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Original Research Article

Impact of Dexamethasone on Postoperative Nausea and Vomiting in Women with Gynecological Surgery in a Tertiary Care Hospital

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Abstract: ***Background:*** Postoperative nausea and vomiting (PONV) remain common complications following gynecological surgeries, often leading to patient discomfort and prolonged recovery. This study aimed to evaluate the impact of dexamethasone in preventing PONV in women undergoing gynecological surgery at a tertiary care hospital. ***Methods:*** This was a prospective observational study conducted in the Department of Anaesthesiology, Square Hospital and Bangladesh Medical College Hospital, Dhaka, Bangladesh, from April 2014 to March 2015. This study included 100 women who underwent elective gynecological surgery under general anesthesia. They were randomly allocated into two groups: Group A (n=50) - Patients received intravenous dexamethasone, and Group B (n=50) - Patients received intravenous granisetron. ***Results:*** Baseline characteristics were comparable between groups, with a mean age of 44.45 ± 9.74 years in the Dexamethasone group and 44.26 ± 9.89 years in the Granisetron group. The mean BMI was similar (24.7 ± 1.69 vs 24.56 ± 2.27). Adnexectomy was the most common surgery in both groups. Duration of surgery (70.21 ± 19.62 vs 72.11 ± 16.60 min, p = 0.602) and anesthesia (93.22 ± 18.58 vs 95.23 ± 21.94 min, p = 0.622) did not differ significantly. A history of PONV was reported in 4.0% of patients in the Dexamethasone group and 6.0% in the Granisetron group (p = 0.660). Postoperatively, nausea occurred in 14.0% vs 12.0% (p = 0.587), vomiting in 6.0% vs 8.0% (p = 0.750), and metoclopramide use in 6.0% vs 8.0% (p = 0.750), with no significant differences. Side effects were minimal and comparable between groups. ***Conclusion:*** Dexamethasone was as effective as granisetron in preventing postoperative nausea and vomiting in women undergoing gynecological surgery, with no significant difference in efficacy or side effects. Both agents appear to be safe options for PONV prophylaxis in this patient population.

Keywords: Dexamethasone, Granisetron, Postoperative Nausea and Vomiting, Gynecological Surgery.

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INTRODUCTION

Postoperative nausea and vomiting (PONV) remain one of the most common and distressing complications following general anesthesia. It not only delays postoperative feeding and prolongs hospital stay but also reduces patient satisfaction and overall recovery quality. The incidence of PONV varies widely, ranging from 20% to 80%, and it can contribute to complications such as anxiety, dehydration, electrolyte imbalance, wound dehiscence, muscular fatigue, and delayed recovery. In severe cases, it may even lead to gastric herniation, esophageal tears, or life-threatening aspiration, thereby increasing medical costs [1, 2]. Despite advances in anesthetic techniques and identification of patient, anesthesia, and surgery-related risk factors, the incidence of PONV remains about 20–30% in the general adult population and as high as 70–80% among high-risk patients [3, 4]. This highlights the importance of effective preventive strategies, particularly in day-case and gynecological surgeries where rapid recovery is crucial.

Traditionally, various pharmacologic agents have been used to prevent PONV, including serotonin (5-HT_3) receptor antagonists (ondansetron, dolasetron, granisetron), dopamine D_2 receptor antagonists (droperidol, metoclopramide), muscarinic cholinergic

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M_1 receptor antagonists (scopolamine), and histamine H_1 receptor antagonists (promethazine, prochlorperazine) [4]. Among these, 5-HT_3 receptor antagonists such as ondansetron and granisetron are widely used, but their high cost often limits routine use. Other antiemetics, while effective, are associated with significant adverse effects such as restlessness, dry mouth, tachycardia, and extrapyramidal symptoms [5].

Since the mid-1980s, dexamethasone has emerged as an effective antiemetic, initially recognized for its ability to reduce chemotherapy-induced vomiting. Subsequent studies have demonstrated its efficacy in preventing PONV, particularly in patients receiving epidural morphine for postoperative analgesia. Meta-analyses suggest that dexamethasone is comparable to ondansetron in PONV prevention, with the added advantages of low cost, favorable safety profile, and ease of use [6–12]. It has been shown to be effective across a variety of surgical contexts, including breast surgery, laparoscopic cholecystectomy, abdominal hysterectomy, and other gynecological surgeries. Interestingly, despite the minimally invasive nature of laparoscopy, which generally offers benefits such as faster recovery and shorter hospital stays the incidence of PONV following gynecological laparoscopic surgery remains notably high, ranging from 54% to 92% [13].

