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Original Research Article

Comparison between Sub-Anaesthetic Dose of Propofol and Ondansetron as Pretreatment Options in Prevention of Post Operative Nausea and Vomiting in Pregnant Females after Spinal Anaesthesia

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Abstract

Background: PONV is a common long-standing post-operative problem in anesthesia and remains a challenge, especially in obstetrics populations, and occurs more often after caesarean operations under regional anesthesia**.** Many anti-emetics have been studied for effectively attenuating post operative nausea and vomiting in pregnant females but there is no evident literature comparing the efficacy of sub-anaesthetic doses of propofol with ondansetron as pretreatment options on reducing the incidence and severity of post operative nausea and vomiting, this study was designed to compare efficacy of 0.5mg/kg propofol and 0.1mg/kg ondansetron intravenous pretreatment for PONV prevention in pregnant females.

Aims: Aim of this study is to compare the efficacy of sub-anaesthetic dose of propofol with ondansetron in prevention of incidence and severity of post operative nausea and vomiting.

Material and Methods: This prospective randomized double blind study was conducted in a tertiary hospital associated with a medical college, 60 patients undergoing elective caesarean section under spinal anaesthesia were randomly allocated to one of the two groups Group I received 0.5mg/kg of propofol and Group II 0.1mg/kg of Ondansetron, 10 minutes before completion of surgery, patients were assessed for incidence and severity of nausea and vomiting over next twenty four hours. Students t test, chi square test were used as per the requirement and a P value of <0.05 was considered statistically significant.

Result: Out of 60 patients 30 were pretreated with propofol and 30 were pretreated with ondansetron 10 minutes before completion of surgery. In our study 8(26.66%) patients from propofol group developed PONV whereas only 2(6.66%) patients from ondansetron group developed PONV. In our study severity of PONV was calculated on a 3 point scale, it was observed to be 0.33 in patients belonging to propofol pretreatment group whereas it was observed to be 0.10 in ondansetron pretreatment group.

Conclusion: Both groups were comparable with respect to demographic characteristics, the incidence(26.66% in group I vs. 6.66% in group II) and severity(0.33 in group I vs 0.10 in

group II), of PONV was significantly reduced in ondansetron pretreatment group as compared to propofol pretreatment group, (95% confidence interval, $P < 0.05$).

Keywords: postoperative nausea and vomiting (PONV), antiemetic, prophylaxis, post spinal, pregnant females, Propofol, Ondansetron, caesarean section.

Introduction

PONV (Postoperative nausea and vomiting) is defined as any nausea or any urge to vomit, or vomiting that occurs during the first 24–48 h post-operative time in patients undergoing surgery [1]. PONV is a common long-standing post-operative problem in anesthesia and remains a challenge, especially in obstetrics populations, and occurs more often after lower segment caesarean sections (LSCS) under regional anesthesia [2].

The prevalence of nausea & vomiting after caesarean section under spinal anesthesia in Ethiopia was found to be 54.3% in Gandhi memorial hospital (GMH) and the incidence of intraoperative nausea and vomiting after spinal anesthesia in South Gondar zone hospitals was 40.2% [2]. The symptoms of nausea and vomiting occur more frequently in pregnant patients compared with non-pregnant due to the high level of progesterone that causes an increase in gastrin secretion, smooth muscle relaxation, decrease in gastrointestinal motility and lower oesophageal sphincter tones [3].

The intense efforts accompanying PONV increases the risk of aspiration pneumonitis, wound dehiscence, bleeding, hypertension, and increased intracranial pressure [4]. It also leads to higher consumption of calories, and delayed discharge leading to a higher cost of care [5]. Other morbidities synonymous with Post operative nausea & vomiting also includes; dehydration, electrolyte disturbance, rarely, oesophageal rupture [6]. Prophylaxis with antiemetic has successfully reduce the incidence of PONV in surgical procedures by 15–30% [7].

The Apfel risk score is based on four predictors: female, history of PONV and/or motion sickness, non-smoking status, and use of postoperative opioids. The incidence of PONV with the presence of 0, 1, 2, 3, and 4 risk factors is 10%, 20%, 40%, 60%, and 80%, respectively.[8] Patients with 0–1, 2 or 3, and more risk factor are considered as "low," "medium," and "high" risk categories, respectively. [9] Therefore most Indian females come under 40-60% high risk category in terms of susceptibility to PONV.

Numerous antiemetic drugs have been studied for the prevention of PONV with varying degrees of success [10]. Propofol is known to have a low emetic score, and its antiemetic properties have been investigated. While it was found to be effective by some studies, the contrary was reported in other studies [11]. Series of clinical trials have reported a sub-hypnotic dose of propofol to be equally effective in reducing the incidence of not only PONV but also pruritus following intrathecal morphine [12].

