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ORIGINAL RESEARCH

Study on efficacy of Ketamine and Ondansetron for Prevention of Shivering during Anesthesia

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ABSTRACT

Background: The use of anesthetics and opioids leads to motor and behavioral inhibition, body movements and consequently a decrease in body temperature, which results in shivering. So, the objective of this study to evaluate the efficacy Of Ketamine and Ondansetron for prevention of shivering during anesthesia.

Materials and Methods: Total 120 cases were included in this study. We were divided in to 2 groups. This study was conducted in the Department of Anaesthesia in Pacific Medical College and Hospital.

Results: We were included 120 cases in this study. Among all 70 were female and rest were male. We were divided in to three group which were Ketamine (60) & Ondansetron (60). We were found in this study, the frequency of shivering in the groups who received Ketamine was significantly lower than the Ondansetron group.

Conclusion: This study concludes that, Ketamine in dose of 0.25mg/kg has been found to be significantly more effective than ondansetron (4mg) during spinal anesthesia.

Keywords: Ketamine, Ondansetron, Shivering, Anaesthesia.

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INTRODUCTION

Shivering is a known complication following exposure to anesthesia. Approximately 5-65% patients after general anesthesia and 33% patients after regional anaesthesia complained shivering. Post anesthetic shivering is defined as detected tremor or fasciculation of the face, jaw, head, trunk or extremities lasting longer than 15 sec.[1,2] for the treatment of postoperative shivering pethidine 25mgIV is remarkably effective.[3,4] Its antishivering action is partially mediated by K opioid receptors Ketamine.[5,6] It is a competitive NMDA receptor antagonist also inhibits post operative shivering.[7] NMDA receptor antagonists modulate thermoregulation at multiple levels. These areas are preoptic anterior hypothalamus.[8]

All general anesthetics markedly impair normal autonomic thermoregulatory control. Though, non-thermoregulatory shivering may also occur in normothermic patients in response to anesthetics or postoperative pain.[9] Postoperative shivering is very unpleasant and physiologically stressful. Sometimes it may cause complications in patients with coronary artery disease. the reason could be the increases in oxygen consumption (by 100–600%), cardiac output, carbon dioxide production, and circulating catecholamines, and a significant decrease in mixed venous oxygen saturation.[10] However an increase in intracranial and intraocular pressure, interference with monitoring of ECG and blood pressure, increased metabolic rate, and lactic acidosis have been described in shivering

patients.Several drugs have been investigated for prevention or treatment of postoperative shivering.

Ondansetron, 5HT 3 receptor antagonist, is used mainly as an antiemetic. Its role in the prevention of shivering in dose of 8mg IV without any side effects has been of late discussed. A very few studies are available to show preventive effects of ketamine and ondansetron against shivering during spinal anaesthesia and on the other hand, there is no study assessing the use of low doses of these two drugs for prevention of shivering during spinal anaesthesia. Therefore, the present study was planned to assess and compare the preventive effects and safety of low dose ketamine (0.25 mg kg-1) and ondansetron (4 mg) against shivering during spinal anaesthesia.

The aim of the present study is to evaluate the efficacy Of Ketamine and Ondansetron for prevention of shivering during anesthesia.

MATERIALS & METHODS

Study Population: Total 120 cases were included in this study. We were divided in to 2 groups.

Study Area: This study were conducted in This study were conducted in the Department of Anaesthesia in Pacific Medical College and Hospital.

Data collection:120 the cases that were going to lower abdominal surgery were included in this study. After obtaining informed written consent, all of them were divided into two groups, Group O & K.Group O was Ondansetron (4mg) and Group K (0.25 mg/kg) was Ketamine. Each group had 60 cases.The room temperature kept at 25oC.Prior to spinal anesthesia, each case was preloaded with 15 ml/kg of Ringer Lactate solution. Subarachnoid anesthesia was instituted at either L3/4 or L4/5 interspace with 3ml of 0.50% hyperbaric Bupivacaine. Then nasopharyngeal temperature was recorded in every 10 min. during the procedure. Then fluid was infused intravenously. After that the intrathecal injection, one of the study drug was given as an IV bolus. Then we were recorded shivering score at every 10 min. of interval. If 15 minutes after spinal anesthesia and concomitant administration of a prophylactic dosed of one of the study drugs, the patients shivered to atleast Grade 3, shivering was considered significant and prophylaxis as ineffective and Tramadol 0.50 mg/kg iv was given as rescue drug. Side effects such as hypotention, nausea and vomiting, and hallucinations were recorded.

The shivering system was evaluated on the bases of 4 grading system.

