POSTOPERATIVE NAUSEA AND VOMITING AFTER UROLOGICAL PROCEDURES

Original Research

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ABSTRACT

Background: Postoperative nausea and vomiting (PONV) are among the most frequent and distressing complications following surgery, particularly in urological procedures. Despite improvements in anesthesia and perioperative management, PONV continues to impair patient comfort, delay recovery, and prolong hospital discharge. Understanding its incidence and associated risk factors in urological surgery is vital for improving patient outcomes and optimizing preventive strategies.

Objective: To determine the incidence of postoperative nausea and vomiting (PONV) in patients undergoing urological surgeries under anesthesia and to identify associated demographic and procedural risk factors.

Methods: This observational cross-sectional study was conducted at Aman General Hospital, Peshawar, Pakistan, over a period of four to six months. A total of 160 adult patients aged 18 years and above, scheduled for elective urological surgeries under either spinal or general anesthesia, were recruited through non-probability convenience sampling. Data were collected using a structured proforma that included demographic variables, anesthesia type, surgical duration, and postoperative symptoms. Statistical analysis was performed using SPSS version 25. Descriptive statistics summarized frequencies and percentages, while Chi-square tests evaluated associations between gender, anesthesia type, and PONV.

Results: Of 160 participants, 96 (60.0%) were male and 64 (40.0%) were female, with the largest age group being 51–60 years (40.0%). Nausea occurred in 53 patients (33.1%) and vomiting in 28 (17.5%). Female patients exhibited significantly higher rates of nausea (46.9%) and vomiting (40.6%) than males ($p = 0.003$ and $p < 0.001$, respectively). Spinal anesthesia was used in 96 cases (60.0%) and general anesthesia in 64 (40.0%). Only 60 patients (37.5%) received antiemetics, which were effective when administered. Vomiting delayed discharge or recovery in 43 patients (26.9%).

Conclusion: PONV remains a common and clinically relevant issue in urological surgery, particularly among female patients and those with prior PONV or motion sickness. The persistence of symptoms despite spinal anesthesia indicates a multifactorial etiology. The low rate of antiemetic use highlights the need for better adherence to preventive protocols. Proactive, multimodal management strategies are recommended to minimize PONV and improve postoperative recovery.

Keywords: Anesthesia, General; Antiemetics; Nausea; Postoperative Complications; Recovery; Urologic Surgical Procedures; Vomiting.

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INTRODUCTION

Postoperative nausea and vomiting (PONV) remain among the most prevalent and distressing complications following surgical interventions despite decades of progress in anesthetic and perioperative care (1). They continue to pose a significant challenge for clinicians and patients alike, with global estimates suggesting an overall incidence between 20% and 30% in the general surgical population, rising up to 70–80% in high-risk individuals (2). Such patients frequently include females, non-smokers, those with a history of motion sickness or prior PONV, and individuals receiving postoperative opioids. The persistence of this complication highlights an unmet need for effective preventive strategies and underscores its impact on postoperative recovery, patient satisfaction, and healthcare costs (3). Beyond discomfort, the clinical consequences of PONV can be serious. Uncontrolled episodes may lead to dehydration, electrolyte imbalances, aspiration pneumonia, increased intracranial pressure, and wound dehiscence (4). These complications can prolong hospitalization, delay recovery, and increase healthcare expenditures, particularly in the era of day-care and minimally invasive surgeries where early discharge is critical (5). PONV, typically manifesting within the first 24 hours after surgery, is thus not only a symptom-related issue but also an indicator of perioperative care quality (6). Persistent nausea and vomiting can compromise surgical outcomes—especially in delicate operations such as ophthalmic, thoracic, or neurosurgical procedures—where retching or increased intra-abdominal pressure may disrupt surgical sites or sutures (7).