The consensus guideline by Gan et al. recommended serotonin antagonists such as ondansetron a first-line treatment for post operative nausea and vomiting in general surgical patients who did not receive antiemetic prophylaxis [13].

With this background in mind we planned this study and chose to compare sub anaesthetic dose of propofol with ondansetron as pretreatment options in prevention of post operative nausea and vomiting. So we made an effort to evaluate the potency of propofol versus ondansetron

as pretreatment options in terms of assessment of incidence of PONV as primary outcome and severity of PONV as secondary outcome of this study.

Material and Methods:

After obtaining Institutional Ethical Committee approval and informed consent from the patients, a prospective randomized clinical study was conducted at tertiary health care hospital. 60 consenting patients of ASA class I and II between the age group of 22-32 years planned for elective caesarean section surgeries requiring sub arachnoid block were randomly selected and included in the study. The patients were divided into 2 groups consisting of 30 patients each which were randomly divided. Group allocation was concealed in a sealed envelopes which were opened 15 min before the end of surgery in order to administer the drugs 10 minutes before completion of surgery. Group I, Propofol group (n = 30) represented the patients who received intravenous propofol (0.5 mg/kg) whereas Group II Ondansetron group (n = 30) represented the patients who received intravenous Ondansetron (0.1mg/kg).

Inclusion criteria: Consenting patients, ASA class I and class II patients, patients aged between 22-32 years, patients undergoing elective caesarean sections requiring spinal anesthesia.

Exclusion criteria: Patient's refusal, ASA class III and above. Participants with history of allergy to ondansetron or propofol, cardiac disease, significant hepatic or renal insufficiency and those who received anti-emetic prophylaxis in past 24 h, those who experienced any episode of nausea or vomiting in last 72 hours were not included in the study.

On arrival in the operation theatre all routine monitoring devices were attached. A 18G intra venous canula was inserted preferably at dorsum of the left hand and connected to a five hundred ml Ringer Lactate solution drip after that all the baseline vital readings of peripheral oxygen saturation, hear rate and non-invasive blood pressure were recorded. None of the patients had any recent history of episodes of nausea & vomiting in the past 72h prior to the surgery. Parturients were strictly advised not to consume solid food for 8h before surgery. An independent anaesthesiologist was assigned to administer the spinal anesthesia and to monitor the patients till discharge. In left lateral position, skin and underlying structures were infiltrated with 1.5 ml of 2% lidocaine using a hypodermic needle. Maintaining all aseptic precautions lumbar puncture was performed using a 25G spinal needle by midline approach at the lumbarL2-L3/ L3-L4 inter vertebral space after confirming free flow of cerebrospinal fluid which indicated successful entry of the spinal needle in the sub arachnoid space subarachnoid block was performed by injecting 2ml (10 mg) preservative-free hyperbaric bupivacaine. The patient was then placed in supine position with their head supported by a pillow. A left lateral tilt was given to aid uterine displacement. Vital signs of the patients were recorded every 4 min for the first half hour and then every 10 min. level of sensory block was confirmed to be up to T8 using ice cubes. Oxygen was supplemented at 5-6 L/minute through hudson mask. Any event of hypotension occurring intraoperatively was treated with 5–10 mg of ephedrine administered intravenously. 10 international units of oxytocin were given intravenously to support uterine contraction. An independent anaesthesiologist who was blinded to the study drugs was asked to inject, 0.5mg/kg propofol to group I and 0.1mg/kg ondansetron to group II patients intravenously 10 minutes before completion of surgery.

Measurements: All episodes of nausea & Vomiting were identified by regular assessments or by spontaneous complaints of the patients after the surgery. The incidence of PONV was recorded every hourly for the first four hours and then four

hourly for the next 20h using a 3 point scale (0 = no nausea or vomiting, 1 = only nausea but no vomiting, 2 = vomiting or both nausea and vomiting). The incidence of PONV was calculated and categorized as early (first 4h) or delayed (5th to 24th h). Intravenous dexamethasone 8 mg was administered if any patient complained of nausea or any episode of vomiting was observed. The number of patients requiring rescue dose of dexamethasone was recorded in both the groups.

The primary objective of our study was to compare the incidence of PONV and secondary objective was to compare severity of PONV after propofol pretreatment versus ondansetron pretreatment.

Result:

Demographics- Out of 60 patients, 30 patients in group I were pretreated with propofol and 30 patients in group II were pretreated with ondansetron 10 minutes before completion of surgery . Both the groups were comparable demographically.

Table 1: Comparison of demographic characteristics between both the groups.

