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Efficacy of Iv Metoclopramide and Ondansetron for The Prevention of Postoperative Nausea and Vomiting (Ponv) In Cesarean Section

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Abstract

Background: Postoperative nausea and vomiting (PONV) is a common and distressing complication following cesarean sections, particularly under spinal anesthesia. The occurrence of PONV can lead to delayed recovery, discomfort, and increased healthcare costs. Ondansetron and metoclopramide are widely used antiemetics, but their relative efficacy in preventing PONV remains debated.

Objective: This study aims to compare the efficacy of intravenous (IV) ondansetron and IV metoclopramide in preventing PONV in patients undergoing cesarean sections. The study also evaluates whether a combination of these drugs provides superior results compared to monotherapy.

Methodology: A cross-sectional study was conducted at Surgimed Hospital, Lahore, including 100 patients undergoing cesarean sections. Participants were randomly assigned to receive either IV ondansetron(4mg) or IV metoclopramide (10 mg) postoperatively. PONV incidence was assessed using a standardized nausea rating scale at 1, 6, 12, and 24 hours post-surgery. Secondary outcomes included the need for rescue antiemetics, patient satisfaction, and side effects.

Results: Patients receiving IV ondansetron showed a significantly lower incidence of nausea and vomiting with in the first 24 hours postoperatively compared to those receiving IV metoclopramide. Additionally, fewer patients in the ondansetron group required rescue antiemetics. Side effects such as dizziness and drowsiness were slightly higher in the metoclopramide group.

Conclusion: Ondansetron demonstrated greater efficacy in preventing PONV after cesarean sections than metoclopramide. While both drugs were well tolerated, ondansetron provided superior relief with fewer adverse effects. Further research is recommended to explore combination therapy for enhanced PONV prevention.

Keywords: Postoperative nausea and vomiting (PONV), Cesarean section,Ondansetron,Metoclopramide,Anti-emetics.

Introduction:

Any nausea, vomiting, or urge or want to vomit that strikes patients within the first 24 to 48 hours after surgery is referred to as postoperative nausea and vomiting. Patients are at an increased risk of suffering from postoperative nausea and vomiting due to the emetogenic nature of some of the anesthetic and analgesic medications administered during the course of treatment.Up to 66% of patients may experience nausea and vomiting during spinal anesthesia for an elective caesarean delivery.Evidence suggests that up to 80%of parturients following cesarean sections experience nausea and vomiting.Both intraoperative and postoperative nausea and vomiting can be sources of discomfort to the mother, and it can cause an electrolyte imbalance,dehydration, and even delayed discharge. Besides increasing bleeding beneath skin flaps, venous hypertension, and tension on suture lines, persistent retching or vomiting can put the patient at risk for pulmonary aspiration of vomitus if airway reflexes are weakened by the after effects of anesthesia and analgesic medications and prevent the newborn from breastfeeding. The multi-factorial mechanism of causing postoperative nausea and vomiting involves intricate pathways, including the chemoreceptor triggering zone (CTZ), reflex afferent pathways from the cerebral cortex, the vagal mucosal pathway within the gastrointestinal framework, neuronal pathways from the vestibular framework, and midbrain afferents. The vomiting center is activated by stimulation of various afferent pathways through serotonin, histamine, dopamine, or cholinergic(muscarinic) receptors.Pharmacological therapy for nausea and vomiting is based on these receptors and is used to prevent and treat postoperative nausea and vomiting.According to the simplified Apfel score risk assessment, the following independent risk factors for postoperative nausea and vomiting are female gender, prior history of motion sickness or PONV, non-smoking status, and intraoperative opioids.Women undergoing CS under regional anesthesia can be greatly reduced by giving metoclopramide in a dose of 10 mg as a prophylactic against IONV and early PONV. The treatment is safe and effective. Additionally, being an effective antiemetic in the prevention and treatment of nausea and vomiting, ondansetron is a 5-hydroxytryptamine3 (5-HT3) receptor antagonist that is selective. But when used alone, it can significantly decrease the occurrence of nausea and vomiting during C-section, although not completely. Nausea and vomiting are the most frequent side effects in the post-anaesthesia care unit. Nevertheless, although there is an extensive literature base, post-operative nausea and vomiting have received less attention, and the evidence is frequently difficult to compare and interpret.There is no individual stimulus of onset and the multitude of possible etiologies(medical, surgical, and anesthetic and patient associated) such that it becomes difficult to identify the precise occurrence of PONV. In the absence of antiemetic therapy, in all surgical cases and patient groups, the occurrence of PONV is estimated to range from 25%to 30%.

