

## Original Research Article

# A comparative study to ascertain the efficacy of intravenous dexmedetomidine versus intravenous tramadol to prevent post-operative shivering after laparoscopic surgery

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### ABSTRACT

**Background:** Shivering is commonly encountered both after regional and general anaesthesia (GA) with a little higher incidence in patients receiving GA. The aim of study was to compare the effectiveness of dexmedetomidine and tramadol in decreasing postoperative shivering in patients undergoing laparoscopic surgery.

**Methods:** Total 120 patients were included in this study. In order to get a 5% level of significance and 80% power number of patients required in each group was 40, with a total of 120 patients. Randomization of groups was done based on closed envelope method. Patients were allocated into three groups group I, II and III of 40 patients each. Patients in group I and group II were administered 0.75 µg/kg of dexmedetomidine and 1.5 mg/kg of tramadol in 100 ml NS respectively half a before extubation, while patients in group III did not receive any pharmacological intervention.

**Results:** All three groups were comparable regarding distribution of age, gender, ASA grade and temperature at beginning and end of surgery and were non-significant.

**Conclusions:** Dexmedetomidine seems to possess anti-shivering properties and was found to reduce the occurrence of shivering in patients undergoing general anaesthesia with minimal side effects although its anti-shivering effect was not superior to tramadol.

**Keywords:** ASA grade, Dexmedetomidine, Laparoscopic surgery, Tramadol

### INTRODUCTION

Shivering is commonly encountered both after regional and general anaesthesia (GA) with a little higher incidence in patients receiving GA.<sup>1</sup> It is distressing and uncomfortable to patients and is perceived by many as equivalent to postoperative surgical pain. It can hamper normal smooth recovery from anaesthesia and can be quite detrimental in certain groups of patients, like

patients with raised intraocular pressure, raised intracranial tension, and those with limited cardiorespiratory reserves such as the elderly.<sup>2,3</sup>

Dexmedetomidine seems to have great potential for its usage in anaesthesia and intensive care practice. It has been successfully used as adjunct to local anaesthetics in neuraxial anaesthesia and peripheral nerve blockade, as a sedative agent during surgery and in the ICU, as well as

supplementation of postoperative analgesia.<sup>4,5</sup> It is also postulated that dexmedetomidine exhibits anti-shivering effects through its centrally mediated actions.<sup>6,7</sup>

The purpose of study was to compare the effectiveness of dexmedetomidine and tramadol in decreasing postoperative shivering in patients undergoing laparoscopic surgery.

**METHODS**

After the approval from the hospital ethics committee, this prospective randomized study was conducted in department of Anesthesiology, Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar, Hyderabad, India on 120 patients over a period of 15 months from December 2016 to May 2018.

**Inclusion criteria**

- Age group: 18-50 years,
- ASA 1 and ASA 2,
- Laparoscopic surgery lasting for more than >1-hour 30 minute.

**Exclusion criteria**

- Conversion to laparotomy,
- Patients receiving blood transfusion,
- Patients with abnormal thyroid function,
- Patients with axillary temperature <36.9/>39°C preoperatively.

**Sampling method**

In order to get a 5% level of significance and 80% power number of patients required in each group was 40, with a total of 120 patients. Randomization of groups was done based on closed envelope method.

Patients were allocated into three groups group I, II and III of 40 patients each. Patients in group I and group II were administered 0.75 µg/kg of dexmedetomidine and 1.5 mg/kg of tramadol in 100 ml NS respectively half a before extubating, while patients in group III did not receive any pharmacological intervention. In the operation theatre, all the baseline parameters such as HR, ECG, NIBP, SpO<sub>2</sub>, and EtCO<sub>2</sub> were observed and noted.

**Statistical analysis**

The statistical software SPSS 15.0 version were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

**RESULTS**

Total 120 patients were included in this study. Patients in the three groups were comparable in relations to their

age, gender and type of surgery. No patients from any of the study groups were excluded. There was no statistically significant difference in age distribution among groups (Table 1).

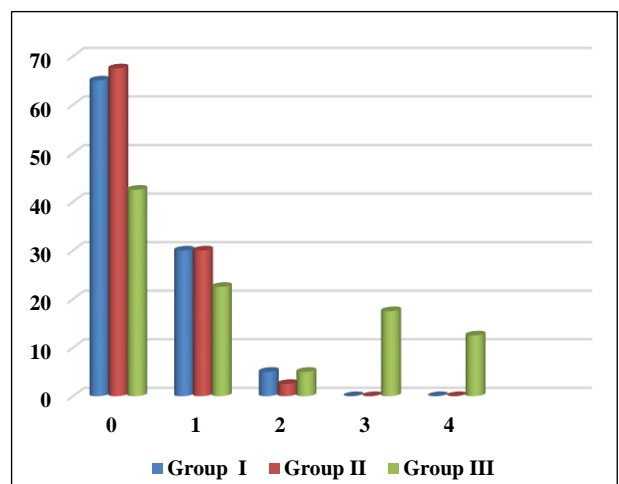
**Table 1: Age distribution of patients among groups.**

