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Original Research Article

Comparison of Ondansetron and Metoclopramide for Prevention of Nausea and Vomiting in Elective Caesarean Section Under Spinal Anesthesia

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Abstract: *Postoperative nausea and vomiting (PONV) are common complications following cesarean section performed under spinal anesthesia and can negatively affect maternal comfort, recovery, and satisfaction. Antiemetic prophylaxis is routinely administered to reduce the incidence of PONV. Both ondansetron and metoclopramide are widely used; however, comparative evidence regarding their effectiveness in obstetric patients remains limited.* ***Objective:*** *To compare the efficacy of ondansetron and metoclopramide in preventing postoperative nausea and vomiting in patients undergoing elective cesarean section under spinal anesthesia.* ***Methods:*** *This comparative study was conducted in the Department of Anesthesia at Hayatabad Medical Complex from August 9, 2024, to February 9, 2025. A total of 268 patients undergoing elective cesarean section under spinal anesthesia were enrolled and non-randomly allocated into two equal groups. Group A received intravenous ondansetron at a dose of 0.15 mg/kg, while Group B received intravenous metoclopramide at a dose of 0.25 mg/kg. The incidence of postoperative nausea and vomiting was assessed during the first 60 minutes following administration of spinal anesthesia. Data were analyzed using SPSS version 27. Comparisons between groups were performed using the chi-square test, with a p-value ≤0.05 considered statistically significant.* ***Results:*** *A total of 268 patients were included, with 134 patients in each group. Postoperative nausea occurred in 19 (14.2%) patients receiving ondansetron compared with 33 (24.6%) patients receiving metoclopramide (p = 0.03). Similarly, postoperative vomiting was observed in 16 (11.9%) patients in the ondansetron group and 30 (22.4%) patients in the metoclopramide group (p = 0.02). Subgroup analysis demonstrated that the antiemetic benefit of ondansetron was particularly pronounced among younger patients aged 18–24 years.* ***Conclusion:*** *Ondansetron was significantly more effective than metoclopramide in reducing the incidence of postoperative nausea and vomiting following elective cesarean section under spinal anesthesia. These findings support the preferential use of ondansetron as a prophylactic antiemetic in obstetric patients undergoing cesarean delivery.*

Keywords: Ondansetron, Metoclopramide, Postoperative Nausea and Vomiting, Caesarean Section, Spinal Anesthesia

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Introduction

Postoperative nausea and vomiting (PONV) is a distressing and frequently encountered occurrence following surgical treatments. Nausea is the sensation of an inclination to vomit, while vomiting is the regurgitation of the contents of the stomach (1, 2). Nausea and vomiting are complex phenomena influenced by multiple risk factors. Key determinants of PONV include being female, not smoking, and advanced age (3, 4). PONV is one of the most prevalent complaints in females who have a lower segment cesarean section (C-Section) under spinal anesthesia. Elective caesarean section under spinal anesthesia is a common procedure in modern obstetric practice, chosen for various medical, obstetric, and personal reasons (5, 6). Spinal anesthesia is favored for elective C sections due to its rapid onset, high success rate, and lower risk of complications compared to general anesthesia (6, 7). A study enrolled women who underwent a C-section. Prevention of nausea was achieved in 28% of the ondansetron group and 14% of the metoclopramide group, and prevention of vomiting was achieved in 22% of the ondansetron group and 8% of the metoclopramide group (8). Antiemetic medications are effective in preventing nausea and vomiting. Metoclopramide has been utilized as an antiemetic for a significant period of time and has been regarded as the most potent standalone medication. Ondansetron has been demonstrated to be beneficial in treating PONV. Several medications have been tested, but none are entirely effective. Recently, the central 5HT3 antagonists have shown promise in achieving the aims, surpassing those previously employed (9-11). Beyond immediate distress, PONV carries risks of serious complications like wound dehiscence, pulmonary aspiration, and dehydration. These issues can prolong hospitalization, cause unplanned readmissions, and drive up healthcare costs (12, 13). Ondansetron and metoclopramide represent two distinct pharmacological approaches in managing PONV. Evidence comparing their relative efficacy and safety in preventing intraoperative and PONV in parturients undergoing elective C-section under spinal anesthesia remains inconsistent. Therefore, this study aims to compare the effectiveness of ondansetron and metoclopramide for PONC in this clinical setting to identify the more suitable agent for optimizing maternal comfort and perioperative outcomes.

