

## Research Article

# Efficacy of ondansetron as antiemetic agent in preventing the incidence of PONV in LSCS under subarachnoid block

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### ABSTRACT

**Background:** Nausea and vomiting are the most common distressing symptom in the postoperative period. Antiemetic drugs play an important role in therapy of PONV. Though many drugs have been tried as prophylaxis and treatment of PONV, no drug has been proved significantly effective and hence, the present study was undertaken to evaluate the efficacy of prophylactic ondansetron in LSCS patients given spinal anaesthesia.

**Methods:** After institutional approval and informed consent 100 ASA I & II patients undergoing non emergent LSCS taken for study. The patients were received ondansetron 4mg i.v. 3-5min before surgery. Episodes and severity of nausea, vomiting and retching were noted at the end of 1<sup>st</sup>, 2<sup>nd</sup>, 6<sup>th</sup> and 24<sup>th</sup> hr.

**Results:** The mean age, weight and duration of surgery was not significantly different when compared group-A parturients with group-B. The mean episodes of emesis, nausea and retching at different postoperative duration were significantly decreasing as postoperative time progresses.

**Conclusion:** The present study suggests that prophylactic ondansetron 4mg is more efficacious in preventing post operative nausea and vomiting in LSCS under spinal anaesthesia.

**Keywords:** LSCS, Ondansetron, Post operative nausea and vomiting, Spinal anaesthesia

### INTRODUCTION

Spinal anaesthesia is a technique whereby a local anaesthetic drug is injected into the cerebrospinal fluid. It was James Young Simpson on Jan 19, 1847 first used chloroform to anaesthetize a woman with a deformed pelvis for delivery.<sup>1</sup> Later in the early 20<sup>th</sup> century, expanded use of opioids has taken place and developed a technique called "Twilight sleep" by Von steinbuechel which combined opioids with scopolamine to make women amnesic during labor. Mid 20<sup>th</sup> century (1900-1930): Refinement of regional anaesthesia. Early 20<sup>th</sup> Century: Mortality rates 10%, but still performed only for the most severe cases of contracted pelvis. The caesarean

rates have increased from 21.8% in 1988-89 to 25.4% in 1993-94 in India.<sup>2</sup>

Use of subarachnoid anaesthesia probably generates lower incidence of post operative vomiting than general, although this difference become less significant if pain is perceived during surgery or if parental narcotics are administered for pain reduction and supplementation. Blockade above a T5 sensory level increases the incidence of nausea and vomiting during and after Subarachnoid block (SAB), perhaps related to complete blockade of sympathetic outflow leading to unbalanced parasympathetic influence. The appearance of systemic hypotension during subarachnoid block also increases the

incidences of PONV, where as administration of ephedrine to avoid hypotension during SAB off sets this increase. Most likely this effect of ephedrine indicates that maintenance of appropriate perfusion pressure reduces the stimulation for nausea although direct antiemetic effect of ephedrine administration has also been postulated. General anaesthesia (GA) may offer slightly lower incidence of nausea in selected patient, but this correlation is not consistent.<sup>3</sup> Use of intrathecal sympathomimetics such as phenylephrine or epinephrine also increases the risk of nausea after spinal anaesthesia (SA) as does administration of epidural or intrathecal opioids. Administration of opioids for post operative pain relief after regional block increases incidence of nausea.

Spinal anaesthesia is a safe and effective anesthetic technique for cesarean section, considering its simplicity, rapidity, accompanied maternal awareness and distribution of anesthetic agents, dense neural block, less shivering, and minimal fetal exposure to drugs. Factors favoring spinal anaesthesia are that it is faster, technically easier, and has a lower failure rate than epidural anaesthesia. The common and distressing symptoms which follow anaesthesia and surgery are pain, nausea and vomiting.<sup>4</sup> Nausea and vomiting are the most common side effects in the post- anaesthesia care unit. But post operative nausea and vomiting have received less attention, though there are extensive literature, data are frequently difficult to interpret and compare. Nausea and vomiting have been associated for many years with the use of general anesthetics for surgical procedures.<sup>5</sup>

