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## A comparative study on the efficacy of Dexmedetomidine and tramadol on post-spinal anaesthesia shivering

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### Abstract

**Background of this study:** Shivering is the most general adverse effect occurs after the administration of anaesthesia with several aetiologies. In order to control the shivering, drug such as tramadol is broadly required. Nausea as well as vomiting is majorly caused by the drug tramadol. Therefore, there is a search for the efficient drug that lacking of adverse effects.

**Aim of the study:** The goal of this study was to evaluate the efficiency of tramadol as well as dexmedetomidine in the medication of post-spinal anesthesia shivering and also to examine their associated adverse effects.

**Materials and Methods:** 60 number of patients having shivering after the administration of spinal anaesthesia were arbitrarily separated to two groups include Group D and Group T, each injected with 0.5 µg/kg of dexmedetomidine and 0.5 mg/kg of tramadol along with 100 ml of normal saline respectively. The rate of response, onset of shivering, time taken for cessation of shivering, percentage of recurrence as well as associated effects was observed. All the data were assessed by means of independent t-test analysis as well as chi-square assessment to find out the significant value.

**Results:** Both the drugs such as tramadol and dexmedetomidine are efficiently managed the shivering effectively as well as both take approximately the similar time for its deactivation. This study found that the associated unfavourable effects include vomiting and nausea is higher in Group T, so the patients in Group T need proper medication. The occurrence of recurrence of shivering was elevated in Group T.

**Conclusion:** Dexmedetomidine provides good outcomes as compared to tramadol with less associated effects.

**Keywords:** Dexmedetomidine, tramadol, Post-spinal anesthesia shivering

### Introduction

Regional anesthesia is accepted as well as harmless technique of anaesthesia for numerous operations while performed correctly. This can cause some definite adverse consequences like shivering, bradycardia and hypotension. Approximately forty to fifty percent of individual administering the regional anesthesia can cause shivering effect<sup>[7]</sup>. Shivering is defined as a usual happening after incorporating the anaesthesia and it is caused due to the uncontrolled and recurring action of skeletal muscles. The occurrence of shivering has been observed to be rather elevated, in around forty to fifty percent of the various research studies<sup>[6]</sup>. Shivering effect can cause the overconsumption of oxygen as well as the formation of carbon-dioxide<sup>[3]</sup>. Moreover, this can elevates intraocular and intracranial pressure, may involve in slow curing of wounds, elevated pain of wounds, as well as late discharge after the administration of anaesthesia. Its detrimental consequences need crucial prevention as well as fast management on its occurrence.

Shivering is described as a physiological reaction to stimulate core hypothermia to increase the body temperature in metabolic way. The primary effects of post-operative or intra-operative shivering effect are elevated pain of body, loss of body normal temperature, complete discharge of pyrogens as well as raised sympathetic tone. Spinal block weakens the thermoregulatory organization of body by means of hindering tonic vasoconstriction, which involves as significant part in body temperature management. Moreover, this can create a redeployment of core temperature from the trunk to the peripheral tissues. These are the aspects which prompt the patients to develop shivering as

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well as hypothermia [10]. The medication for the shivering effect can be both non-pharmaceutical and pharmaceutical processes. The non-pharmaceutical methods is administered by exterior warming includes the usage of forced air warming, warm blankets, heated fluids and so on [6].

Pharmacological interventions include the use of medicines like tramadol, pethidine, ketamine, ketanserine, nefopam, clonidine, doxapram, as well as buprenorphine [14]. The drug 'Methylphenidate' was one among the 1<sup>st</sup> pharmaceutical mediators established to be efficient towards shivering happening after the administration of anaesthesia subsequent to halothane anaesthesia [5]. Though, perfect medication was not found yet, so the incorporation of all the accessible medicines can cause several unfavourable consequences [15].