Dexamethasone is a synthetic adrenocorticoid that acts primarily through glucocorticoid receptors, with negligible mineralocorticoid activity [14]. Its antiemetic mechanism is not fully understood, but proposed explanations include central inhibition of prostaglandin synthesis, suppression of central serotonin activity, and altered permeability of the blood–brain barrier to plasma proteins [15, 16]. Additionally, its potent anti-inflammatory properties may reduce local surgical inflammation and the associated parasympathetic afferent stimulation of the vomiting center. Dexamethasone may also enhance endorphin release, contributing to improved mood and appetite, thereby reducing the risk of PONV [14-16].

The recommended intravenous dose of dexamethasone for PONV prevention in adults ranges between 2.5–10 mg. Studies have shown that a minimum of 2.5 mg is effective for gynecological surgeries such as abdominal hysterectomy and myomectomy, while higher doses (≥5 mg) are required after procedures like thyroidectomy [17, 18]. Furthermore, dexamethasone has demonstrated efficacy in preventing nausea and vomiting associated with intravenous or epidural morphine used for postoperative pain control [9-20]. The optimal dose may vary depending on the emetogenic stimulus, with studies suggesting 8 mg for intravenous morphine-induced emesis and 5 mg for epidural morphine [19, 20]. Importantly, the timing of administration plays a critical role: dexamethasone requires 12–24 hours to reach peak effect, and its physiological action may last 36–72 hours, making it a particularly suitable agent for sustained PONV prophylaxis [14].

Therefore, in this study, we aimed to evaluate the impact of dexamethasone in preventing PONV in women undergoing gynecological surgery at a tertiary care hospital.

METHODOLOGY & MATERIALS

This was a prospective observational study conducted in the Department of Anaesthesiology, Square Hospital and Bangladesh Medical College Hospital, Dhaka, Bangladesh, from April 2014 to March 2015. In this study, we included a total of 100 women who underwent elective gynecological surgery under general anesthesia at study institutions were enrolled and randomly allocated into two groups: Group A (n=50): Patients received intravenous dexamethasone, and Group B (n=50)**:** Patients received intravenous granisetron.

These were the following criteria for eligibility as study participants:

Inclusion Criteria

- Female patients aged 18-60 years.
- Undergoing elective gynecological surgery under general anesthesia.
- Classified as American Society of Anesthesiologists (ASA) physical status I or II.
- Patients who provided informed written consent.

Exclusion Criteria

- History of hypersensitivity to dexamethasone, granisetron, or related drugs.
- Patients with gastrointestinal disorders (e.g., gastritis, peptic ulcer disease, reflux disease).
- Use of antiemetics, corticosteroids, or psychoactive drugs within 24 hours before surgery.
- Pregnant or lactating women.
- Patients with significant hepatic, renal, or cardiovascular disease.
- Emergency surgical cases.

Data Collection Procedure:

Informed written consent was obtained from all patients before enrollment. Eligible participants were classified as ASA physical status I or II, according to the American Society of Anesthesiologists (ASA) classification. Patients were randomly assigned to two groups using a computer-generated sequence, which was kept concealed in sealed opaque envelopes until the time of assignment.

Patients in Group A received 8 mg of Dexamethasone intravenously, while those in Group B

received 3 mg of Granisetron intravenously, 15 minutes before anesthesia induction.

General anesthesia was induced in all patients with Thiopental sodium (5 mg/kg), Fentanyl (1.5 µg/kg), and Atracurium (0.5 mg/kg) to facilitate tracheal intubation. Standard intraoperative monitoring included electrocardiography, pulse oximetry, and non-invasive blood pressure measurement. Anesthesia was maintained with Isoflurane (1.2%), with incremental doses of Fentanyl (10 µg every 15 minutes) administered after 30 minutes of induction as needed. During laparoscopic procedures, intra-abdominal pressure was maintained at 12 mmHg. At the end of surgery, carbon dioxide was evacuated via manual abdominal compression with open trocars. Postoperative nausea and vomiting (PONV) were assessed at three intervals: 0–6 hours, 6–12 hours, and 12–24 hours after recovery of consciousness. Patients with PONV received 10 mg of Metoclopramide intravenously as rescue medication.