In spite of the advances like using less emetic anaesthetic agents, improved pre and post operative technique and identification of patient predictive factors, nausea and vomiting still occur with unacceptable frequency in association with surgery and anaesthesia, and is described as "the big little problem". Early studies<sup>6</sup> reported incidence of post operative nausea and vomiting (PONV) as high as 75-80%. But in the second half of this century, however these incidences have decreased by almost 50% for various reasons. It is noted that incidence is more common in females especially in lower segment caesarean section (LSCS) under subarachnoid block. PONV may be associated with wound dehiscence, pulmonary aspiration of gastric contents, bleeding, dehydration and electrolyte disturbance. Hence vomiting can potentially delay hospital discharge or lead to unexpected hospital admissions and increased hospital cost<sup>7</sup> and can result in serious medical and surgical complications. There are many different modes of intervention to prevent PONV. Antiemetic drugs play an important role in therapy of PONV.<sup>8</sup> Though many drugs have been tried as prophylaxis and treatment of PONV, no drug has been proved significantly effective and a search for better drug continues.

It was reported that, the astounding efficacy of 5HT<sub>3</sub> receptor antagonists as an antiemetic in the management of vomiting induced by chemotherapy and radiotherapy

was followed by new era in the treatment of PONV.<sup>9</sup> Metoclopramide is in use as antiemetic for many years but ondansetron is being used recently. Though ondansetron is used as antiemetic pre-operatively its efficacy of prevention of postoperative nausea and vomiting in elective LSCS under spinal anaesthesia was not well documented. Therefore, the present study was undertaken to evaluate the effectiveness of preventing the incidence of PONV in LSCS under subarachnoid block.

## METHODS

The study was carried out after the approval from ethical committee, and an informed, written consent from all the parturients. 100 parturients undergoing elective LSCS were selected. All participants belonged to ASA grade I or II and were aged above 18 years. They were divided into 2 groups as, Group A (n = 50) inj ondansetron 4mg i.v. and Group B (n = 50) normal saline 2 ml.

**Selection of patients:** Parturients undergoing LSCS under subarachnoid block were selected. Parturients with renal impairment, hepatic disease, neurological and endocrinal abnormalities were excluded. Parturients with history of PONV in previous surgery and patients with history of motion sickness were excluded. Patients with history of vomiting and/or Ryle's tube in situ in the last 24 hours were also excluded.

**Pre-operative evaluation:** Pre-operative visit was conducted on the day before surgery. Detailed history of parturients complaints was noted. General and systemic examination of cardiovascular and respiratory system was done.

**Pre-operative order:** Patients were advised to remain nil orally after 10 P.M. the day before surgery.

**Anaesthesia:** When the patient was brought to the operation theatre, her pulse rate and BP were recorded. An i.v. access with 18G i.v. cannula was obtained. The patients were received 4 mg injection Ondansetron i.v., 3-5 minutes before subarachnoid block and 2 ml normal saline to controls. Pulse, BP and any side effects of drug given was also noted.

Sub arachnoid block was performed in a left lateral position using 23G spinal needle at L3-L4 or L2-L3 interspace. 0.5% bupivacaine 2-2.5ml depending on patients, were given. Following injection, patient was immediately brought on supine position and time of onset of action, T6 level was noted using pinprick method. Desired operative position was given after 5 minutes. Intra operative pulse, BP monitored and maintained with fluids. Duration of surgery was noted.

The parturients were observed for 24 hours post operatively. Nausea, retching and emesis were recorded at 1 hour, 2 hour, 6 hour and 24 hours respectively. The

number of episodes of emesis and type were recorded. Repeated vomiting within 1-2 minute period was recorded as single emesis. The data were recorded as follows. No emesis - complete control, 1-2 episodes - Nearly complete control, 3-5 episodes - Partial control and > 5 episodes as Failure. Similarly, the number of episodes of retching (dry heaves) was also registered. The nausea was graded as 0 as none, 1 as Mild, 2 as Moderate and 3 as Severe. Any side effects appreciated were also recorded. The results were tabulated at 1 hr, 2hr, 6 hr and 24 hours post operatively. Severe nausea and vomiting was labelled as failure and rescue therapy was initiated with i.v. ondansetron with i.v. fluids.

**Statistical analysis:** The data obtained in the present study was expressed as Mean ± Standard Deviation. The data were analyzed by 'z test'. The level of significance was taken as P < 0.05.

