

## ORIGINAL ARTICLE

**Comparison of Efficacy of Intravenous Tramadol versus Normal Saline in Suppression of Postoperative Shivering in Patients undergoing Elective Surgery**RIFFAT SAEED<sup>1</sup>, NASIR ALI<sup>2</sup>, SYED MEHMOOD ALI<sup>3</sup>, IRAM QAMAR<sup>4</sup>, AMER LATEF<sup>5</sup>, MUHAMMAD SARWAR<sup>6</sup>, IRFAN ALI<sup>7</sup>, SABIN SHAHJEHAN<sup>8</sup><sup>1</sup>Assistant Professor Anesthesia Sheikh Zayed Hospital, Lahore<sup>2</sup>Consultant Anaesthetist Sheikh Zayed Hospital, Lahore<sup>3</sup>Associate Professor Anesthesia Sheikh Zayed Hospital, Lahore<sup>4</sup>Assistant Professor Anesthesia Mayo Hospital, Lahore<sup>5</sup>Associate Professor of Hepatobiliary Sheikh Zayed Hospital<sup>6</sup>Consultant Anaesthetist Sheikh Zayed Hospital, Lahore<sup>7</sup>Consultant Anaesthetist Sheikh Zayed Hospital, Lahore<sup>8</sup>Consultant Anaesthetist Sheikh Zayed Hospital, LahoreCorrespondence to: Dr. Riffat Saeed, Email: [riffatsaeeddr@gmail.com](mailto:riffatsaeeddr@gmail.com), Cell: +92 302 4615150**ABSTRACT****Background:** Shivering in the post anesthesia care unit is a common and distressing complication for patients after receiving general or regional anesthesia. Perioperative hypothermia has been associated with an increase in morbidity and mortality. Both central and peripheral thermoregulation is impaired by regional anesthesia. Thermoregulatory system synchronizes with defense system to maintain body's heat and coolness within the narrow range, thus improving the normal functioning.**Objective:** To compare the efficacy of intravenous tramadol versus normal saline in suppression of postoperative shivering in patients undergoing elective surgery.**Design:** It was a randomized control trial.**Study Settings:** Trial was conducted at Department of Anesthesiology and ICU, Sheikh Zayed Hospital, Lahore, for a period of one year w.e.f 7-11-2019 to 7-11-20.**Patients and Methods:** A total of 50 patients with age 18 years and above from both the genders undergoing elective surgery under general anesthesia were included in the study and divided into two equal groups randomly. Patients in tramadol group were given tramadol 0.5mg/kg I/V and patients of control group were given 0.9% normal saline 5ml I/V.**Results:** In tramadol groups the mean age of patients was 27.88±2.79 years while the mean age of the patients from placebo group was 27.84±4.23 years. In this study the efficacy was achieved in 37(74.0%) patients. In control group the efficacy was achieved in 15(60%) patients and in tramadol group the efficacy was achieved in 22(88.0%) patients (p-value<0.05).**Conclusion:** According to this study the intravenous tramadol is safe and effective drug in suppression of postoperative shivering in patients undergoing elective surgery under spinal anesthesia.**Keywords:** Intravenous Tramadol, Spinal Anesthesia, Shivering, Elective Surgery.**INTRODUCTION**

Shivering in post anesthesia care unit is a common and distressing complication for patients after receiving general or regional anesthesia.<sup>1</sup> It increases oxygen consumption, increases cardiac output, decreases mixed-venous oxygen saturation and leads to monitor artifacts.<sup>2</sup> Shivering causes increased metabolic requirements of the body, predisposing patients to complications who already have respiratory illnesses, fixed cardiac outputs and intrapulmonary shunts.<sup>3,4</sup>

Shivering is a frequent complication and is seen in 40% of cases intra-operatively under spinal anesthesia and postoperatively after general anesthesia.<sup>5</sup> General anesthesia causes thermoregulatory impairment by increasing heat response and decreasing cold response thresholds, body heat is redistributed peripherally causing a reduction in core temperature and the body requires more shivering to prevent further hypothermia. Under spinal

anesthesia, heat loss accelerated by vasodilatation and impaired afferent thermal information caused by the sympathetic block.<sup>6,7</sup>

Tramadol is a  $\mu$ -receptor agonist opioid. It inhibits the reuptake of serotonin, norepinephrine and acts as a serotonin 5-HT<sub>2C</sub> receptor antagonist.<sup>8</sup> Activation of Cerebral alpha 2 adrenoceptors by Tramadol helps in controlling of postoperative shivering. It has been postulated that Tramadol may control shivering at doses less than 1mg/kg.<sup>9,10</sup>

A randomized double blind study reported that, post-operative shivering incidence was 12.5% in tramadol group (efficacy=87.5%) and 25% in control group (efficacy=75%) with p-value of 0.12.<sup>9</sup> In another study conducted in 2016, tramadol and normal saline were compared and reported that the shivering incidence was 3.3% (efficacy= 96.7%) and 40% (efficacy=60%) in both groups respectively with a p-value<0.01 and significantly reduced shivering was seen with tramadol as compared to other drugs.<sup>11</sup>

