International Journal Dental and Medical Sciences Research
Volume 4, Issue 2, Mar-Apr 2022 pp 232-237 www.ijdmsrjournal.com ISSN: 2582-6018

Comparison of Ondansetron and Palonosetron in the Preventive Management of Postoperative Nausea and Vomiting following Elective LUCS"

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Submitted: 15-03-2022 Accepted: 25-03-2022

ABSTRACT

Background: The usage of general anesthetics in the management of various clinical procedures and subarachnoid block in major to minor surgical procedures has been associated with postoperative nausea and vomiting (PONV) in people who had their meal after clinical procedure. Efforts are still conducted to reduce side effects of anesthesia, such as postoperative nausea and vomiting (PONV). **Objective:** To assess the Comparision of Ondansetron and Palonosetron in the Preventive Management of Postoperative Nausea and Vomiting following elective LUCS. **Methods:** In this prospective study was carried out in the department of Anaesthesiology, Institute of Child and Mother Health (ICMH), Matuail, Dhaka, Bangladesh from January to December-2020. A total of 100 patients belonging to the American Society of Anesthesiologists (ASA) Grade I and II posted for elective LUCS were included in the study. 100 patients were further divided into two groups (n = 50), i.e., Group A (ondansetron) and Group B (palonosetron). This study was conducted from November 2017 to August 2019 on 100 ASA I and ASA II patients, aged from 18 to 35 years who underwent elective LSCS under the subarachnoid block. **Results:** Both drugs Ondansetron and Palonosetron showed prevention of PONV (Palonosetron showed 80% response and Ondansetron showed 44% response). Both drugs have shown promising results for a shorter duration in postoperative care but Ondansetron showed a higher number of PONV incidences than Palonosetron in long duration. **Conclusion:** Palonosetron is effective than Ondansetron in preventing nausea and vomiting in the late postoperative period with fewer side effects.

Keywords: Cesarean Section, Palonosetron, Ondansetron, Postoperative Nausea And Vomiting.

I. INTRODUCTION

The usage of general anesthetics in the management of various clinical procedures and subarachnoid block in major to minor surgical procedures has been associated with postoperative nausea and vomiting (PONV) in people who had their meal after clinical procedure. Yet while IV-PCA is effective in controlling postoperative pain, continuous administration of opioid can cause or aggravate postoperative nausea and vomiting (PONV). PONV, like postoperative pain, is a complication that delays recovery, prolongs hospital stays, and increases costs due to additional drug use [1]. PONV is the most common reason why the usage of general anesthetics in the management of various clinical procedures and subarachnoid block in major to minor surgical procedures has been associated with postoperative nausea and vomiting (PONV) in people who had their meal after clinical procedure. Yet while IV-PCA is effective in controlling postoperative pain, continuous administration of opioid can cause or aggravate postoperative nausea and vomiting (PONV). PONV, like postoperative pain, is a complication that delays recovery, prolongs hospital stays, and increases costs due to additional drug use [1]. PONV is the most common reason why patients choose to stop IV-PCA. Identification and better management of PONV is crucial for the outcome of a surgery and also it influences various physical factors such as tear and rupture (Boerhaave syndrome) in the esophageal tract, fracture in ribs, stomach herniation

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Volume 4, Issue 2, Mar-Apr 2022 pp 232-237 www.ijdmsrjournal.com ISSN: 2582-6018

and aversion towards surgery [2]. To minimize the usage of emetic anesthetic drugs, enhanced usage of the pre and postanesthetic medications and advances in surgical techniques were implemented which resulted in fewer incidences of PONV. Thus there have been many studies on methods and drugs to prevent PONV. The 5-Hydroxytryptamine (5-HT3) receptor antagonist is being commonly used because it is more effective in PONV prevention and treatment than other antiemetics and has few side effects [3]. Recently, palonosetron has been reported to be effective against chemotherapy-induced nausea and vomiting [4, 5] and effective in the prevention of PONV [6, 7]. Palonosetron is a newly developed 5-HT3 receptor antagonist. Its receptor-affinity is more potent than other antagonists. Its plasma half-life is very long [8, 9], Also it is known to be more effective than ondansetron against nausea and vomiting in patients using anticancer drugs [5]. However, studies comparing the effects of preventing PONV between palonosetron and other 5-HT3 receptor antagonists are sparse. The introduction of 5HT3 receptor antagonist in 1990s was heralded as a major advance in the treatment of PONV because of the absence of adverse effect that were observed with commonly used traditional antiemetics [10,11]. The present study was done to compare the antiemetic effect of optimal dose of oral ondansetron (8md) and palonosetron 0.075 mg (4 ml) for prevention of PONV following elective caesarean section.