Methodology

This comparative study was conducted in the Department of Anesthesia at Hayatabad Medical Complex, Peshawar, with requisite ethical approval (Ref#1976). We calculated a sample size of 268 patients using the WHO sample size calculator, based on anticipated frequencies of 28% (8) for the prevention of nausea with ondansetron and 14% (8) with metoclopramide, with 80% power and a 95% confidence level. Participants were selected using a consecutive non-probability sampling technique. Patients selected for this study were women 18 to 30 years old, scheduled for an elective caesarean section defined as a planned surgical delivery performed before the onset of labor without immediate medical necessity. The procedure was conducted under spinal anesthesia, which involved the injection of a local anesthetic agent into the subarachnoid space to achieve temporary numbness and paralysis of the lower body, making sure that the patient experiences no pain during the procedure. Several exclusion criteria were applied, including women with known coagulation disorders, a history of cardiac, respiratory, renal, or hepatic failure, a history of motion sickness, diagnosed psychological disorders, or an allergy to the study medications. Consent was taken from the

patients. Eligible participants were then non-randomly allocated to one of two equal groups. Patients assigned to Group A received an intravenous dose of Ondansetron at 0.15 mg/kg. Patients in Group B were administered an intravenous dose of Metoclopramide at 0.25 mg/kg. Postoperative nausea and vomiting were assessed. Postoperative nausea was characterized as the unpleasant sensation of the need to vomit occurring within 60 minutes following the administration of the treatment. Postoperative vomiting was defined as the forceful expulsion of stomach contents through the mouth within the same 60-minute window. All clinical assessments were conducted under the direct supervision of a consultant with five years of post-fellowship experience. A predesigned pro forma was used to document all information. SPSS 27 was used for statistical analysis. Age and BMI were presented using the mean and standard deviation. Other qualitative demographic variables, along with hypertension, diabetes, and PONV, were expressed as frequency and percentages. We used the chi-square test to compare both groups for PONV; we kept the P value significant at ≤ 0.05.

Results

In this study, 268 participants were enrolled and evenly distributed into two treatment groups, with 134 cases in each. The average age of participants in Group A was 23.93 ± 4.11 years while in Group B it was 24.05 ± 3.93 years. The prevalence of pre-existing medical conditions was low as we observed that hypertension was present in 4.5% (n=6) cases of Group A and 3.7% (n=5) cases of Group B, while diabetes was found in 3.0% (n=4) and 2.2% (n=3) cases of the groups, respectively (Table 1).
In the ondansetron group, 14.2% (n=19) of participants experienced postoperative nausea, which was lower than the 24.6% (n=33) observed in the metoclopramide group (P = 0.03). Similarly, the incidence of postoperative vomiting was 11.9% (n=16) in the ondansetron group compared to 22.4% (n=30) in the metoclopramide group, a difference that was also potentially significant (P = 0.02) (Table 2). In group A, 18 (24.3%) patients belonging to the 18 to 24 years age bracket experienced post-op nausea, while 28 (41.2%) patients in group B (P = 0.03). Vomiting was experienced by 11 (14.9%) patients in the age bracket of 18 to 24 years in group A and 25 (36.8%) in group B (P = 0.003) (Table 3).

Table 1: Demographics

Demographics		**Groups**			
		Group A (Ondansetron)		**Group B (Metoclopramide)**	
		n	%	n	%
Occupation status	Employed	46	34.3%	59	44.0%
	Unemployed	88	65.7%	75	56.0%
Education status	Educated	62	46.3%	57	42.5%
	Uneducated	72	53.7%	77	57.5%
Socioeconomic status	Lower class	44	32.8%	31	23.1%
	Middle class	75	56.0%	85	63.4%
	Higher class	15	11.2%	18	13.4%
Residence	Urban	52	38.8%	55	41.0%
	Rural	82	61.2%	79	59.0%
Hypertension	Yes	6	4.5%	5	3.7%
	No	128	95.5%	129	96.3%
Diabetes	Yes	4	3.0%	3	2.2%
	No	130	97.0%	131	97.8%
Mean			SD	Mean	SD
Age (Years)		23.93	4.111	24.05	3.932
BMI (Kg/m^2)		24.4198	1.71377	24.4061	1.69851