In 2017, a study was conducted in Iran that compared the effect of oral clonidine with oral tramadol in patients undergoing transurethral lithotripsy under spinal

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anesthesia, in controlling shivering. Both the groups were statistically insignificant with regard to shivering ( $p > 0.05$ ).<sup>12</sup> Another study compared shivering control of dexmedetomidine, pethidine and tramadol. Dexmedetomidine had better control of shivering in comparison with tramadol ( $p$ -value 0.0012). Both tramadol and pethidine had statistically insignificant difference ( $p$ -value 0.082). It was concluded that dexmedetomidine was better in control of shivering as compared to other two drugs but with a higher incidence of complications like bradycardia and hypotension ( $p < 0.05$ ).<sup>13</sup>

There was no local published data. So, the purpose of this study was to repeat this clinical study in local population and see efficacy of IV tramadol versus normal saline in suppression of postoperative shivering in patients undergoing elective surgery.

### PATIENTS AND METHODS

This randomized controlled trial was conducted at anesthesia department, operation theatres and post anesthesia care unit, Shaikh Zayed Hospital, Lahore for a period of one year w.e.f 7-11-2019 to 7-11-20. Patients belonging to both the genders with age 18 years or above undergoing elective surgery under general anesthesia were included in the study through non-probability consecutive sampling and were divided into two groups using lottery method. Patients with known hypersensitivity to tramadol, with body temperature  $> 100^{\circ}\text{F}$ , with history of substance or alcohol abuse or having intramuscular meperidine within one hour were excluded from the study. An informed written consent was taken from all the patients. Sample size of 50 was estimated by using 80% power of test, 5% level of significance with expected percentage of postoperative shivering i.e. 96.7% with tramadol and 60% with normal saline.<sup>10</sup>

Operation theatre temperature was set at  $24^{\circ}\text{C}$  using room/wall thermometer and maintained with air conditioners / central heaters. Drugs and infusion fluids were given at room temperature and body temperature was recorded. Standard monitoring was applied including pulse oximeter, electrocardiography and non-invasive blood pressure. For spinal anesthesia, preloading was done with crystalloid solutions like Ringer's Lactate or Normal Saline. Subarachnoid block was achieved at L3-4 or L4-5 intervertebral space with 0.75% Bupivacaine. Blanket was used to cover the chest and upper limbs. Supplemental oxygen at the rate of 5Liters/min was administered via Hudson mask.

Table 3: Comparison between the Groups Stratified by Age, Weight and Body Temperature

Description	Efficacy	Control Group	Control Group	Total	p-value
Age (Years)					
20-30	No	3 (13.6%)	8 (42.1%)	11 (26.8%)	0.040
	Yes	19 (86.4%)	11 (57.9%)	30 (73.2%)	
31-40	No	0 (0.0%)	2 (33.3%)	2 (22.2%)	0.257
	Yes	3 (100%)	4 (66.7%)	7 (77.8%)	
Weight (kg)					
$\leq 70$	No	9 (47.4%)	2 (14.3%)	11 (33.3%)	0.46
	Yes	10 (52.6%)	12 (85.7%)	22 (66.7%)	
$> 70$	No	1 (16.7%)	1 (9.1%)	2 (11.8%)	1.000
	Yes	5 (83.8%)	10 (90.9%)	15 (88.2%)	
Body Temperature( $^{\circ}\text{F}$ )					
$\leq 99$	No	5 (41.7%)	1 (10.0%)	6 (27.3%)	0.097
	Yes	7 (58.3%)	9 (90.0%)	16 (72.7%)	
$> 99$	No	5 (38.5%)	2 (13.3%)	7 (25.0%)	0.198
	Yes	8 (61.5%)	13 (86.7%)	21 (75.0%)	

At the end of surgery; patient were shifted to post anesthesia recovery room. Recovery room was temperature was controlled at  $24^{\circ}\text{C}$ . Patients were given either 1mg/kg intravenous tramadol or placebo (normal saline). Then patients were followed-up by the researcher for shivering. Efficacy was labeled if patient was not have shivering and grade  $< 2$  (as per operational definition). The statistical analysis was conducted through SPSS v22.0. The initial analysis was descriptive analysis in which mean and standard deviation of continuous variables (age, weight, blood pressure, temperature) and percentages of categorical variables (gender, shivering and efficacy) was calculated. Among groups efficacy was compared by using chi-square test. P-value  $\leq 0.05$  was considered significant. Data was stratified for age, gender, weight, blood pressure and body temperature. Post-stratification, comparison was made by using chi-square test. P-value  $\leq 0.05$  was considered significant.