Numerous procedures have been required for the avoidance and medication of shivering effect after the incorporation of anaesthesia. The drug called 'Dexmedetomidine' is a primary alpha 2-adrenoreceptor agonist, has been utilized as a tranquillizing mediator and is well-known to decrease the threshold of shivering [18]. Several researches have been conducted in the treatment of shivering effect with the use of dexmedetomidine. However still, there are confined numbers of researches with the use of dexmedetomidine in the medication of postsurgical shivering effect. Tramadol is defined an opioid receptor adherent and it is also acts as a hindrance to re-absorption of serotonin and norepinephrine in the location of spinal cord. This assists discharge of 5-hydroxytryptamine, which controls regulation of thermoregulatory system. Currently, it is a broadly used medicine for the shivering management. Other than, tramadol can produce vomiting and nausea which is very worrying for the patient. For this reason, the necessity to discover an enhanced drug with less adverse effects as compared to tramadol. The plan of the research was to contrast the efficiency of tramadol and dexmedetomidine in the medication of postsurgical shivering effect and also assess the adverse events associated with these drugs [11].

### Objectives of the study

The goal of this research is to scrutinize the efficiency of tramadol and dexmedetomidine in the medication of shivering effect occurring after the administration of spinal anaesthesia regarding,

- To assess the onset time of shivering, termination time of shivering, rate of response and percentage of recurrence.
- To find out the adverse events associated with tramadol and dexmedetomidine

### Materials and Methods

A randomised, prospective, double blind study conducted in 60 ASA grade 1 and 2 patients in between the age group 18-60 years who developed shivering grade 3 grade 4 during spinal anesthesia included in the study. Study conducted in Mallareddy medical college for women, Hyderabad during the period of November 2018 to May 2019.

#### Classification of Shivering [6]

Grade 0: No shivering.

Grade I: One or more of the following: peripheral vasoconstriction, peripheral cyanosis, piloerection, but without visible muscle activity.

Grade II: Visible muscle activity confined to one muscle group

Grade III: Visible muscle activity in more than one muscle group

Grade IV: Gross muscle activity involving the whole body

Data collected were stored into Ms-Excel data sheet and evaluated utilizing SPSS software. Chi-square analysis was utilized to find the implication value. Constant data were illustrated as mean and SD. Independent t-test analysis was the significance assessment to recognize the average difference involving 2 groups. Patients were randomized to 2 groups of 30 patients to administer the following injections:

- Group T – injection includes 0.5 mg/kg of tramadol in 100 ml of normal saline
- Group D – injection includes 0.5 µg/kg of dexmedetomidine in 100 ml of normal saline

### Results

Table 1 depicts the demographic profile of the research. All parameters such as age, gender, height and weight are not statistically significant involving Group D and Group T. The values are illustrated as in the form of mean± SD in the parameters such as age, height and weight.

**Table 1:** Demographic profile of the study

Parameters	Group D	Group T	P-Value
Age	38.90±10.52	41.73±10.62	0.32
Gender (F:M)	12:18	14:16	0.655
Weight	166.12±6.83	166.62±7.80	0.751
Height	161.14±6.12	159.18±5.36	0.885

In the table 2, onset time of shivering in Group D and Group T was 22.30±13.83 and 21.00±14.22 minutes correspondingly, with a statistically insignificant difference between Group D and Group T. The average cessation time of shivering in Group T and Group D was 6.30±1.32 and 5.82±1.61 correspondingly; with a statistically significant difference between the Group D and Group T. The frequency of recurrence in Group T and Group D was 20% (6 patients) and 6% (2 patients). Recurrence frequency is higher in Group T as compared to Group D.

**Table 2:** Parameters for post-spinal anaesthesia shivering

Parameters	Group D	Group T	P-Value
Onset of shivering	22.30±13.83	21.00±14.22	0.75
Time taken for cessation of shivering	5.82±1.61	6.30±1.32	0.0021
Response Rate	100	100	
Recurrence	2 (6%)	6 (20%)	0.162

In table 3, hemodynamic characteristics are found to be the standard range in both the groups, excluding the higher occurrence of sedation and bradycardia. The frequency of bradycardia in Group D and Group T was 13% in 4 patients and 6% in 2 patients. The frequency of bradycardia is higher in Group D as compared to Group T. The frequency of sedation in Group D and Group T was 26% in 8 patients and 23% in 7 patients. There was no occurrence of hypotension or respiratory depression in both the groups. The frequency of nausea and vomiting in Group T was 26% in 8 patients and 23% in 7 patients. There was no occurrence of nausea and vomiting in Group D.

