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COMPARATIVE EFFECTS OF ONDANSETRON AND METOCLOPRAMIDE WITH POSTOPERATIVE NAUSEA AND VOMITING IN PATIENTS UNDERGOING BARIATRIC SLEEVE GASTRECTOMY

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ABSTRACT

Background: Postoperative nausea and vomiting (PONV) are among the most common complications following bariatric sleeve gastrectomy. PONV can delay recovery, increase patient discomfort, prolong hospital stay, and negatively affect overall surgical outcomes. Ondansetron and metoclopramide are commonly used antiemetic agents for the prevention of PONV; however, their comparative effectiveness in bariatric surgery patients remains an important area of investigation.

Objective: To compare the effects of ondansetron and metoclopramide in preventing postoperative nausea and vomiting among patients undergoing bariatric sleeve gastrectomy.

Methodology: A comparative cross-sectional study had conducted at Peshawar medical complex Peshawar, and Healthnet hospital Peshawar. the study period was from December 2025 to May 2026. the study includes 100 patients which are admitted for elective Bariatric sleeve gastrectomy. Patients were divided into two groups: Group O (Ondansetron, n = 50) and Group M (Metoclopramide, n = 50). The incidence of postoperative nausea and vomiting was assessed at 2, 4, and 6 hours after surgery. A pre design Questionnaire was instrumented for data collection. Data were analyzed by R software version 4.6.1.

Results: Ondansetron demonstrated superior efficacy in reducing PONV compared with metoclopramide. At 2 hours postoperatively, nausea occurred in 16.0% of patients receiving ondansetron compared with 26.0% of patients receiving metoclopramide. By 6 hours, nausea was observed in 8.0% of the ondansetron group and 20.0% of the metoclopramide group. Similarly, vomiting at 6 hours occurred in 2.0% of patients receiving ondansetron compared with 10.0% of those receiving metoclopramide. Overall, the ondansetron group consistently showed lower rates of both nausea and vomiting at all assessed time points.

Conclusion: Ondansetron was more effective than metoclopramide in preventing postoperative nausea and vomiting following Bariatric sleeve gastrectomy. The findings support the preferential use of ondansetron as a prophylactic antiemetic in bariatric surgery patients to improve postoperative recovery and patient comfort.

Keywords: Postoperative Nausea and Vomiting, PONV, Ondansetron, Metoclopramide, Bariatric Surgery, Sleeve Gastrectomy, Antiemetics.

1 INTRODUCTION

Obesity is a condition where too much body fat builds up in the body to the point that it can negatively affect a person's health. In developed countries, obesity places a major financial burden on healthcare systems, with estimates suggesting that it accounts for around 2–7% of total healthcare spending. This represents a substantial cost to national healthcare budgets [1]. According to the World Health Organization, BMI is commonly used to classify individuals as underweight, normal weight, overweight, or obese. A BMI between 18.5 and 24.9 kg/m² is considered normal, while a BMI of 25.0–29.9 kg/m² indicates overweight status, BMI of 30 kg/m² or higher is considered obese [2]. Being overweight or obese can have serious effects on health. It increases the risk of developing several long-term conditions, including Type 2 Diabetes, Coronary Heart Disease, certain types of cancer, breathing problems such as Obstructive Sleep Apnea, and osteoarthritis affecting both large and small joints [3]. Bariatric surgery refers to a group of surgical procedures performed to promote significant weight loss in individuals with severe obesity. These procedures work by reducing the size of the stomach, limiting food intake, altering the digestive process, or a combination of both. Bariatric surgery is widely recognized as an effective intervention for morbid obesity. It results in significant and sustained weight loss, enhances patients' quality of life, reduces obesity-related comorbidities, and contributes to improved long-term survival and life expectancy [4]. Among various bariatric surgery, Sleeve Gastrectomy has become one of the most widely performed procedures due to its proven effectiveness in promoting substantial and long-term weight loss while maintaining a relatively low complication rate. The procedure involves removing a large portion of the stomach, which not only limits the amount of food that can be consumed but also influences hormones involved in appetite regulation and metabolism. As a result, patients often experience significant weight reduction and improvements in obesity-related health conditions. Because of its effectiveness, safety profile, and minimally invasive nature, Sleeve Gastrectomy has become a preferred bariatric treatment worldwide [5]. Nausea is defined as an unpleasant, painless, subjective sensation associated with the urge to vomit. Vomiting is a complex physiological process involving coordinated motor and autonomic responses that lead to the forceful expulsion of gastric contents through the mouth. Vomiting should be distinguished from retching and regurgitation. Retching consists of rhythmic contractions of the respiratory and abdominal musculature that typically precede vomiting but do not result in the expulsion of gastric contents [6]. Bariatric surgery patients are particularly susceptible to PONV because of multiple contributing factors such as obesity, use of volatile anesthetic agents, opioid administration, prolonged surgical duration and increased intra-abdominal pressure [7]. Although serious complications from postoperative nausea and vomiting (PONV) are uncommon, they can sometimes have significant consequences. In rare cases, vomiting can lead to aspiration pneumonitis, a potentially life-threatening condition that occurs when stomach contents enter the lungs. Repeated or severe vomiting may also cause dehydration and disturbances in electrolyte balance. Many people who have experienced severe nausea or vomiting after a previous operation approach future surgery with considerable anxiety [8]. Ondansetron is an antiemetic. It acts by blocking specific serotonin 5-HT₃ (5-hydroxytryptamine) receptors in the body that trigger the vomiting reflex. It is one of the commonly approved drugs in this group of antiemetics and is widely used to manage nausea and vomiting in clinical settings [9]. Ondansetron works by acting on both centrally and peripherally to help prevent nausea and vomiting. In the brain, it blocks 5-HT₃ serotonin receptors. It also works in the digestive system by acting on the Vagus nerve. The Vagus nerve carries signals from the gastrointestinal tract to the brain, especially when the stomach is irritated. Ondansetron acts in both areas, its anti-nausea effect is thought to be mainly due to its action on the peripheral (Gut-Vagus nerve) pathway [10,11].