II. MATERIALS AND METHODS

In this prospective study was carried out in the department of Anaesthesiology, Institute of Child and Mother Health (ICMH), Matuail, Dhaka, Bangladesh from January to December-2020. 100 patients belonging to the American Society of Anesthesiologists (ASA) Grade I and II posted for elective lower (uterine) segment cesarean section (LUCS) under the subarachnoid block were enrolled in this study. Of these 100 patients an equal number of patients were divided into two groups (n=50); Group A and Group B. Group A patients were given Ondansetron and Group B patients were given palonosetron. Inclusion criteria include ASA Grade I and II, aged between 18 and 35 years, 45–65 kg weight with normal body mass index, and scheduled for <90 min surgery. Exclusion criteria include any previous history of PONV, hyperemesis gravidarum, hypersensitive to ondansetron and palonosetron, any renal/ hepatic/endocrine abnormalities, and patients who had any antiemetic drug within 24 h of surgery.

Preoperative routine investigations are carried out as per institutional standard. In the labor room, electrocardiogram, pulse oximeter, noninvasive blood pressure, and the intravenous line with 18G cannula were established after the patient arrived in the operation theater. For the management of hypotension all the patients in both groups were preloaded with Ringer's lactate solution 20 ml/kg. All patients received oxygen 6 l/min. For postoperative pain management intramuscular injection diclofenac sodium 75 mg was given. All the patients were observed for 24 h postoperation for any signs or symptoms of nausea, vomiting, or any other side effects at the end of each interval.

We assessed PONV by using a three-point scale of the PONV score system where, patients who report no nausea or vomiting were considered as complete response (CR), any patients complaining of nausea were considered as 1, and patients who complained vomiting were considered as 2. We made no difference between vomiting and retching. A single vomit or retch or combination of vomits and/or retches occurring within 1 min of each other was considered as a single emetic episode. PONV scores of 0, 1, and 2 recorded at three intervals: 0–6 h, 7–12 h, and 13–24 h. During the postoperative management patients who experienced PONV were treated with Metoclopramide 10 mg as a rescue antiemetic drug with intravenous fluid support. Adverse events such as headache, rash, abdominal discomfort, and allergic reactions were noted and treated accordingly. Rest other parameters as for example; heart rate, BP, respiration and SpO2 were also recorded at same interval. Patients were carefully observed for any adverse effects like headache, flushing, drowsiness or any other symptoms.

The data was collected in a pre-designed 'Data collection form'. All data were compiled and analysed using one-way ANOVA or Chi square (X 2) test as appropriate with the help of SPSS. The result was regarded as significant if P<0.05 or á Value of .05 with confidence interval 95%.

III. RESULTS

Patients aged from 18 to 35 years were enrolled. The mean age of Group A was found to be 26 ± 3.9 years and 28 ± 4.02 years in Group B. The mean weight of the patients in Group A was found to be 57.8 ± 5.2 kg and in Group B was 56.6 ± 6.2 kg. There was no statistical significance with age and weight in either of the groups (Table 1). (Table 2) reveals the number of incidences regarding PONV for the

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24 h of duration. The incidence of nausea and vomiting did not show any statistical difference between two anti-emetic groups at three different time intervals ($P > 0.05$) (Table 3). We found that the PONV score was higher in Group A than Group B in all three different intervals. OR and their P value were statistically significant where $P < 0.05$, at 7–12 h and 13–24 h interval, respectively. In the 13–24 h period, we found the number of PONV reported cases in Group A was 56% and Group B was 20% (OR: 4.24, 95% confidence interval: 1.807–9.956, $P < 0.001$) (Table 4).

Table 1: Patient characteristics of Group ondansetron and Group palonosetron.