Statistical Analysis:

All data were recorded systematically in a pre-formatted data collection form. Quantitative data were expressed as mean and standard deviation, and qualitative data were expressed as frequency distribution and percentage. Quantitative variables were compared between the two groups using the Student's t- test. For categorical variables, comparisons were performed using the Chi-square test, and Fisher's exact test was applied when the expected frequency in any cell was less than five. In cases of non-normal distribution, appropriate non-parametric tests were employed. A p-value <0.05 was considered significant. Statistical analysis was performed by using SPSS 16 (Statistical Package for Social Sciences). This study was ethically approved by the Institutional Review Committee of Bangladesh Medical College Hospital.

RESULTS

Table 1: Baseline characteristics of study patients in the Dexamethasone and Granisetron groups

Baseline Characteristics	**Group A**		**Group B**	
Age (years)	**N**	**P(%)**	**N**	**P(%)**
18-30	6	12.0	5	10.0
31-40	10	20.0	14	28.0
41-50	21	42.0	19	38.0
51-60	13	26.0	12	24.0
Mean age	44.45± 9.74		44.26 ± 9.89	
Socioeconomic status				
Upper Class	21	42.0	23	46.0
Middle Class	26	52.0	25	50.0
Lower Class	3	6.0	2	4.0
BMI (kg/m²)				
Mean ± SD	24.7 ± 1.69		24.56 ± 2.27	
History of Surgery				
General Surgery	1	2.0	2	4.0
ENT Surgery	2	4.0	1	2.0
Gynecology & Obstetrics	5	10.0	3	6.0
Other	0	0.0	1	2.0
History of Motion Sickness	10	20.0	13	26.0
History of Headache	4	8.0	6	12.0

Group A = Dexamethasone, Group B = Granisetron

Table 1 shows that the mean age of patients was comparable between the two groups (Dexamethasone: 44.45 ± 9.74 years vs Granisetron: 44.26 ± 9.89 years). Most patients were in the 41–50 years age group in both groups (42.0% vs 38.0%). Socioeconomic distribution showed a predominance of middle-class patients (52.0% in Dexamethasone vs 50.0% in Granisetron), followed by upper-class (42.0% vs 46.0%). The mean BMI was similar (24.7 ± 1.69 vs 24.56 ± 2.27). Regarding surgical history, gynecology & obstetrics procedures were more frequent in the Dexamethasone group (10.0% vs 6.0%), whereas other surgeries were slightly more in the Granisetron group (2.0% vs none). History of motion sickness (20.0% vs 26.0%) and headache (8.0% vs 12.0%) were observed in both groups without major differences.

Table 2: Operative parameters of patients in the Dexamethasone and Granisetron groups

Operative parameters	**Group A**		**Group B**		**P-value**
Types of surgery	**N**	**P(%)**	**N**	**P(%)**	
Hysterectomy	9	18.0	10	20.0	0.234
Adnexectomy	18	36.0	15	30.0	0.362
Diagnostic laparoscopy	16	32.0	17	34.0	0.223

Operative parameters	Group A		Group B		P-value
Types of surgery	**N**	**P(%)**	**N**	**P(%)**	
Myomectomy	7	14.0	8	16.0	0.248
Duration of Surgery					
<45 mins	1	2.0	3	6.0	
46-75 mins	27	54.0	21	42.0	
76-105 mins	22	44.0	26	52.0	
Mean ± SD	70.21 ± 19.62		72.11± 16.60		0.602
Duration of anaesthesia					
<60 mins	2	4.0	4	8.0	
61-90 mins	25	50.0	20	40.0	
90-120 mins	23	46.0	26	52.0	
Mean ± SD	93.22 ± 18.58		95.23± 21.94		0.622

Group A = Dexamethasone, Group B = Granisetron

Table 2 shows the distribution of surgery types was comparable between the two groups, with adnexectomy being the most common procedure (36.0% in the Dexamethasone group vs 30.0% in the Granisetron group), followed by diagnostic laparoscopy (32.0% vs 34.0%), hysterectomy (18.0% vs 20.0%), and myomectomy (14.0% vs 16.0%). The mean duration of surgery was similar between the groups (70.21 ± 19.62 minutes vs 72.11 ± 16.60 minutes, $p = 0.602$). Likewise, the mean duration of anesthesia did not differ significantly (93.22 ± 18.58 minutes vs 95.23 ± 21.94 minutes, $p = 0.622$).