- G-0 No shivering
- G-1 Mild fasciculation of face or neck
- G-2 Visible tremor involving more than one muscle group
- G-3 Gross muscular activity involving the entire body

RESULTS

In this study we were included 120 cases. Among all we were divided into two groups. One group was Group O (Ondansetron) & another was Group K (Ketamine). In this study predominantly we found female than female. We recorded grading of shivering in 0-30 min,30-60 min 60-90 min & 90-120 min.Which we showed in Table 2. In the present study, cases showed by different side effect that was in 8 cases hypotension, Nausea & Vomiting 17, halluciationation 7 & in 58 cases developed sedation in Group O and 6, 17, 13 & 43 in Group K respectively.

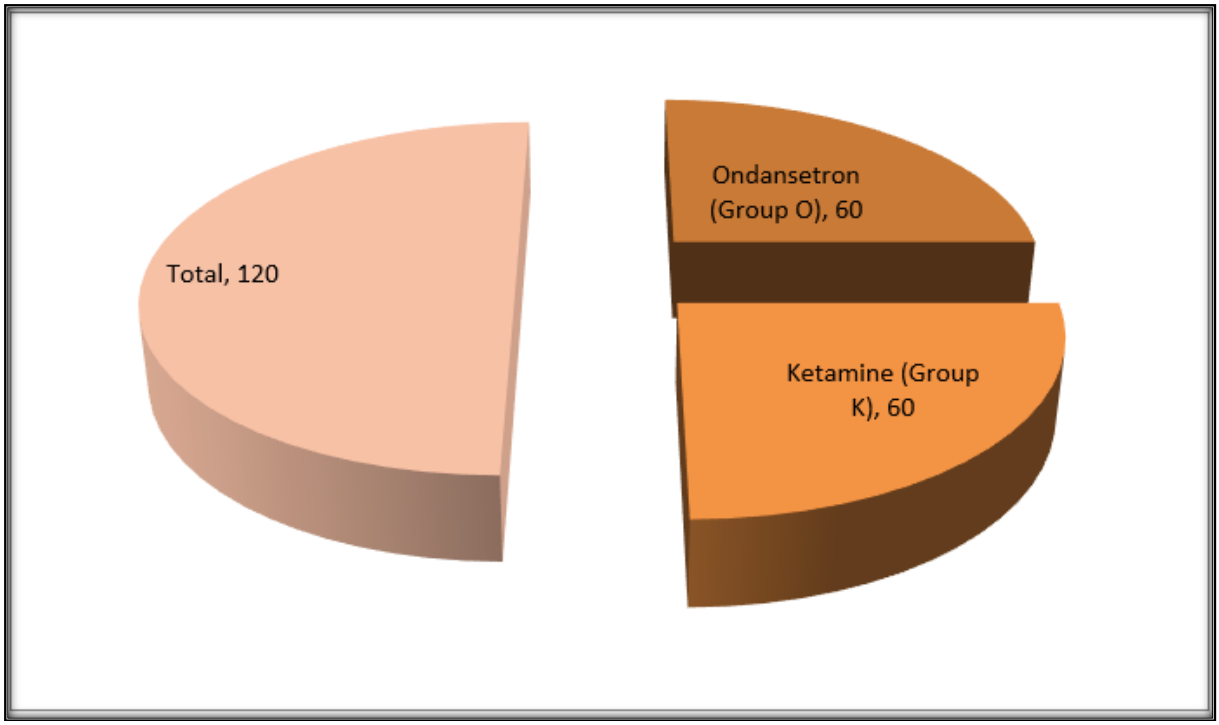

Figure 1: Distribution of cases according to group

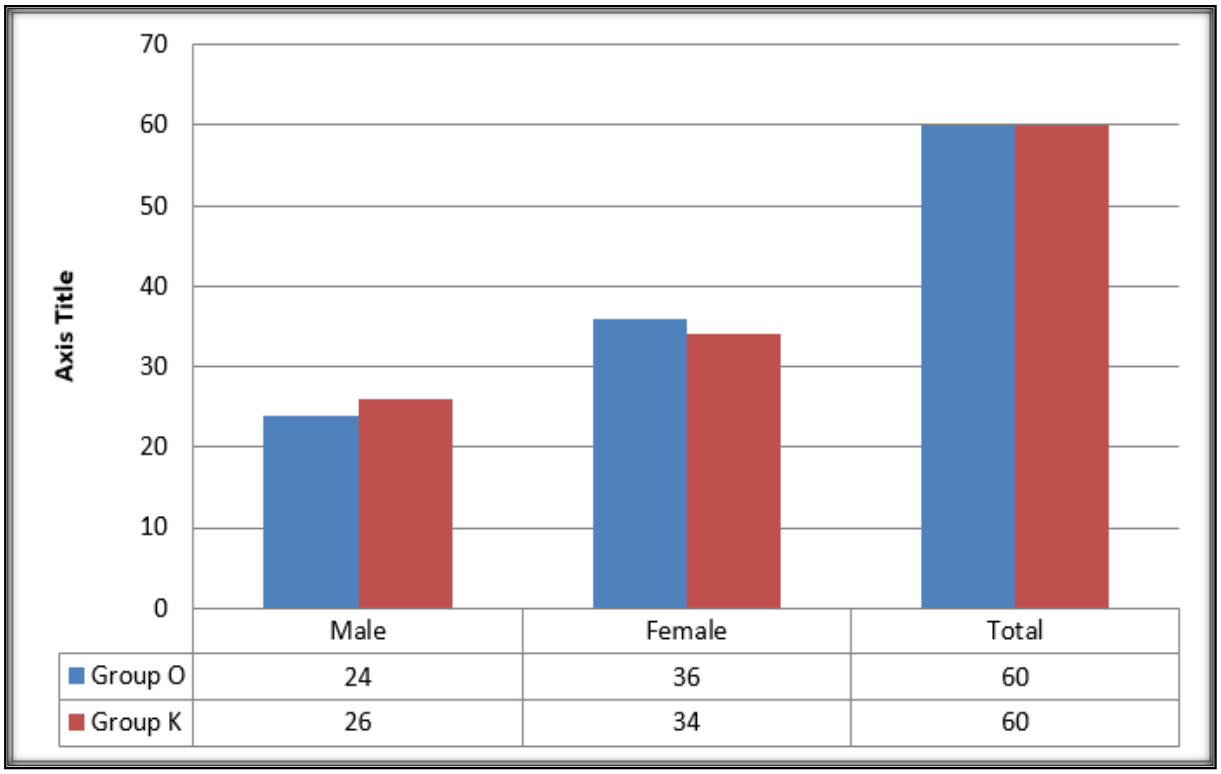

Figure 2: Distribution of cases according to gender

Table 1: baseline characteristics

Characteristics	Group O	Group K
BMI	22±1.4	22±1.39
Surgical duration	105	103

Table 2: Distribution of cases according to shivering grading

Groups	Shivering							
	0-30		30-60		60-90		90-120	
	Grade>3	Grade<3	Grade>3	Grade<3	Grade>3	Grade<3	Grade>3	Grade<3
Group O	2	58	4	56	6	54	6	54
Group K	0	60	0	60	2	58	2	58

Table 3: Distribution of cases according to side effect

Side effect	Group O (60)	Group K (60)
Hypotension	8	6
Nausea and vomiting	17	17
Hallucinations	7	13
Sedation	58	43

DISCUSSION

In the present study, the preventive effects of comparative efficacy and safety of prophylactic low dose of ondansetron and ketamine with different mechanism of action were evaluated against shivering during spinal anaesthesia. In both the groups, the median level of sensory block was compared (upto 110) after 15 minutes of spinal anesthesia. Throughout intra-operative period, hemodynamic parameters like heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure were monitored every 10 minutes. In hemodynamic parameters of the present study, no differences were reported among both the groups. The results of the present study were comparable with the findings of other studies who also evaluated the preventive effects of low dose ketamine and ondansetron against shivering during spinal anesthesia. Outcomes of the study were also similar to Sagir O et al,[11] who assessed the