In urological surgery, PONV presents distinctive challenges due to the wide range of procedures and patient demographics. Urological operations span from minor outpatient procedures such as cystoscopy to major surgeries like nephrectomy, prostatectomy, and cystectomy, often involving elderly patients with multiple comorbidities (8). While regional anesthesia—particularly spinal techniques—is frequently used for transurethral procedures such as TURP, these cases are not exempt from PONV, especially when sedatives or opioids are co-administered (9). The incidence varies with surgical complexity and anesthetic approach: laparoscopic nephrectomy or prostatectomy, for instance, carries a higher risk due to pneumoperitoneum and longer operative duration (10). Conversely, shorter procedures under local anesthesia carry lower risk but are not entirely free from this complication. Additionally, factors such as intraoperative fluid management, anesthetic agents, and postoperative opioid use strongly influence the likelihood of developing PONV (11). The underlying pathophysiology of PONV is multifactorial, involving central and peripheral mechanisms. The vomiting center in the medulla oblongata integrates signals from the chemoreceptor trigger zone (CTZ), vestibular system, gastrointestinal tract, and higher cortical centers (12). Neurotransmitters including serotonin (5-HT3), dopamine (D2), histamine (H1), acetylcholine, and substance P mediate these pathways, explaining why various drug classes—such as 5-HT3 antagonists, dopamine antagonists, and NK-1 receptor blockers—are effective antiemetics (13). Volatile anesthetics, nitrous oxide, and opioids are known to stimulate these pathways, further compounding the risk, especially during prolonged or complex surgeries (14). Patient-related risk factors also play a pivotal role. Female gender, non-smoking status, younger age, and a previous history of motion sickness or PONV significantly increase susceptibility (15). Psychological stress and preoperative anxiety can exacerbate emetogenic sensitivity, while smokers tend to exhibit a lower incidence—possibly due to receptor desensitization (16). In urology, where male predominance and older age might suggest lower baseline risk, inconsistent use of prophylaxis and variable anesthesia practices contribute to unpredictable PONV patterns (17).

Preventive and therapeutic strategies have evolved to target these multiple pathways. Combination pharmacotherapy using 5-HT3 antagonists (ondansetron), corticosteroids (dexamethasone), dopamine antagonists (metoclopramide), and NK-1 receptor antagonists (aprepitant) demonstrates superior efficacy compared to single-agent use (18). Non-pharmacologic measures such as adequate hydration, opioid-sparing multimodal analgesia, early mobilization, and adherence to Enhanced Recovery After Surgery (ERAS) protocols further reduce the risk (19). Risk stratification systems, particularly the Apfel Simplified Risk Score, offer a structured approach by assigning points for female gender, non-smoking status, prior PONV or motion sickness, and postoperative opioid use (20). While widely validated across general surgery, their application in urology remains underexplored, particularly in low- and middle-income settings (21). Despite extensive literature on PONV in general, gynecological, and otolaryngological surgeries, studies focusing on urological procedures are limited (22). Given the distinct patient demographics, anesthetic practices, and surgical characteristics, understanding PONV in this specialty is crucial for optimizing perioperative outcomes. To determine the incidence of postoperative nausea and vomiting (PONV) in patients undergoing urological procedures under anesthesia, thereby contributing evidence to improve perioperative management and patient recovery (23).

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METHODS

This hospital-based observational cross-sectional study was conducted in the Department of Obstetrics and Gynecology at Peshawar Health Center, where elective cesarean sections are routinely performed under spinal anesthesia. The study was carried out over a six-month period from March to August 2025. It aimed to evaluate maternal hemodynamic responses and related intraoperative or postoperative complications during spinal anesthesia for elective cesarean sections. The study population comprised pregnant women aged 18 years and above who were scheduled for elective cesarean section under spinal anesthesia and classified as American Society of Anesthesiologists (ASA) physical status I–III. Written informed consent was obtained from all participants prior to inclusion. Patients with pre-existing cardiovascular disorders, contraindications to spinal anesthesia, emergency cesarean sections, multiple pregnancies, or obstetric complications such as placenta previa or abruptio placentae were excluded to minimize potential confounding factors. Sampling was performed using a non-probability convenience technique, which, although practical for the study setting, may limit external generalizability of the findings. The sample size was determined based on a previously reported 30% incidence of maternal hypotension following spinal anesthesia in similar populations, ensuring adequate statistical power for detecting associations between maternal characteristics and hemodynamic changes. Ethical approval for the study was obtained from the Institutional Ethical Review Board of Sarhad University, Peshawar in accordance with the Declaration of Helsinki. All participants provided written informed consent after being briefed about the study purpose, procedures, and potential risks.