2 LITERATURE REVIEW

Among the various antiemetic agents available, ondansetron (a 5-HT₃ receptor antagonist) and metoclopramide (a dopamine D₂ receptor antagonist with prokinetic properties) are two commonly used medications. However, debate persists regarding which agent provides superior efficacy in the bariatric population. This literature review examines the existing evidence comparing ondansetron and metoclopramide, alone and in combination, for PONV prevention in patients undergoing sleeve gastrectomy, with particular attention to studies that support the superiority of ondansetron over metoclopramide.

Ebrahimian et al.[12] conducted a randomized clinical trial on patients undergoing bariatric surgery, comparing ondansetron, metoclopramide, granisetron, and a combination of metoclopramide and ondansetron. The combination group showed the lowest incidence of PONV at 46.1%, compared to 53.8% in the control group. Additionally, no patients in the combination group required rescue antiemetics, whereas 34% of control patients did. The authors concluded that

the combination of metoclopramide and ondansetron is recommended for reducing PONV after sleeve gastrectomy, especially when used alongside ERAS protocols. However, the study did not report whether the groups were blinded to the treatment or document specific side effects of the medications. Importantly, when examining the individual drug groups in the Ebrahimian et al. study, the incidence of nausea on the first postoperative day was higher in the metoclopramide-alone group ($n = 12$) compared to the ondansetron-alone group ($n = 10$). Similarly, vomiting on the first day occurred in 8 patients (30.7%) in the metoclopramide group versus 5 patients (19.2%) in the ondansetron group. These findings suggest that ondansetron alone may be more effective than metoclopramide alone in reducing PONV after sleeve gastrectomy.

Dabbous A et al.[13] conducted a prospective, randomized, double-blind study comparing ondansetron, droperidol, and metoclopramide for established PONV in 173 patients undergoing laparoscopic surgery. At 10 minutes after drug administration, nausea scores dropped from 8.3 to 3.7 with ondansetron, from 8.5 to 5 with droperidol, and from 8.4 to 6.7 with metoclopramide ($p < 0.05$ between groups) [2]. At 30 minutes, nausea scores were 1.3 with ondansetron, 1.7 with droperidol, and 5 with metoclopramide. The authors concluded that ondansetron was faster-acting and more effective than metoclopramide, with better patient satisfaction and less sedation than droperidol (which caused sedation in 25% of patients) [2]. However, this study included general laparoscopic surgery patients rather than specifically bariatric or sleeve gastrectomy patients, limiting its direct applicability to the population of interest in this thesis.