Table 2: Comparison of PONV in both groups

PONV		**Groups**				**P value**
		Group A (Ondansetron)		**Group B (Metoclopramide)**		
		n	**%**	**n**	**%**	
Postop nausea	Yes	19	14.2%	33	24.6%	0.03
	No	115	85.8%	101	75.4%	
Postop vomiting	Yes	16	11.9%	30	22.4%	0.02
	No	118	88.1%	104	77.6%	

Table 3: Association of PONV with age in both groups

Vaiable				**Groups**				**P value**
				Group A (Ondansetron)		**Group B (Metoclopramide)**		
				n	%	n	%	
Age groups (Years)	18 to 24	Postop nausea	Yes	18	24.3%	28	41.2%	0.03
			No	56	75.7%	40	58.8%	
		Postop vomiting	Yes	11	14.9%	25	36.8%	0.003
			No	63	85.1%	43	63.2%	
	25 to 30	Postop nausea	Yes	1	1.7%	5	7.6%	0.02
			No	59	98.3%	61	92.4%	
		Postop vomiting	Yes	5	8.3%	5	7.6%	0.87
			No	55	91.7%	61	92.4%	

Discussion

Our results demonstrated a clear and statistically significant superiority of ondansetron in minimizing the disturbing symptoms of PONV. Specifically, the incidence of postoperative nausea was 14.2% in the ondansetron group compared to 24.6% in the metoclopramide group. A similar reduction was observed for vomiting with rates of 11.9% and 22.4% in the ondansetron and metoclopramide groups, respectively.

Based on the demographic data of our study cohort, the mean age of our participants was approximately 24 years, with a mean BMI of around 24.4 kg/m². This profile shows similarity to Vasantha et al. and Hendre & Bhale, who reported mean ages of 24.9 to 26.5 years and weights corresponding to a similar BMI range (14, 15). This demographic consistency is crucial as it suggests that our findings apply to a typical obstetric population undergoing this procedure. Furthermore, our study provided a detailed sociodemographic breakdown revealing a predominantly middle-class, rural population with a high proportion of unemployed and uneducated participants. The study by Qadeer et al. also reported on socioeconomic status, noting that a majority of patients were middle class (16). The prevalence of comorbidities such as hypertension and diabetes was low in our cohort (less than 5%), consistent with the standard inclusion criteria for ASA I/II patients used across all referenced studies, thereby ensuring a relatively healthy population and minimizing confounding effects (15, 16).

The core finding of our research was the superior performance of ondansetron, which aligns with Vasantha Kumar et al., who reported a nausea incidence of 62% with metoclopramide versus 36% with ondansetron at 1 hour postoperatively (14). Hendre et al. reported that 62% of their metoclopramide group experienced nausea within the first hour, compared to 36% in the ondansetron group, a disparity that widened further at the two-hour mark (15). Similar findings were reported by Qadeer et al., who found that the ondansetron group showed remarkable efficacy, with a higher rate of absence of PONV, compared to the metoclopramide group (16). Riaz et al. in their study compared both treatment groups in women after laparoscopic cholecystectomy, and they found that ondansetron was better in reducing the incidence of PONV (17). Shahid et al. compared ondansetron with dexamethasone and found that ondansetron resulted in a notable reduction in PONV compared with dexamethasone, further affirming our findings (18). Similar findings regarding the superiority of ondansetron have been reported in various studies (19, 20).

Our results show incidences of 24.6% and 14.2% for nausea, while numerically lower, follow the same pattern of a significant advantage for ondansetron. This consistent trend across different study populations and geographical settings underscores the reliability of ondansetron as a more effective prophylactic agent. Studies have also shown that ondansetron can notably reduce the incidence of hypotension (20).

Beyond the direct comparison of the two drugs, the systematic review by Hailu et al. provides a broader context for our findings. Their review, which synthesized evidence from multiple studies, strongly advocated a multimodal approach to PONV prophylaxis, especially in high-risk settings such as cesarean sections. They concluded that combinations of antiemetics such as ondansetron with dexamethasone or metoclopramide were more effective than monotherapy (22).