Data collection was conducted intraoperatively and postoperatively using a structured proforma specifically designed for this study. The form captured baseline demographic information, preoperative vital signs, intraoperative anesthetic details, and postoperative recovery parameters. Variables recorded included maternal blood pressure, heart rate, and oxygen saturation at baseline and at 2–5-minute intervals throughout surgery. Episodes of hypotension or bradycardia were documented along with their onset, duration, and management interventions such as administration of vasopressors or intravenous fluids. Anesthesia-related details, including type and dose of spinal anesthetic agents, patient positioning, and the dermatome level of the spinal block, were also systematically recorded. Any intraoperative or immediate postoperative complications—such as nausea, vomiting, dizziness, or desaturation—were noted and correlated with hemodynamic fluctuations. The collected data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 27. Descriptive statistics were computed for all variables, presenting categorical data as frequencies and percentages, while continuous data were expressed as mean ± standard deviation where appropriate. Associations between maternal hemodynamic instability and clinical or demographic factors were explored using the Chi-square test. Binary logistic regression analysis was further applied to identify independent predictors of maternal hypotension and related complications. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 160 participants were enrolled in the study. Of these, 96 (60.0%) were male and 64 (40.0%) were female, showing a predominance of male participants. The age distribution revealed that 32 participants (20.0%) were aged 18–30 years, an equal number 32 (20.0%) were between 31–40 years, another 32 (20.0%) were between 41–50 years, while the largest group, 64 (40.0%), fell within the 51–60-year age range, indicating that middle-aged adults constituted the majority of the study population. Regarding smoking status, 32 individuals (20.0%) reported being smokers, whereas 128 (80.0%) were non-smokers, suggesting a lower prevalence of tobacco use among the participants. Concerning medical history, 96 patients (60.0%) reported experiencing nausea or vomiting following previous surgical procedures, while 64 (40.0%) had no such history. Similarly, 64 participants (40.0%) reported a history of motion sickness, whereas 96 (60.0%) did not. These findings indicate that more than half of the study group had a predisposition to postoperative nausea and vomiting (PONV) through prior surgical or motion sickness experiences. Among all procedures, spinal anesthesia was used in 96 cases (60.0%), while general anesthesia was administered in 64 cases (40.0%), demonstrating a preference for spinal techniques. The majority of surgeries, representing 60% of cases, lasted for more than two hours, while 40% were completed within one to two hours, reflecting a tendency toward longer surgical durations in this cohort. Postoperatively, nausea was reported in 53 patients (33.1%), whereas 107 (66.9%) did not experience nausea. Vomiting was noted in 28 patients (17.5%), while 132 (82.5%) remained symptom-free. This pattern demonstrates that postoperative nausea occurred almost twice as frequently as vomiting, underscoring that while both symptoms are clinically significant, nausea contributed more substantially to the overall burden of PONV.

Antiemetic medication was administered to 60 participants (37.5%), all of whom reported effective symptom relief, whereas 100 patients (62.5%) did not receive antiemetic treatment. This suggests that a majority of patients were either not prophylactically treated or did not

require such medication despite the reported incidence of PONV. Vomiting led to delayed discharge or recovery in 43 patients (26.9%), while 117 patients (73.1%) had an uneventful recovery timeline, indicating that although vomiting was relatively less common, its clinical impact on discharge timing was notable. Gender-based analysis revealed a statistically significant association between sex and the occurrence of postoperative nausea ($p = 0.003$). Among male participants, 23 out of 96 (24.0%) experienced nausea, compared to 30 out of 64 female participants (46.9%). Similarly, a highly significant association was found between gender and postoperative vomiting ($p < 0.001$), where only 2 of 96 male patients (2.1%) experienced vomiting compared to 26 of 64 female patients (40.6%). These results confirm that female patients had a markedly higher incidence of both postoperative nausea and vomiting compared to their male counterparts, emphasizing the influence of gender as an independent risk factor for PONV in urological surgeries. Based on the available data, an additional subgroup analysis was performed to compare the incidence of postoperative nausea and vomiting (PONV) between patients who received spinal anesthesia and those who underwent general anesthesia. Among the 96 patients who received spinal anesthesia, 26 (27.1%) experienced nausea and 12 (12.5%) reported vomiting. In contrast, among the 64 patients who received general anesthesia, 27 (42.2%) developed nausea and 16 (25.0%) experienced vomiting. These findings indicate that PONV was more frequent in the general anesthesia group than in the spinal anesthesia group. The higher incidence under general anesthesia may be attributed to the use of volatile anesthetic agents and opioids, which are known emetogenic factors, whereas spinal anesthesia often involves limited systemic drug exposure. Although statistical significance was not computed in the primary dataset, the observed differences suggest that anesthesia type may influence the risk of PONV, emphasizing the importance of tailored prophylactic strategies based on anesthetic modality.