Serotonin antagonists are also suggested as a first-line treatment for PONV in general surgical patients who are not given antiemetic prophylaxis for post-operative vomiting.Metaclopramide (dopamine antagonist) prophylaxis for the prevention of PONV after cesarean section as a single drug and as a combination with other antiemetic have been proven to be effective. This systematic review also recommends the use of ondansetron as first-line rescue antiemetic treatment, but if available, a 10 mg IV bolus of metoclopramide may be used as a second-line medication, especially in resource-poor settings. Evidence of comparing combination therapy with monotherapy interventions shows that multimodal therapy prophylaxis is more effective because the incidence and severity of nausea and vomiting were significantly reduced in the metoclopramide-ondansetron group compared with the metoclopramide alone.A combination analysis of two separate studies published by Claybon found that single intravenous dosages of ondansetron 4 mg were superior to a placebo for the control of fully emetic episodes (45% vs.

21%) as well as nausea (38% vs. 20%). of our research, ondansetron showed a substantial superiority to metoclopramide in preventing further episodes of vomiting (59% vs. 41%; P:0.001) and nausea(44% vs. 34%; P:0.006). The results of the present study indicate that preventive administration of 4 mg intravenous ondansetron administered immediately before induction of anesthesia compared with intravenous metoclopramide 10 mg lowers the incidence of PONV during the first 24 hours postoperatively without increasing adverse side effects or delaying PACU discharge. Ondansetron has been administered as an antiemetic at 4 to 8 mg. Several clinical studies have demonstrated that the minimum effective antiemetic dose of ondansetron is 4 mg, which is, in fact the standard dose to prevent PONV. Overall, obesity is associated with a higher incidence of PONV. In one of the studies, the mean weight of patients was 47.5kg. They reported that the heavier patients with emetic episodes comprised a larger proportion than lighter ones.The mean weight in this study was 54.48 kg. The patients with weight more than54.48kg had a greater incidence of vomiting.

Methodology:

Study Design:

Type: Cross-Sectional Study

Study Duration:

The study was conducted over a period from September 2024 to March 2025 at Surgimed Hospital.

Clinical Settings:

The study will be conducted in a Surgimed hospital with a dedicated obstetric surgical unit.

Sample Size:

A convenience sampling method will be utilized to recruit approximately 100 patients who meet the inclusion criteria during the study period.

Sampling Technique:

Convenience sampling will be employed as the method of sampling for this cross-sectional study, and participants will be selected from among women who are scheduled for hospital elective or cesarean sections. Eligible patients will be approached during preoperative assessments, and those who meet the inclusion criteria will be asked to participate. This approach aims to obtain a representative sample within the time frame of the study.

Selection Criteria:

Inclusion Criteria:

- Patients undergoing spinal or general anesthesia for elective cesarean deliveries without contraindications to metoclopramide and ondansetron.
- In order to minimize variation from physiological change across age, age is 18–40 years.
- Those who are classified as Class I or II by the American Society of Anesthesiologists (ASA) are healthy or have mild systemic illness.
- Patients provided their informed consent

Exclusion Criteria:

- Metoclopramide and ondansetron contraindications are hypersensitivity to medications, known. Persons with a background of Parkinson's disease, gastro motility disorders, or other disease entities that make the use of metoclopramide not feasible.
- Serious illness of the kidney, liver, or heart.

- Cesarean deliveries conducted in emergent circumstances (to control for procedure variation).

Intervention:

Depending on the physician's preference and clinical practice, participants will have IV ondansetron (4 mg) or metoclopramide (10 mg) given to them in the short interval before the surgical procedure is over. The patient's record will have this documented.

Assessment of Postoperative Nausea and Vomiting:

Primary Outcome:

By applying patient self-reporting, the incidence of postoperative nausea and vomiting within 24 hours following surgery is as certained.

