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ORIGINAL ARTICLE

# A comparative study on the efficacy of antiemetic drugs to prevent per-operative nausea and vomiting among parturients undergoing caesarean section under spinal anesthesia

**Pradip Chandra Das[1*], Mosharraf Hossain[1], Tapas Kumar Das[1], Mritunjoy Goswami[1], Muhibullah Muhib[1], Muhammad Nazmul Ahasan[2], Anwarul Haque[1]**

[1]Department of Anesthesiology, Dhaka National Medical Institute Hospital, Dhaka, Bangladesh, [1]Department of Anesthesiology, Dhaka National Medical College, Dhaka, Bangladesh, [1]Department of Anesthesiology, Dhaka National Medical College, Dhaka, Bangladesh, [1]Department of Anesthesiology, Dhaka National Medical College, Dhaka, Bangladesh, [2]Department of ENT, Dhaka National Medical Institute Hospital, Dhaka, Bangladesh, [1]Department of Anesthesiology, Dhaka National Medical Institute Hospital, Dhaka, Bangladesh.

## Abstract:

**Background:** Nausea and vomiting are undesirable per-operative events among parturients during cesarean section under spinal anesthesia. Therefore prophylaxis is recommended.

**Objectives:** To compare & assess the effect of intravenous Ondansetron, Metoclopramide and Prochlorperazine Maleate administered before achieving spinal anesthesia for preventing per-operative nausea and vomiting.

**Materials and methods:** This comparative study was done in the Department of Anesthesiology in Dhaka National Medical Institute Hospital, Dhaka from February 2024 to January 2025. Total 60 women, age ranged from 18-45 years undergoing caesarean section of both emergency and elective were included. They were divided into 3 groups as group A, B, C; each group comprising with 20 subjects. Group-A received intravenous metoclopramide, group-B received intravenous prochlorperazine maleate & group-C received intravenous ondansertron.

**Results:** Among 20 patients of Group A, mean age was 26.53±5.9 years, height was 151.27±3.8cm and weight was 63.77±9.5kg; while in group B, mean age was 27.00±6.2 years, height was 152.10±4.7cm and weight was 62.97±9.1kg and for group C, mean age was 28.71±7.72 years, height was 153.24±5.2 cm and weight was 64.78±9.6kg. In group A (Metoclopramide), 6 patients (30.0%) had IONV and in group B (Prochlorperazine), 3 patients (15.0%) and in group C (Ondansetron), 1patient (5.0%) had IONV respectively. Regarding hypotension with IONV 5 patients (55.5%) in group A, 2 patients (25.0%) in group B and 1 patient (10.0%) in group C respectively. But statistically the difference was not significant.

**Conclusions:** This study reveals that intravenous Ondansetron had superior effect in preventing nausea and vomiting among parturients undergoing caesarean section under spinal anesthesia in contrast to intravenous Metoclopramide and Prochlorperazine Maleate.

**Keywords:** Metoclopramide, Ondansetron, Nausea-vomiting, Caesarean Section, Spinal Anesthesia.

## Introduction

Intraoperative nausea and vomiting (IONV) occur in 40 to 80% of women receiving spinal anesthesia for cesarean section.[1] Nausea and vomiting might complicate perioperative care due to the patient's increased risk of aspirating vomitus. Moreover, the protrusion of abdominal contents would disrupt the surgeon during the operation.[2] The primary objective of obstetric anesthesia is to guarantee the safety of both mother and infant. Consequently, it is imperative to meticulously choose the anesthesia and its delivery. Spinal anesthetic, due to its straightforward administration and minimal effects on the fetus, has emerged as the preferred option for cesarean sections.

***Correspondence:** Dr. Pradip Chandra Das, Senior Consultant, Department of Anesthesiology, Dhaka National Medical College, Dhaka, Bangladesh, Email: dr.prodip21@gmail.com

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The APGAR score of the fetus under spinal anesthesia was superior than that under general anesthesia.[3] While spinal anesthesia is optimal for cesarean sections, it may also induce unpleasant responses. Spinal anesthesia may result in significant bradycardia or hypotension in parturients exhibiting unstable hemodynamics.[4] A variety of pharmacological agents have been utilized for the treatment and prevention of IONV: 5-hydroxytryptamine (5-HT3) antagonists (e.g., Ondansetron and Granisetron), dopamine receptor antagonists (e.g., Metoclopramide), butyrophenones (e.g., Droperidol), and anticholinergic agents (e.g., Atropine).[5] Specific essential limiting criteria are associated with them. This encompasses expenses associated with 5-HT3 antagonists and extrapyramidal symptoms (tremor, bradykinesia, dyskinesia) linked to dopamine receptor antagonists. Dopamine and histamine antagonists, such as prochlorperazine maleate, exhibit antiemetic properties and are utilized in our local community as prophylaxis against nausea and vomiting during spinal anesthesia. This study aims to evaluate the efficacy of Ondansetron, Metoclopramide, and Prochlorperazine Maleate administered prior to spinal anesthesia for the prophylaxis of IONV at our hospital.