Mieszczański P et al. [14] conducted a scoping review of 81 randomized controlled trials on PONV prevention in laparoscopic bariatric surgery. The authors reported that PONV affects up to 80% of patients undergoing these procedures, which is significantly higher than in the general surgical population. They identified that multimodal prophylaxis — combining pharmacological interventions (including 5-HT₃ antagonists like ondansetron), opioid-sparing strategies, and regional anesthesia — is the current standard approach. The review found that while there is general consensus on multimodal prevention, debates persist regarding the optimal drug regimens. The authors also highlighted that emerging evidence supports combined pharmacological prophylaxis and innovative regional anesthesia techniques. However, as a scoping review, this paper synthesizes existing evidence rather than providing new primary data, and the authors themselves called for further research to establish bariatric-specific guidelines.

Bamgbade et al. [15] conducted a prospective observational study of 400 consecutive laparoscopic bariatric surgery patients over a 6-year period. The overall PONV incidence was 19.5%. Intraoperative multimodal antiemetic use was associated with significantly less PONV, shorter post-anesthesia care unit duration, earlier postoperative drinking, and shorter hospital stay ($p = 0.001$). Among the different multimodal regimens, dexamethasone + cyclizine + prochlorperazine provided the best prophylaxis ($p = 0.002$). The authors concluded that intraoperative multimodal antiemetic prophylaxis effectively minimizes PONV and enhances fast-track bariatric surgical care. However, this was an observational study rather than a randomized controlled trial, so confounding factors cannot be excluded, and the optimal combination (including ondansetron vs. other agents) remains unclear from this analysis.

Talebpour, M et al. [16] conducted a study on 80 patients undergoing laparoscopic gastric plication (LGP), a restrictive bariatric procedure different from sleeve gastrectomy. They compared promethazine/dexamethasone versus metoclopramide/dexamethasone for PONV prevention over 48 hours. The promethazine group had significantly lower PONV incidence (41%) compared to the metoclopramide group (97.5%) in the first 24 hours (relative risk 0.042, 95% CI 0.006-0.299). The promethazine group also had lower epigastric fullness, reflux, and reduced opioid requirements (32.1 ± 2.6 vs 68.5 ± 4.6 mg). However, promethazine caused more sedation, which reduced walking duration. The authors concluded that promethazine/dexamethasone was more effective than metoclopramide/dexamethasone for PONV prevention in LGP patients.

3 MATERIALS AND METHODS

3.1 Study Design

The study was a comparative cross sectional observational study to compare the preventive effect of Ondansetron and Metoclopramide against postoperative nausea & vomiting.

3.2 Study Settings

The study was carried out in two tertiary care health care centers in Peshawar, Pakistan:

- Peshawar Medical Center, Peshawar, Pakistan and Health Net Hospital, Peshawar, Pakistan.

3.3 Study Duration

The study was carried out for four (4) months starting from the day of formal approval of the synopsis by the institutional review boards and ethical committees.

3.4 Target Population

Patients with clinically significant obesity aged 18 to 60 years and who were scheduled for elective bariatric sleeve gastrectomy (BSL) under general anesthesia were included.

3.5 Sample Size and Calculation

Sample size was calculated with the Sample Size Calculator provided by the World Health Organization (WHO) for health studies. The calculations were done based on a 95% confidence level (critical value $Z=1.96$). Expected Prevalence (p)= 0.5 Margin of Error (e)= 0.05 (5%).

3.6 Sampling Technique

Convenience sampling was used for the selection of participants.

3.7 Selection Criteria

3.7.1 Inclusion Criteria

- Age: 18 to 60 years.
- Type: Elective gastrointestinal surgery (sleeve gastrectomy).
- Physical Status: ASA Physical Status Classification Class I, II or Class III.
- Without anesthesia: Will not be done while awake. Under anesthesia: To be performed under general anesthesia.

3.7.2 Exclusion Criteria

- Pre-existing hypersensitivity or allergy to Ondansetron, Metoclopramide or other 5-HT₃ receptor antagonists and dopamine antagonists.
- Patients with mechanical gastrointestinal obstruction, active bowel perforation or severe gastrointestinal haemorrhage.
- Severe renal impairment (e.g., estimated Glomerular Filtration Rate [eGFR] <30 mL/min/1.73m) end-stage renal disease (ESRD).
- Patients taking other medications that might interact with the study medications (such as apomorphine, SSRIs, MAOIs, or other prokinetic/dopaminergic agents).
- Patients who refused to give written informed consent.

Group O (n=50): Was administered intravenously Ondansetron 8 mg during the operation.

Group M (n=50): Intraoperatively, they received 10 mg of intravenous Metoclopramide.

3.8 Data Collection Procedure

Before data collection was started, formal ethical approval was taken from the Ethical Committee of NorthWest General Hospital, Peshawar and administrative approval was granted from the Director of Peshawar Medical Center and Health Net Hospital.