Demographics	Group I(Propofol)	Group II(Ondansetron)	P value
Age	25.80±3.08	26.93±2.84	0.145NS
Weight	60.33±6.20	61.13±5.29	0.593 NS
Systolic Blood Pressure	120.33±9.84	122.26±8.42	0.412 NS
Diastolic Blood Pressure	71.20±9.50	73.33±7.99	0.351 NS
Heart Rate	91.20±5.82	88.92±6.62	0.162 NS
Gestational Age	38.82±1.27	39.09±1.53	0.460 NS

Chi square test not significant (NS) at P<0.05

Incidence of PONV-

Out of 30 patients in group I, 3(10%) patients suffered from PONV in the 1st four hours whereas 5(16.66%) patients in 5-24 hours, whereas in group II, 1(3.33%) patient suffered from PONV in the 1st 4 hours and 1(3.33%) patients in 5-24 hours.

Table 2: Cross tabulation of incidence of PONV between group i and ii

Incidence of PONV at	Group I(Propofol)	Group II(Ondansetron)	P value
0-4 hours	03(10.00%)	01(3.33%)	0.0377
5-24 hours	05(16.66%)	01(3.33%)	

Chi square test significant at P<0.05

Severity of PONV-

The severity of PONV in group I was as follows- grade 0 in 22(73.33%) patients, grade I in 6(20%), patients, grade II in 2(6.66%) patients whereas in group II it was as follows grade 0 in 28(93.33%).

grade I in 1(3.33%) patients, grade II in 1(3.33%) patients.

Table 3: Cross tabulation of severity of PONV between group I and II

Severity of PONV at	Group I (Propofol)	Group II (Ondansetron)
0-24 hours	0.33	0.10

Safety profile-

Out of 30 patients from group I, 6(20%) patients developed minor side effects like bradycardia 3(10%), hypotension 3(10%) whereas in group II 4(13.33%) patients developed minor side effects like

bradycardia 2(6.66%), hypotension 2(6.66%). None of the patients experienced sedation or suffered from respiratory depression .

Table 4: Cross tabulation of safety profile between group I and group II.

Side Effect	Group I(Propofol)	Group II(Ondansetron)	P value
Bradycardia	3	2	<0.218 NS
Hypotension	3	2	<0.218 NS
Sedation	0	0	-
Respiratory Depression	0	0	-

Chi square test not significant at P<0.05

Discussion

This study evaluated the efficacy of propofol pretreatment compared to ondansetron pretreatment in preventing post-operative nausea and vomiting(PONV). Both the study groups were comparable demographically and these variables had no role in clinical implications of this study.

Post operative nausea and vomiting is the most distressing and unpleasant experience for a patient undergoing anaesthesia and surgery. Furthermore, severe post operative emesis may lead to dehydration, electrolyte imbalance, which in turn may alter the overall outcome of the entire surgical procedure. [14] Numerous antiemetic have been studied for the prevention of post operative nausea and vomiting with varying degrees of success. [10]

In subarachnoid block for Lowe segment caesarean section, hormonal influences are strong emetic stimuli followed by pain, anxiety and drugs like opioids. NSAID also have been implicated in postoperative vomiting. There are many drugs used for treatment of PONV like metoclopramide, domperidone, phenothiazines, butyrophenones, anticholinergics, antihistamines. Even though these drugs either alone or in combination have been proved effective to a certain extent, a search was on for a newer antiemetic drug, which leads to the invention of 5-HT3 antagonist, ondansetron. [15]

Montgomery and colleagues. used a similar propofol infusion regimen but were unable to demonstrate any specific antiemetic effect over placebo. [16]

Studies investigating the use of continuous sub hypnotic propofol infusion for the prevention of PONV have produced conflicting results. Ewalenko and colleagues reported that sub hypnotic propofol infusion at 1 mg kg^{-1} h^{-1} effectively reduced the incidence of PONV from 65% to 10% without untoward sedative or cardiovascular effects after thyroidectomy. [17]

But none of the studies compared the antiemetic prophylaxis of propofol with ondansetron.

Therefore keeping this background in mind we decided to compare the efficacy of propofol pretreatment with ondansetron pretreatment to prevent post operative nausea and vomiting in terms of incidence and severity of PONV. Doses were decided considering previous studies and the safety profile of both the drugs. [18]

In our study drugs were administered 10 minutes before completion of surgery to justify its time of onset and duration of action. Our study results showed that in the first four hours incidence of PONV was 10% in Propofol group and 3.33% in Ondansetron group whereas in 5-24 hours incidence of PONV was 16.66% in propofol group and 3.33% in Ondansetron group,

The severity of PONV on a three point basis scale during the 24 hour observation period was observed to be 0.33 in propofol group and 0.10 in ondansetron group.

The safety profile of both the drugs was observed to be statistically comparable at the doses chosen for this study.

Conclusion-

Based upon analysis of the data from our study we conclude that pretreatment with 0.1mg/kg ondansetron 10 minutes prior to completion of surgery was found to be more effective in decreases the incidence and severity of post operative nausea and vomiting compared to pretreatment with 0.5mg/kg propofol 10 minutes prior to completion of surgery without any significant increase in side effects.

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