	Group A (ondansetron)		Group B (palonosetron)		P value
	Mean	SD	Mean	SD	
Age (years)	26	3.9	28	4.02	0.82
Weight (kg)	57.8	5.2	56.6	6.2	0.29
Duration of surgery (mins)	30.7	5.3	31.5	4.06	0.39

SD: Standard deviation

Table 2: Postoperative nausea and vomiting scores at the different interval in Group ondansetron and Group palonosetron.

PONV score	0-6 h		7-12 h		13-24 h		P value
	Ondansetron, N (%)	Palonosetron, N (%)	Ondansetron, N (%)	Palonosetron, N (%)	Ondansetron, N (%)	Palonosetron, N (%)	
0 (none)	34 (68)	41 (82)	32 (64)	42 (84)	22 (44)	40 (80)	0.48
1 (nausea)	10 (20)	7 (14)	14 (28)	5 (10)	20 (40)	8 (16)	0.5
2 (vomiting)	6 (12)	2 (4)	4 (8)	3 (6)	8 (16)	2 (4)	0.5
Total PONV incidences	16 (32)	9 (18)	18 (36)	8 (16)	28 (56)	10 (20)	0.7

Chi-square test. PONV: Postoperative nausea and vomiting

Table 3: Comparison of the total number of postoperative nausea and vomiting scores "0" versus postoperative nausea and vomiting Score 1 and 2 between groups.

Nausea and vomiting incidence	0-6 h		7-12 h		13-24 h	
	Ondansetron, n (%)	Palonosetron, n (%)	Ondansetron,n (%)	Palonosetron, n (%)	Ondansetron,n (%)	Palonosetron, n (%)
None (Score 0)	34 (68)	41 (82)	32 (64)	42 (84)	22 (44)	40 (80)
Yes (Score 1-2)	16 (32)	9 (18)	18 (36)	8 (16)	28 (56)	10 (20)
P‡	0.1		0.02		<0.001	

OR. OR: Odds ratio

Table 4: Comparison of incidence of postoperative nausea and vomiting in 13-24 h interval.

Group	PONV score: 1-2, n (%)	PONV score: 0, n (%)	OR	95% CI	P*
Ondansetron	28 (56)	22 (44)	4.24	1.807-9.958	<0.001
Palonosetron	10 (20)	40 (80)			

*<0.05, PONV: Postoperative nausea and vomiting, OR: Odds ratio, CI: Confidence interval

IV. DISCUSSION

PONV and associated problems are stressful for both patients and clinicians. During surgeries, administration of regional anesthesia causes nausea and vomiting and there is higher incidence in the absence of prophylactic antiemetic drugs.