3.9 Data Analysis Procedure

The data collected were cleaned, coded and analyzed with R version 4.6.1. Tables and graphs were generated after calculation of the data.

4 RESULTS

4.1 Group O (Ondansetron Group):

Out of 50 patients in Group O, 8 (16.0%) experienced nausea during the first two hours (0–2 hr) after laparoscopic sleeve gastrectomy. The incidence of nausea decreased to 5 (10.0%) patients during the second two-hour interval (2–4 hr) and 4 (8.0%) patients during the third two-hour interval (4–6 hr).

Vomiting was observed in 5 (10.0%) patients during the first two hours after surgery, 3 (6.0%) patients during the second two-hour interval, and 1 (2.0%) patient during the third two-hour interval. These findings indicate a progressive reduction in the frequency of both nausea and vomiting over time in patients receiving ondansetron.

Table 1: Ondansetron group

Time	Nausea			Vomiting		
	Frequency	Mean	%age	Frequency	Mean	%age
After 2 hrs	8	1.00	15.3%	5	1.00	10.5%
After 4 hrs	5	1.00	10.5%	3	1.00	5.7%
After 6 hrs	4	1.00	8.6%	1	1.00	2.8%

4.2 Group M (Metoclopramide Group):

Out of 50 patients in Group M, 13 (26.0%) experienced nausea during the first two hours (0–2 hr) following laparoscopic sleeve gastrectomy. Nausea was reported in 12 (24.0%) patients during the second two-hour interval (2–4 hr) and 10 (20.0%) patients during the third two-hour interval (4–6 hr).

Vomiting occurred in 8 (16.0%) patients during the first two hours after surgery, 7 (14.0%) patients during the second two-hour interval, and 5 (10.0%) patients during the third two-hour interval. The frequency of postoperative nausea and vomiting remained higher in the metoclopramide group compared with the ondansetron group throughout the observation period.

Table 2: Metoclopramide group

Time	Nausea			Vomiting		
	Frequency	Mean	%age	Frequency	Mean	%age
After 2 hrs	13	1.00	26.6%	8	1.00	16.5%
After 4 hrs	12	1.00	23.3%	7	1.00	13.5%
After 6 hrs	10	1.00	19.4%	5	1.00	10.6%