## Materials & Methods

This was a prospective observational study conducted in Dhaka National Medical Institute Hospital, Dhaka from February 2024 to January 2025. For this, a total of 60 patients, age ranged from 18-45 years who undergo caesarian section under spinal anesthesia in Dhaka National Medical Institute Hospital, Dhaka, were recruited in this study according to inclusion and exclusion criteria. They were divided into 3 groups such as, group-A (intravenous metoclopramide), group-B (intravenous prochlorperazine maleate) and Group-C (intravenous ondansetron). There were 20 different patients in each group.During Pre anesthetic assessment every patient under through physical examination with ASA (American Society of Anesthesiologists) classifications. Total anesthetic procedure was explained and informed consent was taken from the participants of this study. The study protocol was approved by the institutional Ethics committee of Dhaka National Medical Institute Hospital, Dhaka. The preliminary screening panel for each patient was included the complete history, physical examination and the necessary laboratory tests. The preliminary screening panel for each patient was included the complete history, physical examination and the necessary laboratory tests.

**• Inclusion criteria:**

1. ASA class I and II
2. Patients agreeto participate in this study signing an informed written consent.

**• Exclusion criteria:**

1. Gastrointestinal disorder
2. Motion sickness
3. Hyperemesis gravidarum
4. Intake of antiemetic drugs within the previous 24 hours or had local anesthetics
5. Patient with psychiatric disorder
6. Patient with preeclampsia,eclampsia
7. Patient with neuro logical disorder
8. ASA class III and IV
9. Coagulopathy

Sixty(60) patients, scheduled for caesarean section under spinal anesthesiawere included in this study. They were divided into 3 groups: Group-C (ondansetron), Group-A (metoclopramide) and group-B (prochlorperazine maleate). There were 20 patients in each group.

Intravenous access was established with 18G cannula. Premedication was done intravenous (IV) Omeprazole (40mg) followed by preloading with 15-20ml/kg Lactated Ringer's solution before anesthesia.In addition, patients wereput into the left lateral position and given 5L/minute oxygen by a fascial mask for avoiding the pressure on the aortocaval area. Patients in group C, received 8mg Ondansetron in 5ml intravenously (IV), group A received 10mg metoclopramide in 2ml intravenously (IV), group B received 12.5mg prochlorperazine in 2ml intravenously (IV), 20 minutes before establishing spinal anesthesia.

Under full aseptic precaution, spinal anesthesia was carried out in sitting position at lumbar 3-4 interspace using 25G Quincke's spinal needle.Finally, nausea and vomiting were evaluated using the Bellville scoring6, that is, the following values were assigned to the factors: No symptom=0, nausea=1, gagging=2, vomiting=3.

Patients were monitored for hypotension. Hypotension was defined as decrease in systolic or mean arterial

blood pressure of >20% from the baseline value. Hypotension was treated using crystalloid infusion and ephedrine administration at 6mg intravenous boluses. APGAR scores for the neonates in the 1st and 5th minutes were also recorded.

## Statistical analysis

Data was compiled, presented and appropriate statistical test was done in this study for drawing an appropriate conclusion. Quantitative variable i.e. age, sex, height, weight, pulse, blood pressure. Qualitative variables, i.e.nausea, gagging, vomiting were presented as percentage. Anova test was applied for comparisons of quantitative variables in three groups. Chi-square test was applied for comparison of qualitative variables in three groups.

## Observation and Results

Comparison of mean age, height and weight are presented in Table-I and there were no significant difference among three groups. Nausea occurred in 6 (30.0%) patients in group A,3 (15.0%) in group-B and 1 (5.0%) patient in group-C. Retching or gagging occurred in 4 (20.0%) and 3 (15.0%) of patients in group-A and B Prespectively. Retching was not documented in group-C. Vomiting occurred in 3(15.0%), 2 (10.0%)and none of patients in groups-A, B and O respectively [Table-II]. In group-A, 5 (55.5%) of the patients experienced hypotension with IONV while the figures for groups-B and C were 2 (25.0%) and 1 (10.0%) respectively [Table-III].