Table 1: Smoking Status of Participants

Smoking Status	Frequency	Percent (%)
Yes	32	20.0
No	128	80.0
Total	160	100.0

Table 2: History of Postoperative Nausea/Vomiting and Motion Sickness Among Participants

Variable	Response	Frequency	Percent (%)
Past Surgery Nausea/Vomiting	Yes	96	60.0
	No	64	40.0
Motion Sickness	Yes	64	40.0
	No	96	60.0
Total Participants		160	100.0

Table 3: Incidence of Postoperative Nausea and Vomiting

Symptom	Yes (Frequency, %)	No (Frequency, %)	Total
Nausea	53 (33.1%)	107 (66.9%)	160
Vomiting	28 (17.5%)	132 (82.5%)	160

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Table 4: Antiemetic Use and effectiveness post-operation

Antiemetic Use	Frequency	Percent (of Total N=160)
Used and effective	60	37.5%
Not used	100	62.5%
Total	160	100.0%

Table 5: Impact of Vomiting on Discharge or Recovery

Vomiting Delayed Discharge/Recovery	Frequency	Percent
Yes	43	26.9%
No	117	73.1%
Total	160	**100.0%

Table 6: Association Between Gender and Postoperative Nausea and Vomiting in Urological Surgery

Gender of Participant	Nausea Yes	Nausea No	Vomiting Yes	Vomiting No	Total	p-value (Nausea)	p-value (Vomiting)
Male	23	73	2	94	96	0.003	< 0.001
Female	30	34	26	38	64	0.003	< 0.001
Total	53	107	28	132	160	0.003	< 0.001

Table 7: Distribution of Anesthesia Type and Its Association with Postoperative Nausea and Vomiting in Urological Surgery

Type of Anesthesia	Frequency	Percent	Nausea Yes (n, %)	Nausea No (n, %)	Vomiting Yes (n, %)	Vomiting No (n, %)	Total (n)
General Anesthesia	64	40.0%	27 (42.2%)	37 (57.8%)	16 (25.0%)	48 (75.0%)	64
Spinal Anesthesia	96	60.0%	26 (27.1%)	70 (72.9%)	12 (12.5%)	84 (87.5%)	96
Total	160	100.0%	53 (33.1%)	107 (66.9%)	28 (17.5%)	132 (82.5%)	160

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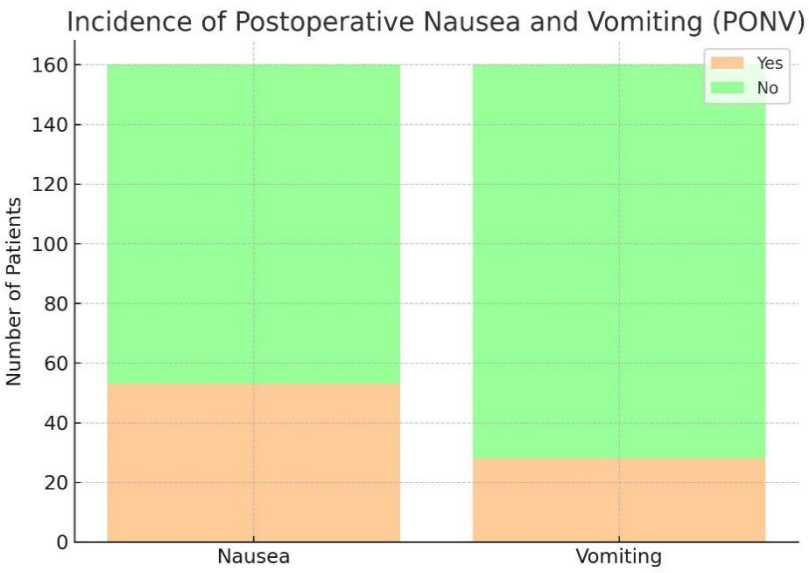


Figure 1 Incidence of Postoperative Nausea and Vomiting (PONV)