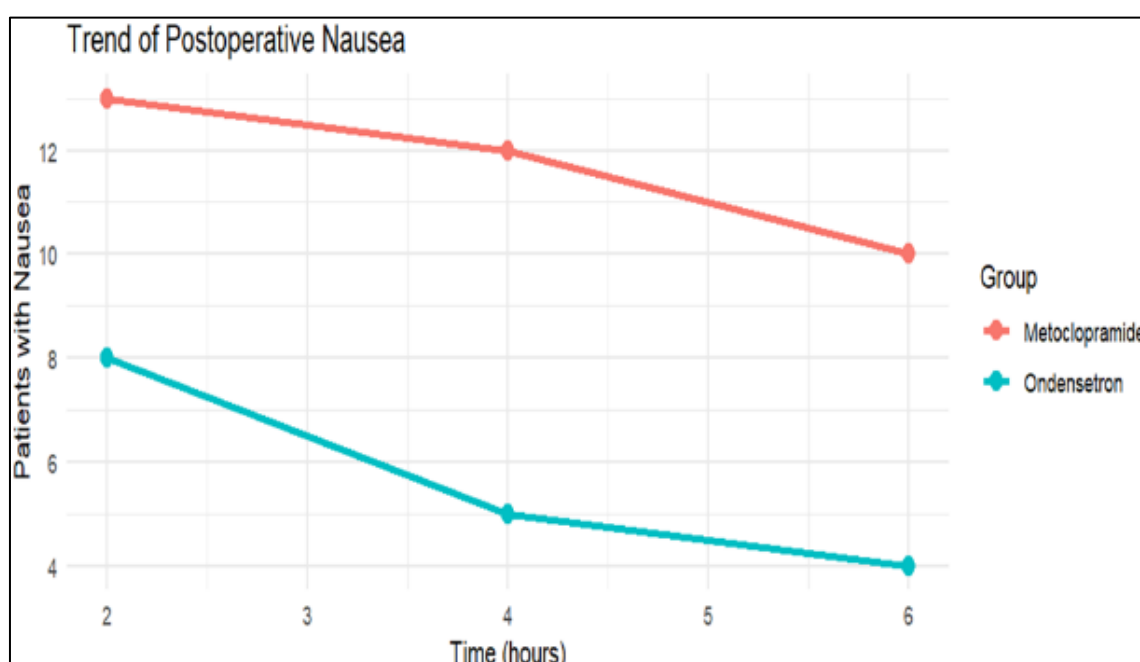


Figure 1: Trends of postoperative Nausea in both O and M groups

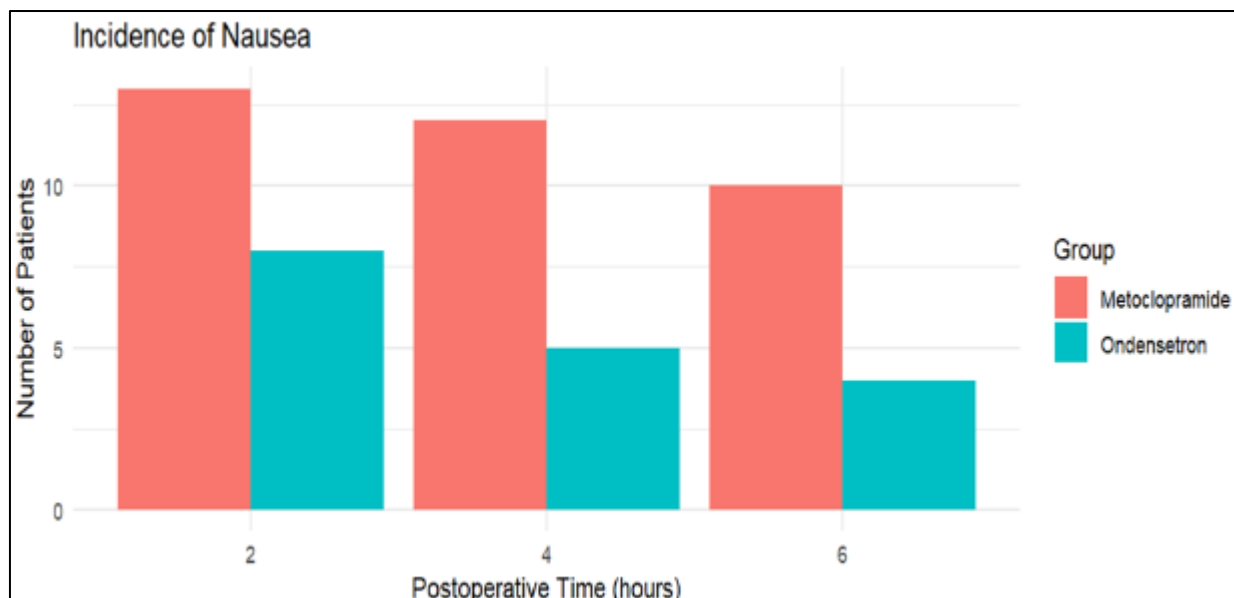


Figure 2: Incidence of Nausea in both O and M groups

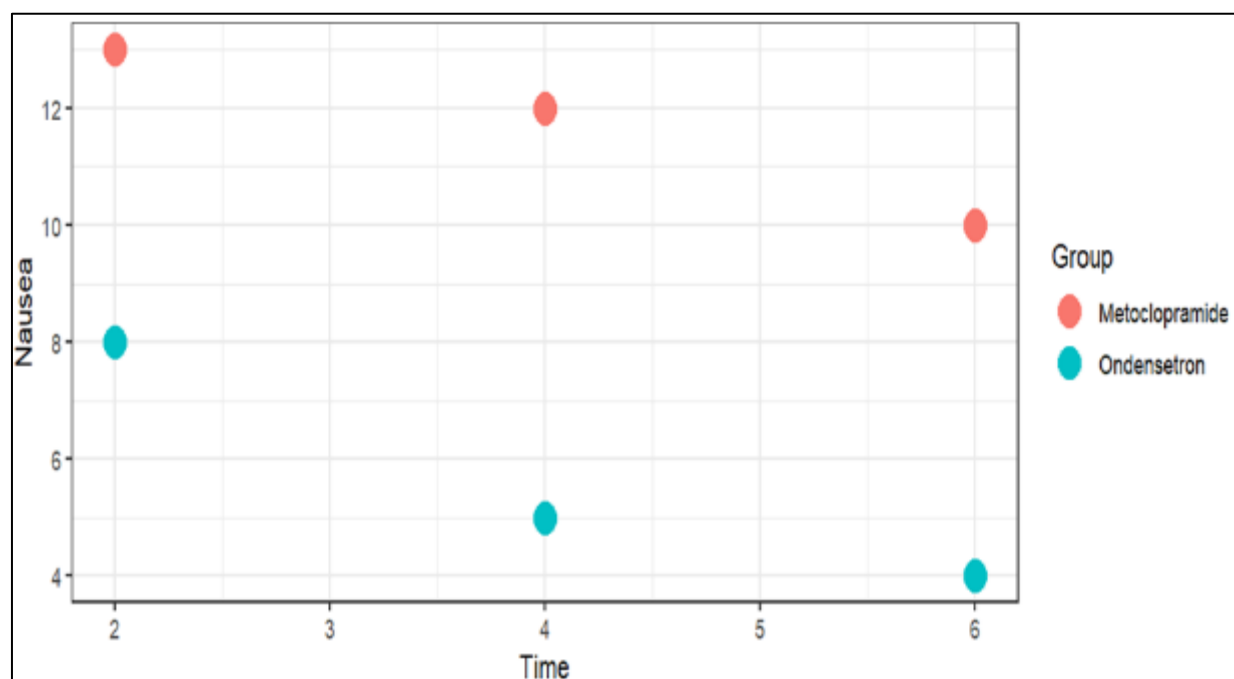


Figure 3: Incidence of Nausea in both O and M groups with time

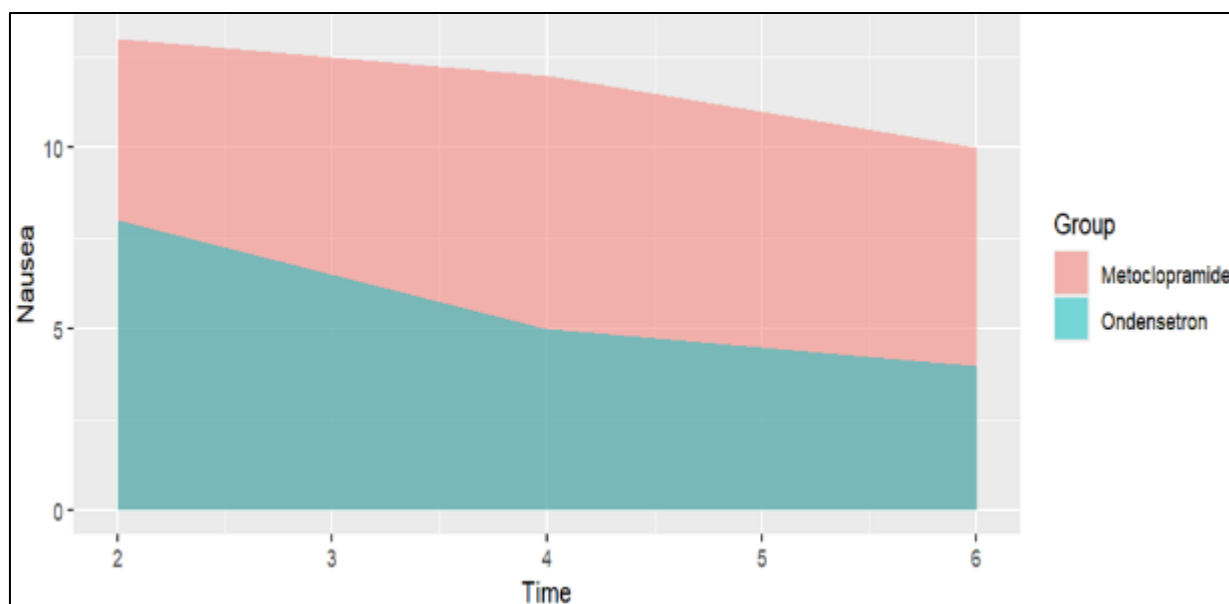


Figure 4: Trends of vomiting in both O and M groups

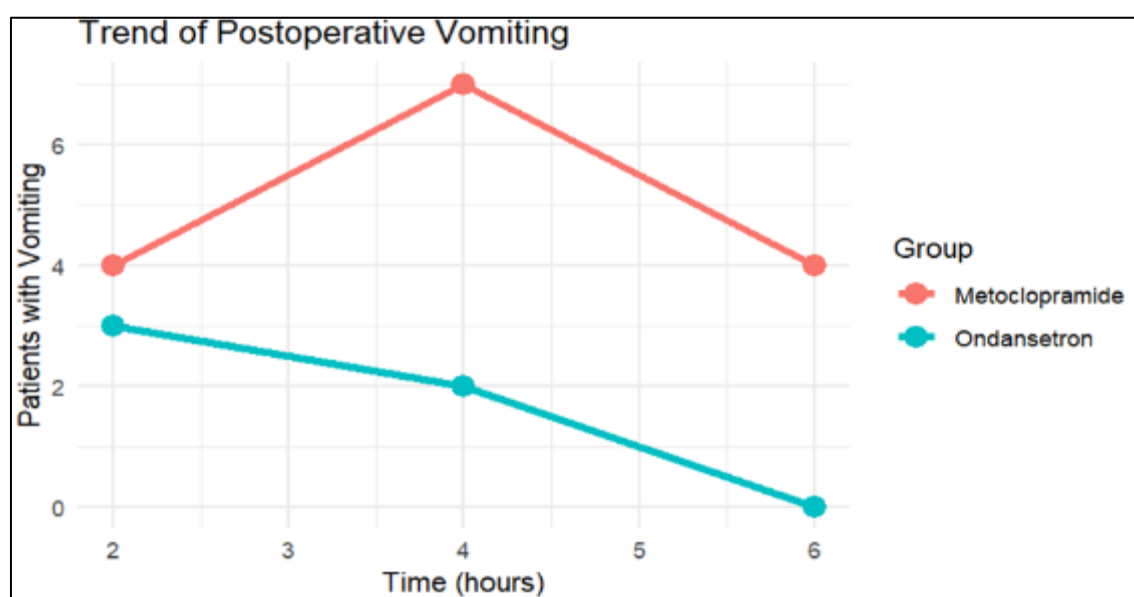