**RESULTS**

In this study, a clinical evaluation of 100 parturients undergoing LSCS under spinal anaesthesia for the efficacy and safety of intravenous ondansetron for PONV was investigated. The large number of cases recruited was in the range of 23-26 years age group with a mean age of 25.7 ± 3.56 years in group-A and 27 ± 4.9 years in group-B (Table 1). The mean body weight of parturients undergoing LSCS under spinal anaesthesia was 54.48± 2.24 kgs in group-A and 54 ± 5.4 kgs in group-B. PONV was more common in parturients weight below 54.48 kgs. The mean duration of surgery was 42.96 ± 4.14 minutes in group-A and 68 ± 5.1 minutes in group-B (Table 1). There was no significant difference (p>0.05) with respect to age, weight and duration of surgery when compared group-A with group-B.

**Table 1: Demographic profile of patient’s in different group. n=50 patients each undergoing LSCS under spinal anaesthesia.**

Variables	Group-A	Group-B	P value
Age in years	25.7± 3.56	27 ± 4.9	p <0.05 NS
Weight in Kgs	54.48± 2.24	54 ± 5.4	p <0.05 NS
Duration of surgery in minutes	42.96± 4.14	68 ± 5.1	p <0.05 NS

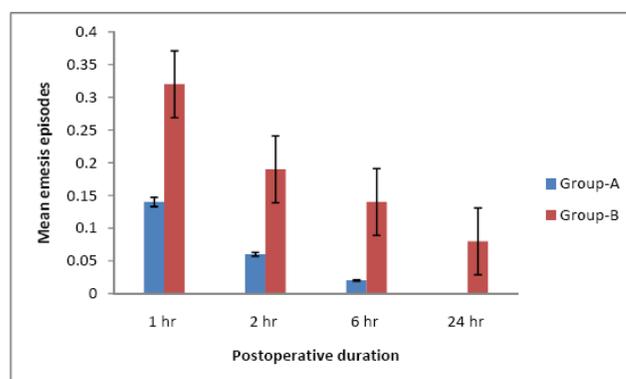
Note: NS=Non Significant

The mean episodes of emesis at different postoperative duration of patients undergoing LSCS under spinal anaesthesia was decreasing as time elapsed and it was significantly different in group-A when compared with group-B (Table 2, Figure 1).The mean nausea grades at different postoperative duration was graded as 0 for none, 1 for mild, 2 for moderate and 3 for severe emesis. The severity of emesis was decreasing as postoperative time progresses. It was not significant at 1<sup>st</sup> hour of

postoperation and it was highly significant in 2<sup>nd</sup>, 6<sup>th</sup> and 24 hours of post operation (Table 3, Figure 2).

**Table 2: Mean episodes of emesis at different postoperative duration in parturients belonging to group-A and group-B undergoing LSCS under spinal anaesthesia.**

Postoperative Duration	Emesis episodes (Mean ± S.D.)		Z-Value	P value
	Group-A	Group-B		
1 hr	0.14 ± 0.40	0.32 ± 0.30	z= -2.1386	p= 0.03
2 hr	0.06 ± 0.24	0.19 ± 0.20	z= -1.9654	p= 0.04
6 hr	0.02 ± 0.14	0.14 ± 0.40	z= -2.2116	p= 0.02
24 hr	0.0 ± 0.14	0.08 ± 0.30	z= -2.0412	p= 0.04



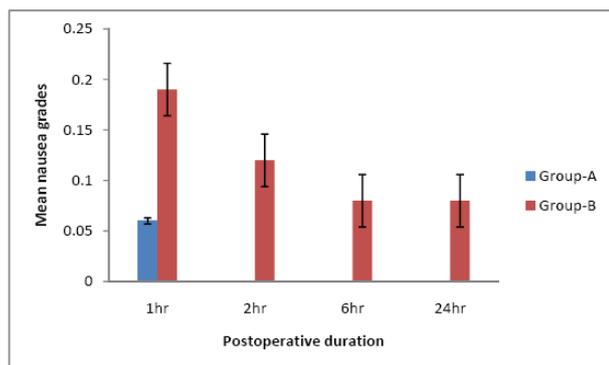
**Figure 1: Mean emesis episodes at different postoperative duration of patients undergoing LSCS under spinal anaesthesia.**

**Table 3: Mean nausea grades at different postoperative duration in parturients belonging to group-A and group-B undergoing LSCS under spinal anaesthesia.**