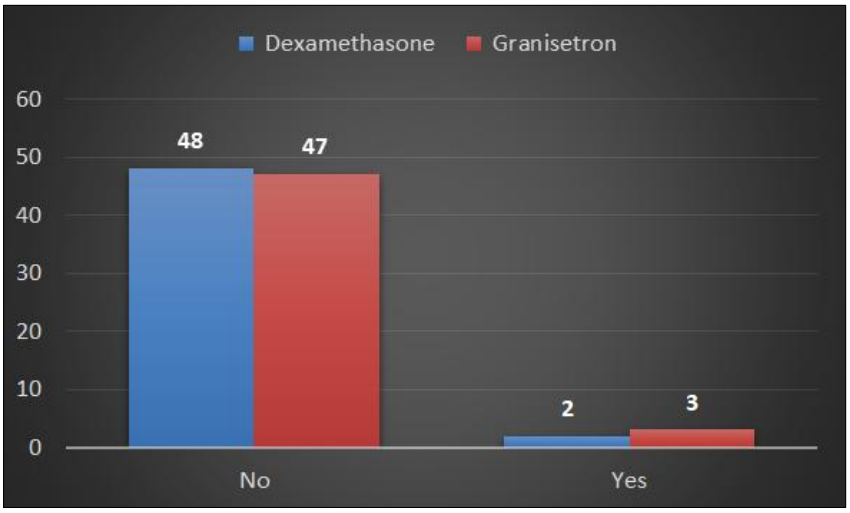

Figure 1: Postoperative nausea and vomiting (PONV) between the two groups

Figure 1 shows that among patients in the Dexamethasone group, a history of PONV was reported in 2 (4.0%), compared to 3(6.0%) in the Granisetron group (p = 0.660).

Table 3: Intervention outcomes in patients after receiving Dexamethasone versus Granisetron

Intervention outcomes	Group A		Group B		P-value
	N=50	P(%)	N=50	P(%)	
Nausea	7	14.0	6	12.0	0.587
Vomiting	3	6.0	4	8.0	0.750
Metoclopramide use	3	6.0	4	8.0	0.750
Side effects	1	2.0	2	4.0	0.614

Group A = Dexamethasone, Group B = Granisetron

Table 3 shows that postoperative nausea occurred in 14.0% of the Dexamethasone group and 12.0% of the Granisetron group (p = 0.587). Vomiting was observed in 6.0% versus 8.0% (p=0.750), and metoclopramide use was required in the same proportions (6.0% vs 8.0%; p=0.750). Side effects were infrequent, occurring in 2.0% of the Dexamethasone group and 4.0% of the Granisetron group (p=0.614).

DISCUSSION

In the present study, the incidence of postoperative nausea was 13.0%, while vomiting was

observed in 7.0% of patients. By comparison, D'souza *et al*., reported a much higher overall incidence of PONV at 44.5%, with nausea accounting for 39% and vomiting for 5.5% of cases. In their study, the highest incidence (37%) occurred within the first 3 hours after surgery, after which the frequency declined to 14.1% over 3–6 hours and to 1.1% over 6–12 hours [13]. This suggests that PONV is most prominent during the immediate postoperative period and decreases steadily within 24 hours. In the Dexa 4 group of that study, the total incidence of PONV was 29%, with the lowest incidence of nausea (26.6%) occurring within the first 3 hours [13]. Previous studies have reported a wide variation in the incidence of PONV, ranging from 54% to 92% [5-21]. Huang *et al*., [22], found that a 5-mg dose of dexamethasone significantly reduced PONV to 28% in laparoscopic tubal ligation, while Fuji *et al*., [23], observed an incidence of 43% in patients receiving 4 mg of dexamethasone during dilatation and curettage. In our study, nausea occurred in 14% of patients receiving dexamethasone and 12% of those receiving 3 mg of granisetron, which is comparable to findings from Gupta *et al*., [24], who reported nausea and vomiting rates of 24% and 12%, respectively, in patients receiving 5 mg of dexamethasone for laparoscopic cholecystectomy.

When comparing doses, D'souza *et al*., reported a PONV incidence of 43% in the Dexa 8 group (nausea 40%, vomiting 3%), though the literature shows wide variation, with reported incidences between 13% and 40% [5-25].