Figure 5: Trends of vomiting in both O and M groups

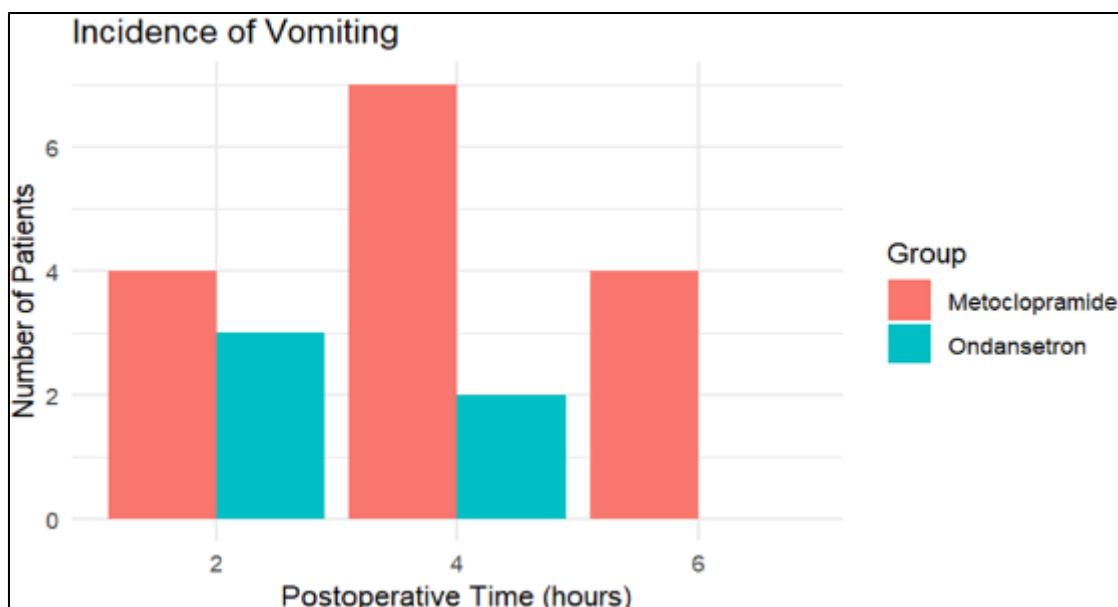


Figure 6: Incidence of vomiting in both O and M groups

5 DISCUSSION

5.1 Summary of Key Findings

The present cross-sectional study compared the efficacy of ondansetron versus metoclopramide for preventing postoperative nausea and vomiting (PONV) in 100 patients undergoing laparoscopic sleeve gastrectomy (50 patients per group). Ondansetron demonstrated consistently lower rates of both nausea and vomiting at all time points (2, 4, and 6 hours postoperatively). At 2 hours, nausea occurred in 16.0% of ondansetron recipients versus 26.0% of metoclopramide recipients. By 6 hours, nausea was present in only 8.0% of the ondansetron group compared to 20.0% of the metoclopramide group. Vomiting at 6 hours was 2.0% in the ondansetron group versus 10.0% in the metoclopramide group.