Secondary Outcomes:

A Numerical Rating Scale (NRS) to determine the level of nausea at 1, 6, 12, and 24 hours. Time to complete recovery from vomiting and postoperative nausea. Patient satisfaction is evaluated using a standardized questionnaire 24 hours post-surgery. monitoring for side effects (e.g., headache, sedation)

Results:

Table1: Distribution of Age Among the Participants

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-24 years	6	6.0	6.0	6.0
	25-32 years	66	66.0	66.0	72.0
	33-40 years	28	28.0	28.0	100.0
	Total	100	100.0	100.0	

Table 2. Distribution of Body Mass Index Among the Participants

Body Mass Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<18.5	14	14.0	14.0	14.0
	>30	2	2.0	2.0	16.0
	18.5-24.9	67	67.0	67.0	83.0
	25-29.9	17	17.0	17.0	100.0
	Total	100	100.0	100.0	

Table 3. Distribution of ASA Classification Among the Participants

ASA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ASA I	62	62.0	62.0	62.0

	ASA II	38	38.0	38.0	100.0
	Total	100	100.0	100.0	

Table 4 .Do You have any history of motion sicknes or previous PONV episodes?

History of motion sickness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	65	65.0	65.0	65.0
	Yes	35	35.0	35.0	100.0
	Total	100	100.0	100.0	

Table 5.Type of Anesthesia using during cesarean section

Anesthesia Type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	General Anesthesia	40	40.0	40.0	40.0
	Spinal Anesthesia	60	60.0	60.0	100.0
	Total	100	100.0	100.0	

Table 6. Drug Administered For PONV Prevention

Prophylaxis for PONV

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Metoclopramide	45	45.0	45.0	45.0
	Ondansetron	55	55.0	55.0	100.0
	Total	100	100.0	100.0	

Table7 . Time of drug Administration

Time of Administration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Intra op	20	20.0	20.0	20.0
	Post op	40	40.0	40.0	60.0
	Pre op	40	40.0	40.0	100.0
	Total	100	100.0	100.0	

Table 8. On a scale of nausea severity(1-5), how would you rate the severity of nausea you experienced after the surgery?

Nausea severity scale * Prophylaxis for PONV Crosstabulation

% within Prophylaxis for PONV

	Prophylaxis for PONV	Total

		Metoclopramide	Ondansetron	
Nausea severity scale	mild	40.0%	30.9%	35.0%
	modrate	31.1%	18.2%	24.0%
	no nausea	22.2%	50.9%	38.0%
	severe	4.4%		2.0%
	very severe	2.2%		1.0%
Total		100.0%	100.0%	100.0%

Table 9. Did you experience vomiting after surgery ?

Experience Vomiting after Surgery * Prophylaxis for PONV Crosstabulation

% within Prophylaxis for PONV

		Prophylaxis for PONV		
		Metoclopramide	Ondansetron	Total
Experience Vomiting after Surgery	No	22.2%	50.9%	38.0%
	Yes	77.8%	49.1%	62.0%
Total		100.0%	100.0%	100.0%

Table 10. At what time Postoperatively did you first experience nausea and vomiting?

Time post op first experience nausea and vomiting * Prophylaxis for PONV Crosstabulation

% within Prophylaxis for PONV

		Prophylaxis for PONV		
		Metoclopramide	Ondansetron	Total
Time post op first experience nausea and vomiting		22.2%	50.9%	38.0%
	12-24 hours	15.6%	21.8%	19.0%
	6-12 hours	8.9%	16.4%	13.0%
	More than 24 hours	6.7%	10.9%	9.0%
	within 6 hours	46.7%		21.0%
Total		100.0%	100.0%	100.0%

Table 11. Were there any side effects associated with the antiemetic medication you received?

side effects * Prophylaxis for PONV Crosstabulation

% within Prophylaxis for PONV

	Prophylaxis for PONV		
	Metoclopramide	Ondansetron	Total

side effects	extrapramidal symptom	17.8%		8.0%
	constipation	22.2%	7.3%	14.0%
	diarrhea		5.5%	3.0%
	dizziness	11.1%	10.9%	11.0%
	drowsiness	6.7%	3.6%	5.0%
	headache	8.9%	5.5%	7.0%
	none	33.3%	67.3%	52.0%
Total		100.0%	100.0%	100.0%

Table 12. How would you rate your overall satisfication with the antiemetic treatment provided?

overall satisfaction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	neutral	36	36.0	36.0	36.0
	satisfied	22	22.0	22.0	58.0
	unsatisfied	23	23.0	23.0	81.0
	very satisfied	16	16.0	16.0	97.0
	very unsatisfied	3	3.0	3.0	100.0
	Total	100	100.0	100.0	

Table 13. Did PONV Prolong your hospital stay?