**Table 3:** Various side effects among two groups

Adverse events	Group D	Group T
Nausea	0	8 (26%)
Vomiting	0	7 (23%)
Sedation	8 (26%)	(23%)
Hypotension	0	0
Bradycardia	4 (13%)	2 (6%)
Respiratory depression	0	0

## Discussion

Dexmedetomidine, is a novel medicine has the ability to reducing the central thermosensitivity by curbing the neuronal conductance [4], thus raising the shivering threshold [17]. Therefore, we examined and related the efficiency, hemodynamic stability and associated adverse effects of tramadol with dexmedetomidine. These medicines are usually utilized for the medication to manage the shivering effect after the administration of spinal anesthesia. This research identified that the intravenous administration of 0.5 mg/kg of tramadol and 0.5 µg/kg of dexmedetomidine are balanced the shivering efficiently at this particular dosages. This outcome is equivalent to the outcomes of earlier researches conducted by Talakoub and Meshkathi [16], Usta *et al.* [18], Mittal *et al.*, [13] and Elvan *et al.* [8]. All these studies revealing that both the trial medicines manage the shivering efficiently at the particular dosages. In our research, the rate of response is found to be 100 percent. This finding is similar to the study of Reddy and Chiruvella [21], the response rate of this study was 95.56 percent. Moreover it is also related to the study of Shukla *et al.*, the response rate of this study was 92.5 percent. The average termination time of shivering was  $5.82 \pm 1.61$  min in Group D and  $6.30 \pm 1.32$  min in Group T. This finding of termination time of shivering in Group D is similar to the study of Blaine Easley *et al.* [20]. This study conducted in children administered with 0.5 µg/kg of dexmedetomidine for the treatment of post surgical shivering effect. The absolute termination time of shivering by 5 min was observed. The recurrence percentage of shivering in our research was observed to be 20% in Group T and 6% in the Group D. The results of our study in the Group T was little more related to the study of Maheshwari *et al.* In this study recurrence percentage was to be 8 percent, whereas the result found in the Group D was similar to the results of Bajwa *et al.*, [2] in this study the percentage of recurrence was found to be 5%. In our research, hemodynamic aspects are found to be the standard range in both the groups. The frequency of bradycardia in Group D and Group T was 13% in 4 patients and 6% in 2 patients. Therefore, the patients having the bradycardia required the administration of atropine correspondingly. The higher incidence of bradycardia was found in the Group D. This finding is equivalent to the study of Whizar *et al.*, [19] and Al-Mustafa *et al.* [1]. In this study, the higher occurrence of bradycardia was found to be 30% and 16% percent in dexmedetomidine group. Vomiting and nausea were the main side effects that happened amongst the patients incorporated the tramadol. The frequency of nausea and vomiting in Group T was 26% in 8 patients and 23% in 7 patients. There was no occurrence of nausea and vomiting in Group D. These outcomes are similar to the findings of Mittal *et al.*, [13] in this study the frequency of vomiting and nausea was 20 percent in tramadol group. The patients having vomiting and nausea required the treatment of antiemetic drugs [16].

Similarly, there is no incidence of vomiting and nausea in the group of dexmedetomidine in the study of Elvan *et al.* [8].

## Conclusion

Administration of 0.5 mg/kg of tramadol and 0.5 µg/kg of dexmedetomidine in the patients having shivering after the post-spinal anaesthesia results in efficient management of the shivering, faster cessation time of shivering, low recurrence rate and less side effects in the group of dexmedetomidine as compared to the tramadol. Dexmedetomidine offers extra advantages of intra-operative sedation lacking the occurrence of vomiting and nausea. In addition to, the percentage of recurrence of shivering was also higher in the tramadol group. Therefore, this study concluded that dexmedetomidine is perfect alternative to tramadol in the treatment of post-spinal anaesthesia shivering.

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