prophylactic role of ketamine and granisetron and to Kelsaka E et al,[12] who evaluated the role of ondansetron and meperidine. Nasopharyngeal temperature is an established site for the measurement of core temperature. In the present study, nasopharyngeal temperature was measured with the help of non-invasive nasopharyngeal temperature probe. A significant decrease in the mean nasopharyngeal temperature was found in both the groups with respect to baseline values after spinal anesthesia. Internal redistribution of body heat, heat loss to the environment and inhibition of centrally mediated thermoregulatory control can be attributed for hypothermia during spinal anesthesia. A significant decrease in nasopharyngeal temperature in Group O in comparison to Group K can be due to vasoconstriction caused by ketamine. 5HT3 receptors have been reported to affect both heat production and heat loss pathways. The mechanism of action of ondansetron, a specific 5HT3 receptor antagonist may be due to the inhibition of serotonin uptake on the pre-optic anterior hypothalamic region. In the present study low dosage of ondansetron were given to patients and the incidence of shivering was reported only in 10% of cases.

Ketamine, a competitive receptor antagonist of Nmethyl-D-aspartic acid (NMDA) has an established role in thermoregulation at multiple levels. Ketamine has been found to control shivering by non-shivering thermogenesis either affecting the beta-adrenergic effect of nor epinephrine or the hypothalamus. In the present study, shivering with ketamine was reported in 2 patients only. Thus, ketamine may be suggested to prevent shivering better than ondansetron. Similarly, the hypotensive episodes were lesser in ketamine. The cause of less

hypotensive effect of Ketamine may be the sympathetic stimulation and vasoconstriction. In another important finding of our study, no hallucination episodes were reported with a dose of 0.25 mg/kg of ketamine.

CONCLUSION

In patients undergoing spinal anesthesia, it can be advocated that the prophylactic low dose ketamine (0.25mg/kg) and ondansetron (4 mg) produces significant anti-shivering effect. Ketamine in dose of 0.25mg/kg has been found to be significantly more effective than ondansetron (4mg) during spinal anesthesia.

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