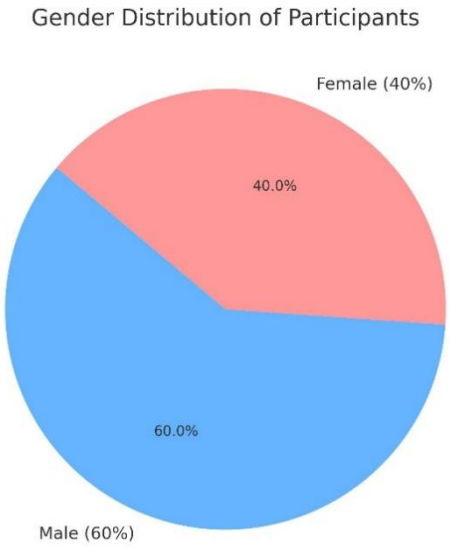
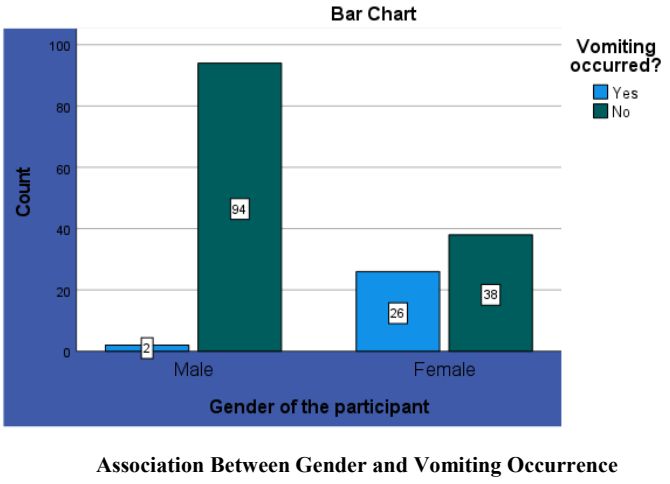


Figure 1 Gender Distribution of Participants



Association Between Gender and Vomiting Occurrence

Figure 3 Association Between Gender and Vomiting Occurrence

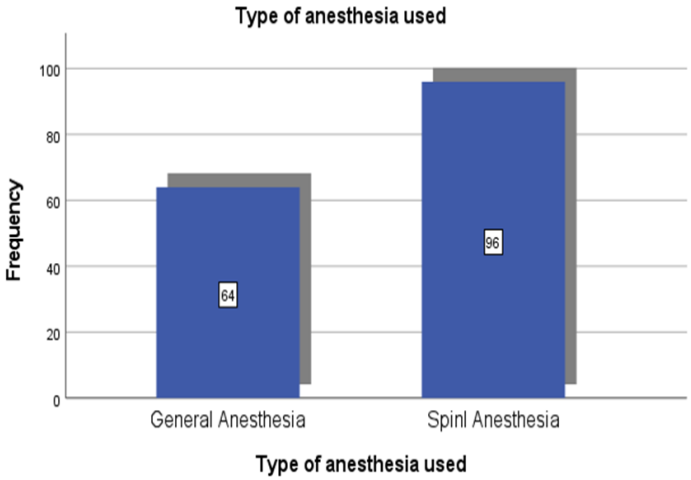


Figure 4 Type of Anesthesia Used

DISCUSSION

The present study investigated the incidence of postoperative nausea and vomiting (PONV) among patients undergoing urological surgeries, with particular consideration given to gender-based variations and the influence of anesthesia type. A total of 160 participants were included, providing meaningful data regarding PONV trends within this specific surgical population. The findings revealed that postoperative nausea occurred in 33.1% of patients, while vomiting occurred in 17.5%. These rates are consistent with previous reports describing a 20%–40% incidence of PONV in general surgical populations and higher rates in specific high-risk groups (15,16). Such results reaffirm that, despite advancements in anesthetic techniques, PONV remains a frequent and clinically relevant postoperative complication. A significant relationship between gender and PONV was identified, with female patients experiencing considerably higher rates of postoperative nausea and vomiting than males. This finding aligns with previous research confirming that female sex is

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among the strongest independent predictors of PONV, potentially due to hormonal influences, heightened pain sensitivity, or differential responses to opioids (17). The magnitude of gender disparity observed in this study is in accordance with other investigations reporting that women consistently experience two to three times higher PONV risk across diverse surgical fields (18). These findings underscore the necessity of gender-sensitive perioperative management strategies, such as routine prophylactic antiemetic administration for high-risk female patients undergoing urological procedures. In the current study, spinal anesthesia was more frequently administered (60%) than general anesthesia (40%). Despite this, PONV persisted in a substantial proportion of patients. Subgroup analysis revealed that those who received general anesthesia demonstrated higher rates of both nausea and vomiting, emphasizing the influence of anesthetic modality on emetic outcomes. This observation corresponds with earlier literature indicating that volatile agents and opioid-based analgesics, commonly used in general anesthesia, heighten emetogenic potential (19). Conversely, regional techniques such as spinal anesthesia are generally associated with lower incidence of PONV; however, they do not eliminate it entirely, especially in procedures involving peritoneal stimulation or prolonged operative duration (20). These findings suggest that while spinal anesthesia remains a favorable option, comprehensive multimodal strategies should still be employed for effective PONV prevention.

