

# EFFECT OF KETAMINE AND NALBUPHINE ON SHIVERING AFTER SPINAL ANESTHESIA

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## ABSTRACT

**Background:** Intraoperative shivering occurs in significant proportions of patients undergoing spinal anesthesia, and may also cause complications, especially in the patients with coronary artery disease, because of associated increase in oxygen consumption. **Objective:** To compare the effect of ketamine and nalbuphine on shivering after spinal anesthesia. **Methodology:** Study design: Quasi experimental study. This study was conducted in operation theater phase 2 of Sheikh Zayed Hospital, Rahim Yar Khan. Duration: From 6<sup>th</sup> September 2016 to 13<sup>th</sup> February 2017. The patients under going non obstetrical surgery under spinal anesthesia were included in this study. The data was collected from 67 patients on which we compared the effect of ketamine (group A) and nalbuphine (group B) on shivering after spinal anaesthesia. The patients undergoing gynaecological and obstetrics procedures were excluded from this study. The data was entered and analyzed by using SPSS 20. **Results:** In our study, total 67 non-obstetrical patients were included undergoing spinal anesthesia. Age range was 15 to 80 years. Out of 67 patients ketamine was given to 34(82.9%) males and 7(17.1%) females and nalbuphine was given to 21(80.8%) males and 5(19.2%) females. In group A shivering stopped by ketamine was 90.2% and in group B shivering stopped by nalbuphine was 69.2%. **Conclusion:** Ketamine showed better effect on shivering after spinal anesthesia as compared to nalbuphine in non-obstetrical patients undergoing elective surgical procedures.

**Key Words:** Ketamine, Nalbuphine, Spinal Anesthesia, Shivering.

## INTRODUCTION

Regional anesthesia, also called conduction anesthesia, is given to many patients under going surgery.<sup>1,2</sup> Conduction anesthesia includes epidural anesthesia, spinal anesthesia, and nerve block anesthesia. Shivering is a frequent well recognized complication.<sup>3</sup> Post anaesthesia shivering (PAS) is associated with patient discomfort including increase in postoperative pain, sympathetic stimulation, metabolic oxygen demand, and carbon dioxide production. As a result, it imposes increased stress on the cardiopulmonary system, via increases in cardiac output and minute ventilation, which can be detrimental in patients with limited reserves.<sup>4-10</sup> Intraoperative shivering occurs in 50-60% of patients undergoing regional anesthesia.<sup>11</sup> These complications can lead to cardiovascular and neurological deficits, as well as organ damage. Shivering if not treated, may detrimentally impact patient outcomes, prolong recovery, and prolong hospitalization.<sup>12</sup> Intraoperative shivering also interfere intraoperative monitoring like ECG, SpO<sub>2</sub> and blood pressure, which may pose patient safety issues.<sup>13</sup> Different drugs have been evaluated for preventing and treating shivering, however, a "gold standard" drug treatment has not been defined. Among the drugs, opiates are most

potent drugs used for shivering (especially the pethedine). However, the opiates are associated wideranging and unpredictable side effects, including respiratory depression, hypertension, sedation, itching, nausea, and vomiting.<sup>14-18</sup> The objective of this study was to compare the effect of ketamine and nalbuphine, on shivering after spinal anesthesia in non obstetrical patients.

## METHODOLOGY

**Study Design:** Quasi experimental study. **Setting:** The study was conducted in the Operation Theater Phase 2, of Sheikh Zayed Medical College/Hospital Rahim Yar Khan. **Duration:** From 6<sup>th</sup> September 2016 to 13<sup>th</sup> February 2017. **Subjects:** A total of 67 patients both male and female who under went urology, orthopedics, plastic surgery and general surgery were included in this study. **Sampling Technique:** Patients were randomly selected in two groups.

This study was conducted on total of 67 patients; in group A intravenous ketamine (at dose of 1-2mg/kg body weight) was given to 41 patients and in group B intravenous nalbuphine was given to 26 patients at dose of 0.1mg/kg body weight. **Inclusion Criteria:** Patients were selected who fulfilled following inclusion criteria; Patients who urology, orthopedics, plastic and

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general surgeries, who were given spinal anesthesia. Age:15-80 years.

**Exclusion Criteria:** Patients who undergone gynecological and obstetrics procedures, patients below 15 years of age, and patients given general anesthesia.

The data was collected on a performa having variables such as age, gender, occupation, temperature of OT, weight, drug of choice and repeated dose. Now occurrence of shivering were seen and then compared the effect of drug on shivering accordingly to these drugs. The data was entered and analyzed by using SPSS 20. Variables like age, gender, procedures, occurrence of shivering, drug used, and repeat dose was analyzed by calculating mean $\pm$  SD. Qualitative data was calculated as frequency. Chi-square test was applied and p value of  $< 0.05$  was considered as statistically significant.