Postoperative duration	Nausea grades (Mean ± S.D.)		Z Value	P value
	Group-A	Group-B		
1 hr	0.36 ± 0.56	0.40 ± 0.52	z= -0.412	p= 0.68 NS
2 hr	0.06 ± 0.24	0.34 ± 0.46	z= -3.5	p= 0.00
6 hr	0.02 ± 0.14	0.20 ± 0.44	z= -2.8764	p= 0.00
24 hr	0.02 ± 0.14	0.14 ± 0.54	z= -2.2116	p= 0.02

The retching was recorded as the number of episodes and the mean episodes of retching at different postoperative duration was recorded. The total number of retching in 5 minutes was taken as one episode. The incidence of retching was significantly different when compared group-A with group-B and the retching episodes were

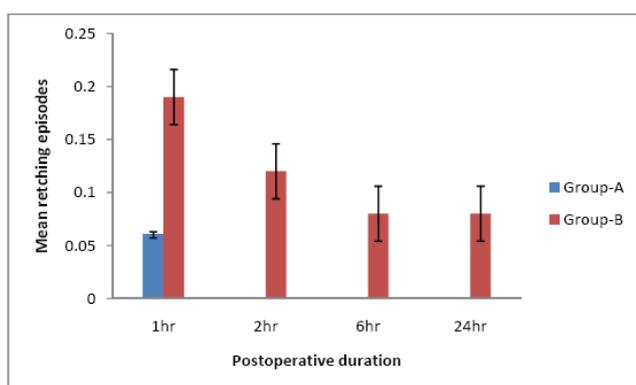
decreasing significantly as postoperative time progresses (Table 4, Fig 3).



**Figure 2: Mean nausea grades at different postoperative duration in patients undergoing LSCS under spinal anaesthesia.**

**Table 4: Mean episodes of retching at different postoperative duration of 100 patients undergoing LSCS under spinal anaesthesia.**

Postoperative duration	Retching episodes (Mean ± S.D.)		Z-Value	P value
	Group-A	Group-B		
1hr	0.06 ± 0.24	0.19 ± 0.28	z=-1.9654	p= 0.04
2hr	0.0 ± 0.0	0.12 ± 0.14	z=-2.5265	p= 0.01
6hr	0.0 ± 0.0	0.08 ± 0.12	z=-2.0412	p= 0.04
24hr	0.0 ± 0.0	0.08 ± 0.18	z=-2.0412	p= 0.04



**Figure 3: Mean retching episodes at different postoperative duration in patients undergoing LSCS under spinal anaesthesia.**

## DISCUSSION

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.<sup>10</sup> Postoperative vomiting may though rarely, lead to a life threatening complication like aspiration pneumonitis.

In subarachnoid block for LSCS, 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-HT<sub>3</sub> antagonist, ondansetron.<sup>11</sup>

In the present study, we evaluated the efficacy and safety of intravenous ondansetron as prophylaxis for PONV in LSCS under subarachnoid block. In an earlier study on the prevention of PONV after LSCS under epidural anaesthesia proved that ondansetron 4mg i.v. is more effective in preventing nausea than metoclopramide 10mg.<sup>12</sup>

**Age incidence:** The average age of the patients in present study was 25.7 years which is similar to the earlier report stating the increase in age causes decrease in emesis.<sup>13</sup> Therefore, it is suggested that the incidence of PONV was more in younger patients than older.

**Weight incidence:** Obesity is usually seen to be associated with increased incidence of PONV. An earlier study<sup>14</sup> reported that, higher percentage of patients with emetic episodes in heavier patients. In the present study, mean weight was 54.48 kg. The incidence of vomiting was more in patients with weight more than 54.48 kgs.

**Vomiting incidence:** In this study, the incidence of vomiting was more at 1 hour and 2 hour but, the severity of vomiting was less. We observed retching separately from vomiting. The incidence of retching was also less in ondansetron administered patients and was very significant at 2 hour.

**Incidence of nausea:** In the present study, the severity of nausea incidence of PONV was very less at 6 hour and 24 hours when compared to the earlier reports.<sup>15</sup>

This study proved that ondansetron significantly reduced the incidence of PONV at 1 hour and 2 hour.

## CONCLUSION

It is fair to conclude from this study that ondansetron; a 5HT<sub>3</sub> antagonist in the dose of 4mg has proved as a better prophylactic drug in the prevention of PONV in LSCS under spinal anaesthesia.

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*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethical Committee*

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