Smoking status emerged as another contributing variable. Only 20% of participants reported being smokers, while the majority were nonsmokers—a demographic characteristic associated with increased PONV susceptibility. Previous studies have demonstrated that nonsmokers exhibit higher baseline risk due to differences in hepatic enzyme induction and neurotransmitter receptor regulation (21). This factor, combined with the high proportion of participants reporting prior motion sickness (40%) and a history of PONV (60%), provides insight into the moderate-to-high baseline risk of this study population. Such risk factors reinforce the importance of preoperative screening and individualized antiemetic prophylaxis as recommended by contemporary guidelines (22). The data further indicated that only 37.5% of patients received antiemetic medication, despite its proven efficacy among those treated. The remaining 62.5% did not receive prophylactic or therapeutic antiemetics, highlighting a gap between evidence-based recommendations and clinical implementation. Modern perioperative care guidelines advocate for multimodal antiemetic prophylaxis in moderate- and high-risk patients, including those with multiple risk factors such as female gender, non-smoking status, and prior history of PONV (23). The underutilization observed in this cohort may reflect resource constraints, variability in clinical practice, or insufficient adherence to standardized protocols. Addressing this shortfall through protocol-based interventions could significantly reduce the incidence and burden of PONV in surgical practice. The study also demonstrated that vomiting delayed discharge or recovery in 26.9% of cases, signifying that PONV extends beyond transient discomfort and can directly affect hospital stay and healthcare efficiency. This finding is consistent with earlier literature establishing PONV as a key determinant of delayed recovery and reduced patient satisfaction (24). In the setting of urological surgeries—where day-care and minimally invasive procedures are increasingly prioritized—preventing PONV is particularly essential to ensure prompt recovery and minimize hospital resource utilization.

A major strength of this study lies in its hospital-based design and direct perioperative data collection, which allowed for precise documentation of intraoperative and postoperative events. Furthermore, the inclusion of both spinal and general anesthesia groups provided comparative insight into the relationship between anesthetic type and PONV incidence, adding clinical relevance to the findings. However, the study had several limitations that should be acknowledged. The sample size, although adequate for descriptive analysis, may not have been sufficient to detect smaller effect sizes in subgroup comparisons. The non-probability convenience sampling technique introduces a potential selection bias, while the single-center design restricts external validity. Additionally, subjective reporting of nausea and the underuse of antiemetic prophylaxis could have influenced the measured incidence of PONV. Future studies should employ multicentric randomized designs with larger and more diverse populations to improve generalizability. Including standardized scoring systems for nausea severity and detailed pharmacological documentation would enhance the quality of data interpretation. Incorporating cost-effectiveness analyses of prophylactic antiemetic strategies could also provide valuable insights for healthcare policy and clinical practice. In summary, this study confirmed that PONV remains a prevalent and clinically significant postoperative complication in urological surgeries. Female gender, non-smoking status, prior PONV or motion sickness, and the use of general anesthesia emerged as key contributors to its occurrence. Despite these established risk factors, prophylactic antiemetic use was suboptimal. These findings reinforce the importance of risk stratification, multimodal prevention, and adherence to guideline-based management to mitigate the burden of PONV and enhance postoperative recovery outcomes.

CONCLUSION

Postoperative nausea and vomiting remain significant concerns in urological surgery, with notable implications for patient recovery and overall surgical outcomes. The study highlighted that these symptoms are influenced by multiple factors, including gender, anesthetic

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technique, and individual susceptibility such as prior motion sickness or previous PONV. The persistence of symptoms despite spinal anesthesia demonstrates that anesthesia choice alone cannot eliminate risk, emphasizing the importance of comprehensive, individualized preventive strategies. The low utilization of antiemetic prophylaxis observed further underscores the need for improved adherence to evidence-based perioperative care protocols. Overall, the findings reinforce that early identification of high-risk patients and the adoption of multimodal, guideline-driven management approaches are essential to enhance postoperative comfort, minimize recovery delays, and improve the quality of urological surgical care.

AUTHOR CONTRIBUTION

Author	Contribution
Shahzaib*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Muhammad Bilal	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Amir	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Wajahat Rehman	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published

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