Based on our findings and their consistency with the aforementioned studies, we suggest that ondansetron should be considered the first-line prophylactic antiemetic for women undergoing elective caesarean section under spinal anaesthesia. Our study has certain limitations. As a single-center study, the generalizability of our findings to other settings with different patient demographics or clinical practices may be limited. The study was not designed to evaluate the combined effects of antiemetic therapy, which appears to be a promising strategy. Furthermore, we did not assess the impact of other potential confounding variables such as the dose of intrathecal opioids or the administration of oxytocin, both of which are known to influence the incidence of PONV.

Conclusion

From our study, we conclude that ondansetron was associated with a significantly lower incidence of PONV than metoclopramide in elective CS under spinal anesthesia. Future studies shall compare the combination therapy of both drugs to assess the synergetic effect of these drugs.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (Ref#1976)

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared no conflict of interest.

Author Contribution

SJ (Postgraduate Resident)

Contributed to study design, data collection, and initial manuscript drafting; assisted in data acquisition, literature review, and manuscript editing. Performed statistical analysis and contributed to the interpretation of results

AFQ (Professor)

Contributed to patient recruitment, data entry and results compilation Assisted in referencing, proofreading, and final revisions of the manuscript, Supervised the research, coordinated among authors, finalized the manuscript, and approved the final version

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the study's integrity.

References

1. Amirshahi M, Behnamfar N, Badakhsh M, Rafiemanesh H, Keikhaie KR, Sheyback M, et al. Prevalence of postoperative nausea and vomiting: a systematic review and meta-analysis. Saudi J Anaesth. 2020;14(1):48-56. https://doi.org/10.4103/sja.SJA_401_19
2. Rajan N, Joshi GP. Management of postoperative nausea and vomiting in adults: current controversies. Curr Opin Anaesthesiol. 2021;34(6):695-702. https://doi.org/10.1097/ACO.0000000000001063
3. Qian Y, Zhu JK, Hou BL, Sun YE, Gu XP, Ma ZL. Risk factors of postoperative nausea and vomiting following ambulatory surgery: a retrospective case-control study. Heliyon. 2022;8(12):e12430. https://doi.org/10.1016/j.heliyon.2022.e12430
4. Darvall JN, Handscombe M, Maat B, So K, Suganthirakumar A, Leslie K. Interpretation of the four risk factors for postoperative nausea and vomiting in the Apfel simplified risk score: an analysis of published studies. Can J Anaesth. 2021;68(7):1057-1063. https://doi.org/10.1007/s12630-021-01974-8
5. Emadi SA, Gholipour Baradari A, Khademloo M, Abotorabi M, Hassanzadeh Kiabi F. Evaluating patients' choice of general and spinal anesthesia for elective cesarean section and associated factors: a descriptive study. Ann Med Surg (Lond). 2023;85(1):6-12. https://doi.org/10.1097/MS9.0000000000000010
6. Yu C, Gu J, Liao Z, Feng S. Prediction of spinal anesthesia-induced hypotension during elective cesarean section: a systematic review of prospective observational studies. Int J Obstet Anesth. 2021;47:103175. https://doi.org/10.1016/j.ijoa.2021.103175