In our study, 8 mg of dexamethasone was more effective than 3 mg of granisetron in reducing PONV. Karanicolas *et al*., conducted a meta-analysis and demonstrated that dexamethasone significantly reduces the incidence of PONV compared with placebo after laparoscopic cholecystectomy [11]. In their analysis, an 8 mg dose of dexamethasone appeared more effective than 3 mg of granisetron or 4 mg of ondansetron for PONV prophylaxis, although the differences did not reach statistical significance [11]. Similarly, Erhan *et al*., evaluated the effects of dexamethasone, granisetron, and ondansetron on PONV following laparoscopic cholecystectomy in comparison with placebo. Their findings also suggested that 8 mg of dexamethasone was more effective than 3 mg of granisetron or 4 mg of ondansetron, but again, the differences were not statistically significant [26]. By contrast, D'souza *et al*., found that 4 mg of dexamethasone was superior to 4 mg of ondansetron, with none of the patients in the Dexa 4 group requiring a rescue antiemetic, compared to 6.7% in the Dexa 8 group and 16.1% in the Ondan 4 group [13]. Similarly, in other types of gynecological surgery, requests for rescue antiemetics were higher—28% in the Dexa 8 group and 36% in the Ondan 4 group [25].

These findings suggest that preoperative dexamethasone, particularly in lower doses, significantly reduces both the incidence of PONV and the need for rescue antiemetics, whereas higher doses may paradoxically increase emetogenic potential. D'souza *et al*., also noted a borderline association between the use of rescue tramadol and increased PONV during the first 3 postoperative hours, possibly related to tramadol's emetogenic effects when administered intravenously [13-27].

Side effects were uncommon in our study, occurring in 2% of the dexamethasone group and 4% of the granisetron group (p=0.614). Similarly, D'souza *et al*., did not report any adverse steroid-related events, supporting the safety of single-dose dexamethasone in this setting [13]. Potential risks of long-term steroid use, such as hyperglycemia, wound infection, delayed healing, gastric ulcers, and avascular necrosis, are less relevant in the context of a single prophylactic dose [11-14]. Nevertheless, some studies have shown that even low-dose dexamethasone can transiently increase blood glucose within 24 hours and may cause a transient drop in cortisol thereafter [28-30]. Importantly, no fatal outcomes have been reported in trials of dexamethasone for PONV prophylaxis [11-14].

The findings of this study are consistent with prior research. Ho *et al*., [16], reported that dexamethasone was more effective for preventing late-onset rather than early-onset PONV, while Khatiwada *et al*., demonstrated that 4 mg of dexamethasone reduced nausea and vomiting after abdominal hysterectomy [31]. Sekhavat *et al*., also showed that 8 mg of dexamethasone lowered PONV following hysterectomy [32]. D'souza *et al*., confirmed its prophylactic efficacy in laparoscopic gynecological surgery [13]. These findings are further supported by meta-analyses and trials, including those by De Oliveira *et al*., the DREAMS Trial, Grape *et al*., and Olajumoke *et al.,* [33-36].

Overall, these findings support the role of dexamethasone as an effective and safe agent for the prevention of PONV in women undergoing gynecological surgery, with evidence suggesting that lower doses may offer the best balance between efficacy and safety.

Limitations of the Study

This study had certain limitations. First, the sample size was relatively small, which may restrict the generalizability of the findings to larger and more diverse populations. Second, only two antiemetic agents were compared, without inclusion of combination therapies or other commonly used drugs, which might have provided a broader perspective. Third, the follow-up period was confined to the immediate postoperative phase, and delayed episodes of PONV beyond the observation window were not evaluated.

CONCLUSION AND RECOMMENDATIONS

The study findings show that Dexamethasone was found to be as effective as granisetron in preventing

postoperative nausea and vomiting among women undergoing gynecological surgeries, with no significant differences in nausea, vomiting, antiemetic use, or side effects. Both agents were well-tolerated and safe. Given its comparable efficacy and favorable safety profile, dexamethasone represents a cost-effective alternative to granisetron for PONV prophylaxis in gynecological surgery.

Further multicenter trials with longer follow-up, including a larger sample size, need to be done to validate the findings of our study and explore the potential benefits of combination therapy.

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Ethical Approval: This study was ethically approved

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