5.2 Interpretation of Findings

The superiority of ondansetron over metoclopramide can be explained by their different mechanisms of action. Ondansetron is a highly selective 5-HT₃ receptor antagonist that blocks serotonin receptors in the chemoreceptor trigger zone and vagal nerve terminals. Serotonin is a primary mediator of emesis in the postoperative period. In contrast, metoclopramide acts primarily as a dopamine D₂ antagonist, and dopamine-mediated emesis is less dominant in the postoperative setting. Additionally, the prokinetic effect of metoclopramide may paradoxically increase discomfort in the reduced gastric sleeve.

Both groups showed progressive reduction in PONV over time as anesthetic gases dissipated. However, the ondansetron group demonstrated a faster rate of improvement, particularly in the first 4 hours postoperatively.

5.3 Comparison with Existing Literature

The findings of the present study are consistent with previous research. Ebrahimian et al. [1] reported that ondansetron alone resulted in lower nausea and vomiting compared to metoclopramide alone in bariatric surgery patients. Dabbous et al. [2] found ondansetron superior to metoclopramide in general laparoscopic surgery, and the present study extends this finding to the bariatric population. Guerrero Gutierrez et al. [6] demonstrated that ondansetron-based regimens without metoclopramide had significantly lower nausea frequency ($p < 0.0001$), supporting the present study's conclusion that ondansetron alone is more effective than metoclopramide alone.

The PONV incidence in the ondansetron group (8.0% at 6 hours) is substantially lower than the 74.6% reported by El-Hag et al. [7] and the 80% cited by Mieszczański et al. [3], suggesting ondansetron may be particularly effective in this population.

5.4 Clinical Implications

These findings have several clinical implications. First, ondansetron should be preferred over metoclopramide for PONV prophylaxis in laparoscopic sleeve gastrectomy patients. Second, lower PONV rates allow for earlier mobilization, oral intake, and potentially shorter hospital stays. Third, fewer rescue antiemetic doses may offset any cost difference between the two drugs. Fourth, improved patient satisfaction is expected with lower PONV rates.

Limitations

This study has several limitations. The cross-sectional design cannot establish causality. There was no randomization, which may introduce selection bias. Patients were only followed for 12 hours, so longer-term outcomes are unknown. This was a single-center study, limiting generalizability. There was no blinding, though objective outcomes like vomiting are less susceptible to observer bias. There was no placebo group to determine absolute efficacy, and the combination of ondansetron and metoclopramide was not evaluated.

6 CONCLUSION

Summary of Findings

This cross-sectional study compared the efficacy of ondansetron versus metoclopramide for preventing postoperative nausea and vomiting (PONV) in 100 patients undergoing laparoscopic sleeve gastrectomy (50 patients per group). The ondansetron group demonstrated consistently lower rates of both nausea and vomiting at all time points (2, 4, and 6 hours postoperatively). At 2 hours, nausea occurred in 16.0% of ondansetron recipients versus 26.0% of metoclopramide recipients. At 6 hours, nausea was present in only 8.0% of the ondansetron group compared to 20.0% of the metoclopramide group. Vomiting at 6 hours was 2.0% in the ondansetron group versus 10.0% in the metoclopramide group.

Answer to the Research Question

The research question asked whether ondansetron is more effective than metoclopramide for preventing PONV after laparoscopic sleeve gastrectomy. The answer is yes. Ondansetron is more effective than metoclopramide, and the null hypothesis is rejected.

Recommendations for Future Research

Future research should include a randomized controlled trial to confirm these findings with stronger causal evidence. Studies should evaluate the combination of ondansetron and metoclopramide to determine if synergy exists. Longer follow-up (24-48 hours) is needed as late PONV may have different risk factors. Multicenter studies would improve generalizability, and cost-effectiveness analysis would guide formulary decisions.

Final Conclusion

In conclusion, ondansetron is more effective than metoclopramide for preventing postoperative nausea and vomiting after laparoscopic sleeve gastrectomy. Ondansetron should be preferred over metoclopramide for PONV prophylaxis in this patient population.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Disclosure of conflict of interest

The authors declare no conflicts of interest regarding this manuscript.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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