PONV are the multifactorial problems which are limited to age, weight, vomiting, preexisting disease, gynecological surgery, history of nausea, anxiety, and smoking [3]. Many factor associated with anesthesia and surgery may contribute to nausea and vomiting. In the present study concern factors are type of anesthesia, female patient and gynecological surgery. Incidence of nausea and vomiting is two to three times more in female due to changing endocrine environment which sensitize the brain stem emetic mechanism. During LUCS the regional anesthesia as well as some traction of vagal innervated gut may play role in triggering emesis. The reported overall incidence of nausea and vomiting after gynecological surgery is 75% [9]. In this present study, we did not find any association between age and patients weight within the two groups. Overall, PONV incidences identified were 56% in Group A and 20% in Group B. Our results are consistent with previous findings where incidences of PONV were between 20% and 30% in a normal population and whereas in high-risk group, it was up to 80% [4]. Previous studies showed us that there is no such single effective drug with 100% efficacy in the prevention of PONVs. Moreover, usage of combinations of antiemetics exhibited side effects [5]. $5HT_3$-receptor antagonists are superior to conventional regimens and became popular because of fewer side effects such as headache and dizziness. $5HT_3$ receptor antagonists' drugs such as Ondansetron, Dolasetron, Palonosetron, and Tropisetron, reported very few adverse effects [6]. Ondansetron is widely used drug clinically [7] in the prevention of PONV and recently Palonosetron has been showing more compelling results than Ondansetron against emesis caused by chemotherapeutic drugs like Cisplatin [8]. In this study, we compared the effectiveness of antiemetics and adverse effects of prophylactic single-dose of 4 mg Ondansetron versus 0.075 mg (4 ml) Palonosetron administered intravenously for the prevention of nausea and vomiting in the early and late postoperative period (24 h) in patients who underwent elective LUCS surgeries under spinal anesthesia and also we found a significance reduction of number of nausea and vomiting events in both groups [9, 10]. Many types of 5-HT_3 receptor antagonists are being currently used to prevent PONV. It affects the receptors of 5-HT_3 in the mucous membrane of the stomach and the central chemoreceptor trigger zone and suppresses nausea and vomiting. Among them, ondansetron is the most widely used type [15]. Palonosetron is a second generation serotonin 5-HT_3 receptor antagonist. Unlike other antagonists, it has unique structural, pharmacological, clinical characteristics. Other antagonists directly compete with serotonin, but palonosetron has an indirect effect by its allosteric binding with 5-HT_3 receptors [16]. Also it suppresses the response induced by substance P, has negative cooperatively with neurokinin-1 receptors by cross-talk, and creates an antiemetic effect [17]. These explain strong receptor-affinity of palonosetron and its long plasma half-life. In high-risk groups for PONV such as in the present study, combination treatments such as TIVA with propofol and other drugs are recommended [18]. However, the present study aimed at comparing the effects of two drugs, so combination preventive methods could not be used. Instead, extensive literature was reviewed to find and use the method that best prevents PONV [6,9,19-21] When we compared the number of incidences with time duration, in the early postoperative care both drugs were equally effective whereas in late postoperative care we found that for prevention of PONV, Palonosetron was more effective than Ondansetron. The introduction of $5HT_3$ receptor antagonist in 1990s was heralded as a major advance in the treatment of PONV because of less adverse effects that were observed with commonly used traditional antiemetics [7, 8]. Therefore, our study revealed that there is no significant difference between the two drugs for a longer duration Moreover, incidences of PONVs under different time intervals increased in the Ondansetron group whereas incidences were stable and consistent in Palonosetron group. Palonosetron is a newer drug and limited study have done with this drug in our country. So we have chosen ondansetron and granisetron for prevention of PONV in elective LUCS to compare these drug about their efficacy and side effects during operations and 24 hours post-operative period.

Conclusion

Both ondansetron and Palonosetron reduce postoperative nausea & vomiting significantly but comparison between this two drugs for prevention of PONV following elective caesarean section is similar. However further work is required to compare between ondansetron and Palonosetron about their efficacy for prevention of PONV in LUCS under SAB.

References:

1. Watcha MF, White PF. Postoperative nausea and vomiting. Its etiology,

treatment, and prevention. Anesthesiology 1992; 77: 162- 84

2. Kovac AL. Prevention and treatment of postoperative nausea and vomiting. Drugs 2000; 59:213-43.
3. Gan TJ, Meyer T, Apfel CC, Chung F, Davis PJ, Eubanks S, et al. Consensus guidelines for managing postoperative nausea and vomiting. Anesth Analg 2003; 97: 62-71
4. Eisenberg P, MacKintosh FR, Ritch P, Cornett PA, Macciocchi A. Efficacy, safety and pharmacokinetics of palonosetron in patients receiving highly emetogenic cisplatin-based chemotherapy: a doseranging clinical study. Ann Oncol 2004; 15: 330-7.
5. Aapro MS, Grunberg SM, Manikhas GM, Olivares G, Suarez T, Tjulandin SA, et al. A phase III, double-blind, randomized trial of palonosetron compared with ondansetron in preventing chemotherapy-induced nausea and vomiting following highly emetogenic chemotherapy. Ann Oncol 2006; 17: 1441-9.
6. Kovac AL, Eberhart L, Kotarski J, Clerici G, Apfel C. A randomized, double-blind study to evaluate the efficacy and safety of three different doses of palonosetron versus placebo in preventing postoperative nausea and vomiting over a 72-hour period. Anesth Analg 2008; 107: 439-44.
7. Candiott KA, Kovac AL, Melson TI, Clerici G, Joo Gan T. A randomized, double-blind study to evaluate the efficacy and safety of three different doses of palonosetron versus placebo for preventing postoperative nausea and vomiting. Anesth Analg 2008; 107: 445-51.
8. Yang LP, Scott LJ. Palonosetron: in the prevention of nausea and vomiting. Drugs 2009; 69: 2257-78.
9. Stoltz R, Cyong JC, Shah A, Parisi S. Pharmacokinetic and safety evaluation of palonosetron, a 5-hydroxytryptamine-3 receptor antagonist, in U.S. and Japanese healthy subjects. J Clin Pharmacol 2004; 44: 520-31.
10. Paxton DL, Mekay CA, Mirakin KR, prevention of nausea and vomiting after day case gynaecological Laparoscopy. Anaesthesia 1995; 50:403-406.
11. TM craft, PM upton. Anaesthesia clinical aspects, 3rd edition 2001; 279-281.
12. Kapur PA. The big little problem. Anaesth Analg 1994; 73:243-5.
13. Kraus GB, Giebner M, Palackal R. The Prevention of postoperative nausea and vomiting following strabismus surgery in children. Anaesthetist- 1991;40:92:95
14. Kovac AL, Eberhart L, Kotarski J, Clerici G, Apfel C, Palonosetron 04-07 Study Group. A randomized, double-blind study to evaluate the efficacy and safety of three different doses of palonosetron versus placebo in preventing postoperative nausea and vomiting over a 72-hour period. Anesth Analg 2008; 107:439-44.
15. Clarke RJ. Nausea and vomiting. Br J Anaesth 1984; 56:19-24.
16. Watcha MF, While PF. Nausea and vomiting: Its etiology, treatment and prevention. Anaesthesiology 1992; 77:162-18.
17. McKenzie R, Tantisira B, Karambelkar DJ, Riley TJ, Abdelhady H. Comparison of ondansetron with ondansetron plus dexamethasone in the prevention of postoperative nausea and vomiting. Anesth Analg 1994; 79:961-4.
18. McNulty R. Are all 5-HT3 receptor antagonists the same? J Natl Compr Canc Netw 2007; 5:35-43. doi: 10.6004/jnccn.2007.0005.
19. Rashad MM, Farmawy MS. Effects of intravenous ondansetron and palonosetron on hemodynamic changes and motor and sensory blockade induced by spinal anesthesia in parturients undergoing cesarean section. Egypt J Anaesth 2013; 29:369-74.
20. Sayed AE, Mohamed AS. Ondansetron versus palonosetron effects on hemodynamic instability during spinal anesthesia for caesarean section. Eur J Pharm Med Res 2017; 4:758-65.
21. Bunce KT, Tyers MB. The role of 5-HT in postoperative nausea and vomiting. Br J Anaesth 1992; 69(7 Suppl 1): S60-62.
22. Rojas C, Stathis M, Thomas AG, Massuda EB, Alt J, Zhang J, et al. Palonosetron exhibits unique molecular interactions with the 5-HT3 receptor. Anesth Analg 2008; 107: 469-78.

23. Rojas C, Li Y, Zhang J, Stathis M, Alt J, Thomas AG, et al. The antiemetic 5-HT3 receptor antagonist palonosetron inhibits substance P-mediated responses in vitro and in vivo. J Pharmacol Exp Ther 2010; 335: 362-8
24. Habib AS, Gan TJ. Evidence-based management of postoperative nausea and vomiting: a review. Can J Anaesth 2004; 51: 326-41.
25. Tramer MR, Reynolds DJ, Moore RA, McQuay HJ. Efficacy, doseresponse, and safety of ondansetron in prevention of postoperative nausea and vomiting: a quantitative systematic review of randomized placebo-controlled trials. Anesthesiology 1997; 87: 1277-89.
26. Choi DK, Chin JH, Lee EH, Lim OB, Chung CH, Ro YJ, et al. Prophylactic control of post-operative nausea and vomiting using ondansetron and ramosetron after cardiac surgery. Acta Anaesthesiol Scand 2010; 54: 962-9.
27. Lim SM, Kim JY, Kang H, Baek CW, Park JW, Jung YH, et al. The effects of continuous infusion of ondansetron on postoperative nausea and vomiting in patients receiving IV-patient controlled analgesia following gynecological surgery. Korean J Anesthesiol 2008; 55: 176-81
28. Paxton DL, Mekay CA, Mirakin KR, prevention of nausea and vomiting after day case gynaecological Laparoscopy. Anaesthesia 1995; 50:403-406.
29. TM craft, PM upton. Anaesthesia clinical aspects, 3rd edition 2001; 279-281.