**Table-I: Demographic Characteristics**

| Variable | Group-A | Group-B | Group-C |
|---|---|---|---|
| Age (years) | 26.53±5.9 | 27.00±6.2 | 28.71±7.72 |
| Height (cm) | 151.27±3.8 | 152.10±4.7 | 153.24±5.2 |
| Weight (kg) | 63.77±9.5 | 62.97±9.1 | 64.78±9.6 |

Data expressed as mean (±SD) and analyzed Anova test.

Group-A: subjects received intravenous metoclopramide

Group-B: subjects received intravenous prochlorperazine maleate

Group-C: subjects received intravenous ondansetron.

**Table-II: Incidence of per-operative nausea, gagging, vomiting among study groups**

| | Drug Study Group | | |
|---|---|---|---|
| | Group-A n(%) | Group-A n(%) | Group-C n(%) |
| IONV (Summary) | | | |
| Yes | 6(30.0) | 3(15.0) | 1(5.0) |
| No | 14(70.0) | 17(85.0) | 19(95.0) |
| Retching (Gagging) | | | |
| Yes | 4(20.0) | 3(15.0) | 0(0) |
| No | 16(80.0) | 17(85.0) | 20(100.0) |
| Vomiting | | | |
| Yes | 3(15.0) | 2(10.0) | 0(0) |
| No | 17(85.0) | 18(90.0) | 20(100.0) |
| Nausea | | | |
| Yes | 6(30.0) | 3(15.0) | 1(5.0) |
| No | 14(70.0) | 17(85.0) | 19(95.0) |

Data analyzed using Chi- square test.

n = Total number of subjects

**Table-III: Hypotension and per-operative nausea and vomiting**

| IONV | Hypotension | |
|---|---|---|
| | Yes n(%) | No. n(%) |
| Group- A | | |
| Yes | 5(55.5) | 1(9.0) |
| No | 4(44.5) | 10(91.0) |
| Group- B | | |
| Yes | 2(25.0) | 1(8.3) |
| No | 6(75.0) | 11(91.7) |
| Group- C | | |
| Yes | 1(10.0) | 0(0) |
| No | 9(90.0) | 10(100.0) |

Data analyzed using Chi- square test.

## Discussion

Metoclopramide is a strong prokinetic drug that blocks dopamine receptors and speeds up the emptying of the stomach. It is used to treat nausea and vomiting, as well as gastroesophageal reflux and gastric stasis.[7] The prevalent adverse effects include extrapyramidal syndrome, dizziness, headache, and supraventricular tachycardia, among others. Ondansetron is the prototype medication within the serotonin 5HT3 antagonist class, principally utilized for the management of nausea and vomiting by inhibiting the release of 5HT3 from activated platelets that engage 5HT3 receptors in the vagal nerve endings, while also diminishing the occurrence of hypotension.[8] The prevalent side effects include headache, tachycardia, moderate sedation, and constipation, among others. Prochlorperazine maleate is a D2 dopamine receptor antagonist that also inhibits histaminergic, cholinergic, and noradrenergic receptors, utilized for the management of nausea and vomiting.[9] The prevalent

side effects, including dizziness, constipation, and extrapyramidal symptoms, occur less frequently. The study reported minimal side effects, with one patient in the metoclopramide group experiencing extrapyramidal syndrome, treated with intravenous diazepam. Additionally, one patient in the ondansetron group reported a headache, which resolved spontaneously, and one patient in the prochlorperazine group experienced dizziness that necessitated no intervention.

Consequently, Ondansetron shown much greater efficacy in reducing IONV after cesarean sections performed under spinal anesthesia, accompanied by a minimal side effect profile. Datta et al. and Kang et al. observed that the occurrence of emetic problems following cesarean sections was associated with the presence of arterial hypotension. Consequently, we administered a preload of 20 ml/kg of lactated Ringer's solution to avert hypotension and positioned a folded towel beneath the right buttock to mitigate aortocaval compression. 10 Paxton et al. noticed in their study that nausea occurred in 25% of patients administered ondansetron, in contrast to 59% of those receiving metoclopramide.[11] Prophylactic prochlorperazine 12.5mg I/V is less efficacious than ondansetron 8mg I/V in mitigating nausea and vomiting. Ondansetron may be favored because to its reduced risk of extrapyramidal side effects and superior efficacy compared to prochlorperazine and metoclopramide.

## Conclusion

This study demonstrated that intravenous Ondansetron, a 5HT3 antagonist administered at a dosage of 8mg, was a more effective prophylactic agent for managing perioperative nausea and vomiting under spinal anesthesia in parturients compared to intravenous metoclopramide, a dopamine receptor antagonist at 10mg, and intravenous prochlorperazine maleate, a D2 dopamine and histamine receptor antagonist at 12.5mg.

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