## RESULTS

A total of 67 non-obstetrical patients were included in this study undergoing spinal anesthesia. Mean age was  $41\pm 21$  years, out of 67 patients male were 55 (82%) and female 12 (18%). Out of 67 patients ketamine was given to 41 patients and nalbuphine given to 26 patients. Shivering stopped by ketamine was 90.2% and shivering stopped by nalbuphine was 69.2%. It was noted that, 56.71% were labourer, 10.47% students, 16.41% landlord and 16.41% were housewives. Out of total 67 patients, 38.8% came for urology surgery, 53.9% came for Orthopedic surgery, 2.9% are for plastic surgery and 4.4% are for general surgery. It was noted that 82.9% in Ketamine group were male where as 80.8% in Nalbuphine group were male.

**Table I : Drug given versus Shivering Stopped**

Drug	Shivering Stopped		Total
	Yes	No	
Ketamine	37(90.2%)	4(9.8%)	41(100.0%)
Nalbuphine	18(69.2%)	8(30.8%)	26(100.0%)
Total	55(82.1%)	12(17.9%)	67(100.0%)

Table I shows that out of 67 patients, ketamine was given to 41 patients and nalbuphine given to 26 patients. Shivering stopped by ketamine was 90.2% and shivering stopped by nalbuphine was 69.2%. (P=0.00)

## DISCUSSION

Shivering during spinal anesthesia can be detrimental for patients generally and specifically for patients with compromised heart functions.<sup>6,10</sup> However different treatments are being used.<sup>2,3</sup> Out of total 67 patients, 38.8% came for urology surgery, 53.9% were for Orthopedic surgery, 2.9% were for plastic surgery and 4.4% were for general surgery. In this study, out of 67 patients, ketamine was given to 41 patients, in which 82.9% were males and 17.1% females and Nalbuphine was given to 26 patients. Previous studies favored our findings that ketamine is better in terms of controlling shivering after spinal anesthesia.<sup>12,13,14</sup> Shivering stopped by ketamine was 90.2% and with nalbuphine was 69.2%. In this study, it was concluded that ketamine shows better effect on shivering after spinal anesthesia as compared to nalbuphine in non-obstetrical patients undergoing elective surgery. A study found that ketamine reduces shivering after spinal anesthesia.<sup>12</sup>

Shivering during spinal anesthesia is common and can be nearly as severe as that observed during general anesthesia.<sup>15</sup> Intraoperative shivering can be treated by skin surfaces warming, radiant heat application or pharmacological agents. Shivering can be distressing to the patient and has been cited as one of the primary causes of discomfort during the postoperative period.<sup>16</sup> Many physiological consequences are also associated with shivering. Shivering also interfere intraoperative monitoring which may pose patient safety issues. Shivering if not treated during intraoperative may impact patient outcomes like prolong recovery and lengthen the period of hospital stay.<sup>17</sup> Ketamine having antagonizing action on NMDA receptor is an inexpensive, widely available general anesthetic agent and ketamine differs from other anesthetic agents as it produces a significant analgesic effect whilst rarely causing cardiovascular or respiratory depression.<sup>17,18</sup> Studies have shown that ketamine may prevent shivering at doses of 0.5mg/kg or less and this dose is much less than the dose used for induction in general anesthesia, this dose unlikely produce side effects associated with ketamine.<sup>10</sup> Ketamine affects shivering by core to peripheral redistribution by preventing vasodilation and also interfere with thermoregulatory mechanism in brain. Ketamine is known to cause hallucinations, but none of the patients complained of hallucination in any of the groups.<sup>15</sup> Our study showed that significant association was found between ketamine and nalbuphine. A study showed

that small doses of ketamine or nalbuphine administered at the end of MRI procedure under sevoflurane anesthesia reduce emergence agitation without delaying discharge, nalbuphine provided better results than ketamine.<sup>17</sup> Additionally Intrathecal nalbuphine is reported to safe method to prevent shivering during spinal anesthesia undergoing knee arthroscopy.<sup>18</sup>

## CONCLUSION

It was concluded that ketamine showed better effect on shivering after spinal anesthesia as compared to nalbuphine in non-obstetrical patients undergoing elective surgery under spinal anesthesia.

**Conflict of interest:** There is no conflict of interest among authors.

**Ethical Consideration:** Informed verbal consent from patients and permission was taken from Institutional Review Board to conduct the study.

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