7. Bjornestad EE, Haney M. An obstetric anesthetist: a key to successful conversion of epidural analgesia to surgical anesthesia for cesarean delivery? Acta Anaesthesiol Scand. 2020;64(2):142-144. https://doi.org/10.1111/aas.13493
8. Kothari A, Shah P, Patel U. Preoperative ondansetron versus metoclopramide for prevention of nausea and vomiting in elective lower segment caesarean section under spinal anaesthesia. Int J Sci Res. 2021;10(7):24-25. https://doi.org/10.36106/ijsr/5229143
9. Ebrahimian M, Mirhashemi SH, Oshidari B, Zamani A, Shadidi-Asil R, Kialashaki M, et al. Effects of ondansetron, metoclopramide, and granisetron on perioperative nausea and vomiting in patients undergoing bariatric surgery: a randomized clinical trial. Surg Endosc. 2023;37(6):4495-4504. https://doi.org/10.1007/s00464-023-09939-2
10. Liu R, Bi R, Zhang J, Li X, Tian B, Yan W. Promethazine combined with metoclopramide for the prevention of postoperative nausea and vomiting in patients undergoing laparoscopic colorectal cancer surgery: a randomized controlled trial. Drug Des Devel Ther. 2025;19:9029-9039. https://doi.org/10.2147/DDDT.S526724
11. Singha D, Thakur A, Nazar MF, Singh J, Bhandari S, Sood P. Comparative study of palonosetron with metoclopramide and ondansetron in prevention of PONV in laparoscopic cholecystectomy: a randomized controlled trial. Int J Med Anesth. 2021;4(3):122-127. https://doi.org/10.33545/26643766.2021.v4.i3b.292
12. Gan TJ, Belani KG, Bergese S, Chung F, Diemunsch P, Habib AS, et al. Fourth consensus guidelines for the management of postoperative nausea and vomiting. Anesth Analg. 2020;131(2):411-448. https://doi.org/10.1213/ANE.0000000000004833
13. Gress K, Urits I, Viswanath O, Urman RD. Clinical and economic burden of postoperative nausea and vomiting: analysis of existing cost data. Best Pract Res Clin Anaesthesiol. 2020;34(4):681-686. https://doi.org/10.1016/j.bpa.2020.07.003
14. Vasantha Kumar J, Shivanand PT, Ravi R. Pre-operative ondansetron vs metoclopramide for prevention of post-operative nausea and vomiting in elective lower-segment caesarean section under spinal anaesthesia. Int J Res Med Sci. 2014;2(1):175-179. https://doi.org/10.5455/2320-6012.ijrms20140234
15. Hendre A, Bhale R. Comparison of ondansetron and metoclopramide for prevention of nausea and vomiting in elective LSCS under spinal anesthesia. Int J Pharm Clin Res [Internet]. 2021 [cited 2025 Oct 27];13(5):208-214. Available from: https://impactfactor.org/PDF/IJPCR/13/IJPCR,Vol13,Issue5,Article31.pdf
16. Qadeer MK, Wadood R, Hameed J. Comparison of oral ondansetron and metoclopramide in reducing postoperative nausea and vomiting in gynecological laparoscopic procedures. Indus J Biosci Res. 2025;3(4):646-651. https://doi.org/10.70749/ijbr.v3i4.998
17. Riaz MM, Shah SQA, Khan TA, Tariq W, Husnain F, Bhatty QA. Comparison of ondansetron and metoclopramide on reducing nausea and vomiting after laparoscopic cholecystectomy in females. Pak Armed Forces Med J. 2024;74(4):1165-1168. https://doi.org/10.51253/pafmj.v74i4.9111
18. Shahid N, Jamshed S, Khan F, Rasheed AM, Ali A, Anwar A. Comparing the effectiveness of ondansetron and dexamethasone on nausea/vomiting in cesarean section under spinal anesthesia. Pak J Med Dent. 2022;11(2):9-14. https://doi.org/10.36283/PJMD11-2/003
19. Dutta D, Mishra N, Ghosh S. A comparative study between ondansetron, dexamethasone, and propofol for prevention of intraoperative nausea and vomiting in patients undergoing cesarean section under spinal anesthesia. J Med Sci Clin Res. 2019;7(7):327-333. https://doi.org/10.18535/jmscr/v7i7.61
20. Hou XM, Chen YJ, Lai L, Liu K, Shen QH. Ondansetron reduces the incidence of hypotension after spinal anesthesia: a systematic review and meta-analysis. Pharmaceuticals (Basel). 2022;15(12):1588. https://doi.org/10.3390/ph15121588
21. Bhiwal AK, Chauhan K, Choudhary S, Bhatt HA, Gupta S. Intravenous ondansetron to prevent hypotension during cesarean section under spinal anaesthesia. J Obstet Anaesth Crit Care. 2021;11(1):15-19. https://doi.org/10.4103/joacc.JOACC_61_20
22. Hailu S, Mekonen S, Shiferaw A. Prevention and management of postoperative nausea and vomiting after cesarean section: a systematic literature review. Ann Med Surg (Lond). 2022;75:103433. https://doi.org/10.1016/j.amsu.2022.103433