### RESULTS

In this study total 50 patients were enrolled. Mean age of the patients from control group was  $27.88 \pm 2.79$  years while the mean age of the patients from tramadol group was  $27.84 \pm 4.23$  years as given in Table 1. The groups were statistically insignificant regard to age, weight and temperature and age i.e.  $p$ -value  $> 0.05$ . Results showed that in control group the efficacy was achieved in 15(60%) patients and in tramadol group the efficacy was achieved in 22(88.0%) patients. Statistically significant difference was observed between the study groups and efficacy. i.e.  $p$ -value=0.024 Table 2. Stratification of dataf or age, weight and body temperature has been given in Table 3.

Table 1: Study Sample Baseline Characteristics

	Control Group (n=25)	Tramadol Group (n=25)	p-value
Age (Years)	50.52±13.71	44.12±16.65	0.145
Weight (Kg)	64.28±7.76	67.20±8.87	0.222
Temperature ( $^{\circ}\text{F}$ )	99.10±0.36	99.16±0.39	0.531

Table 2: Comparison of Efficacy between the Groups

	Control Group (n=25)	Control Group (n=25)	p-value
Efficacy			
Yes	10 (40.0%)	3 (12.0%)	0.024
No	15 (60.0%)	22 (88.0%)	

## DISCUSSION

Anesthesia practice in the present era is dictated by the need to provide maximal patient comfort and maintain body homeostatic mechanisms within the normal limits. Tramadol is  $\mu$  receptor agonist with minimal effect on kappa and delta receptors.<sup>13</sup> It inhibits the neuronal uptake of norepinephrine and 5-hydroxytryptamine and facilitates the release of 5-hydroxytryptamine release. Tramadol, an atypical central acting opioid, is a 4-phenylpiperidine analogue of codeine.<sup>14</sup>

In our study we find significantly better control on shivering in intravenous tramadol group patients in comparison with normal saline group patients. In control group the efficacy was achieved in 15(60%) patients and in tramadol group the efficacy was achieved in 22(88.0%) patients (p-value=0.024). However in term of temperature, blood pressure both groups were equally effective.

A study by Onyekwulu et al.<sup>16</sup> documented that about 80.1% responded to T0.25 and but 4.3% responded to TNS. There was significant differences observed regarding the frequency of recurrence of the shivering in all study groups (P = 0.000). Tramadol is an effective drug for prevention and control of post-anesthetic shivering after surgery. The control of shivering is noted to be better with 0.5 mg/kg tramadol as compared to the 0.25 mg/kg tramadol. So, 0.5 mg/kg tramadol can be administered to prevent or manage the post-anesthetic shivering after a surgery. Similar findings were observed by Morsali SF et al.<sup>12</sup> Wason et al.<sup>17</sup> and Gupta et al.<sup>18</sup> in their study about controlling the shivering due to anesthesia.

In combination with magnesium & tramadol a study by Sachidananda et al.<sup>2</sup> found that the frequency of shivering in control group was 67.5%, with tramadol was 43.9% and with magnesium sulphate was 39%. The frequency of shivering was significantly low in magnesium sulphate and tramadol groups as compared to control group (P-value <0.05), but the difference between tramadol and magnesium sulphate was insignificant (P-value = 0.654). Thus tramadol and magnesium sulfate can significantly control the occurrence of post-anesthetic shivering.

However, a study carried out in 2013 on 40 patients who had post-arachnoid block shivering, Tramadol and Butorphenol were randomly assigned to these patients in doses of 50mg IV and 1mg IV respectively. They were monitored for time required to control the shivering and hemodynamic stability. Butorphenol was found to be more effective in avoiding recurrence as compared to Tramadol, though both were equally effective in controlling shivering.<sup>13</sup>

Whereas a study by Gupta et al.<sup>18</sup> showed no significant difference between the tramadol and pethidine in controlling postoperative shivering. Both the drugs are effective in controlling the postoperative shivering.

In our study when data was stratified by age and gender we came to know that In patients having age  $\leq 50$  years: in control group the efficacy was achieved in 8(66.7%) patients while in tramadol group the efficacy was achieved in 13(92.9%) patients (p-value=0.091). Similarly In patients having age  $>50$  years: in control group the efficacy was achieved in 7(53.8%) patients while in control group the efficacy was achieved in 9(81.8%) patients (p-

value=0.211). Similarly In female patients: in control group the efficacy was achieved in 8(61.5%) patients while in tramadol group the efficacy was achieved in 14(87.5%) patients (p-value=0.104). Similarly In male patients: in control group the efficacy was achieved in 7(58.3%) patients while in tramadol group the efficacy was achieved in 8(88.9%) patients (p-value=0.178).

In future further studies are suggested to be conducted on this topic with larger sample size to evaluate the findings of our study.

## CONCLUSION

According to this study the tramadol is safe and effective drug in suppression of postoperative shivering in patients undergoing elective surgery, so to control post-op shivering tramadol is recommended in surgeries under spinal anesthesia.

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