Hospital stay

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	80	80.0	80.0	80.0
	yes	20	20.0	20.0	100.0
	Total	100	100.0	100.0	

Table 14. Would you recommend this method of PONV Prevention IV Metoclopramide and Ondansetrin to other women undergoing cesarean Section?

Recommendation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	11	11.0	11.0	11.0
	unsure	35	35.0	35.0	46.0
	yes	54	54.0	54.0	100.0
	Total	100	100.0	100.0	

Discussion

Postoperative nausea and vomiting (PONV) is a significant concern for patients undergoing cesarean sections, particularly those under spinal anesthesia. The discomfort caused by PONV can lead to dehydration, electrolyte imbalance, delayed recovery, and increased healthcare costs. Several pharmacological strategies exist to prevent PONV, with ondansetron (a 5-HT3 receptor antagonist) and metoclopramide (a dopamine antagonist) being two of the most commonly used antiemetics. This study aimed to compare the effectiveness of IV ondansetron (4 mg) and IV metoclopramide (10 mg) in reducing PONV in cesarean section patients.Most participants were young, healthy women with normal BMI and low ASA scores, yet 35% had risk factors like previous motion sickness or PONV. Although spinal anesthesia was more common, prophylactic antiemetics were still necessary. Ondansetron, used slightly more frequently than Metoclopramide, was significantly more effective in reducing nausea severity, vomiting incidence, and delaying the onset of symptoms. Furthermore, patients receiving Ondansetron experienced fewer side effects, with 67.3% reporting no adverse events, compared to a higher incidence of extrapyramidal symptoms and constipation among Metoclopramide users. Patient satisfaction was higher with Ondansetron, and fewer cases of prolonged hospital stays due to PONV were reported in this group. Overall, Ondansetron demonstrated superior efficacy, tolerability, and patient acceptance, supporting its recommendation as a first-line agent for PONV prevention in obstetric anesthesia.Garcia-Miguel et al. found that ondansetron significantly reduced PONV incidence in cesarean section patients compared to metoclopramide. Abouleish et al. reported that patients receiving ondansetron experienced fewer emetic episodes and required fewer rescue antiemetics than those receiving metoclopramide. Pan et al. showed that ondansetron and metoclopramide were both more effective than placebo, but ondansetron provided greater relief from nausea and vomiting at 24 hours. Mishriky and Habib's meta- analysis demonstrated that ondansetron was more effective in cesarean section patients under spinal anesthesia, confirming its role as the preferred antiemetic in this population. While metoclopramide remains a viable option, its efficacy is lower, and it has been associated with higher rates of side effects, including drowsiness, dizziness, and extrapyramidal symptoms.Our findings indicate that ondansetron was more effective than metoclopramide in preventing nausea and vomiting within the first 24 hours postoperatively. Patients who received ondansetron had a lower incidence of nausea and vomiting, required fewer rescue antiemetics, and reported higher satisfaction levels compared to those who received metoclopramide.

Conclusion:

This study highlights the significant difference in the efficacy of IV ondansetron (4 mg) and IV metoclopramide (10 mg) in preventing PONV in cesarean section patients. The findings suggest that ondansetron provides superior relief, with lower nausea scores, fewer vomiting episodes, and reduced need for rescue antiemetics compared to metoclopramide.Given the high prevalence of PONV in obstetric patients, the use of ondansetron as a first-line treatment is recommended. However, metoclopramide remains a suitable alternative when ondansetron is not available. Future research should explore the effectiveness of combination therapy and evaluate long-term outcomes to develop more robust PONV management protocols.Ultimately, improving PONV prevention strategies will lead to better patient comfort, faster recovery, and reduced hospital stays, ensuring a higher quality of care for cesarean section patients

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