Years	Group I		Group II		Group III	
	N	%	N	%	N	%
<20	1	2.5	1	2.5	0	0.00
21-30	9	22.5	8	20.0	10	25.0
31-40	11	27.5	13	32.5	10	25.0
41-50	10	25.0	9	22.5	17	42.5
51-60	6	15.0	8	20.0	2	5.0
>60	3	7.5	1	2.5	1	2.5
Total	40	100.0	40	100.0	40	100.0
Mean±SD	1.23±13.85		1.40±12.50		9.80±9.43	

Out of 120 patients, the gender distribution of patients among groups shows that group I (45.0%) was females, and (55.0 %) were males, group II showed 42.5 % were females and 42.5% were males and group III 50.0% were females and 50.0% were males in the study shown in Table 2.

**Table 2: Gender distribution of patients among groups.**

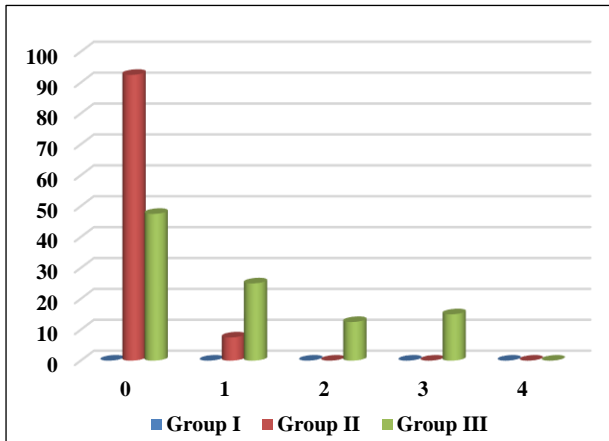
Gender	Group I		Group II		Group III	
	N	%	N	%	N	%
Female	18	45.0	17	42.5	20	50.0
Male	22	55.0	23	57.3	20	50.0
Total	40	100.0	40	100.0	40	100.0



**Figure 1: Post-operative shivering 15 minutes in three groups.**

Figure 1 and Figure 2 showed that grades of post-operative shivering in three groups at various time intervals at 15 minutes, and 30 minutes, there was statistically significant (p <0.001) difference was found in

the shivering grade validated by Tsai and Chun in all three study groups.



**Figure 2: Grades of postoperative shivering in three groups of patients at various time intervals at 30 minutes.**

None of the patients in group I or group II had shivering of grade >2. Five patients of group III had shivering of grade 4 at 15 minutes and were treated with a rescue drug. Authors did not observe any recurrence of shivering after administration of rescue drug in group III.

## DISCUSSION

Shivering is a physiological response of the body for heat preservation through peripheral vasoconstriction and involuntary skeletal muscle contractions. Despite the benefits from reducing heat loss, shivering increases the patient's oxygen consumption, carbon dioxide production, and energy expenditure, and also it may cause severe adverse effects during the recovery from general anaesthesia, especially in patients with impaired cardiac and pulmonary reserves. Moreover, in awake patients, shivering is an uncomfortable experience, sometimes even worse than surgical pain. Incidence of postoperative shivering is as high as 50-60% in normal population undergoing GA.<sup>8,9</sup>

The comparability of the demographic factors such as age, gender distribution, duration of anaesthesia, and surgery in the present study has ruled out any confounding bias which could affect the results of the study. Physical factors such as operating room temperature (22-24°C), and temperature of the infused fluids are considered potential risk factors for shivering, but care was taken to ensure that these factors were standardized and hence did not affect the present study.

In the present study, authors obtained satisfactory decrease in incidence of shivering with dexmedetomidine at a dose of 0.75 µg/kg compared to the control group. However, at this dose author did not find much difference between dexmedetomidine and tramadol in reduction of shivering. This was similar to the finding of Liu ZX et al,

who in their meta-analysis attempted to find the efficacy of dexmedetomidine over other anti-shivering agents and found that dexmedetomidine given at a dose of 0.5 µg/kg intravenously or through epidural route did not show any superiority over tramadol.<sup>10</sup> Although we used a higher concentration of dexmedetomidine, findings of present study were consistent with the author's meta-analysis.

In present study, although group I patients showed significant sedation most of the patients had a score of 1 to 3. This amount of sedation did not affect the respiratory drive of the patients and hence, author did not notice any delay in extubation.

Thus, dexmedetomidine produces a kind of sedation where the patients are able to return to baseline consciousness with gentle stimulation. Most of the patients are calm and do not show any features of agitation or restlessness. This causes a smooth extubation with minimal hemodynamic changes during recovery and in the postoperative period. This property of dexmedetomidine is beneficial in certain group of patients, where sudden increase in heart rate or blood pressure during extubation could be detrimental.<sup>10</sup>

The present study, statistically significant decrease in incidence of shivering was noted when either group I or II were compared with group III showing that pharmacological intervention with the study drugs (i.e.) dexmedetomidine or tramadol at a dose of 0.75 µg/kg and 1.5 mg/kg respectively, caused a significant reduction in shivering when compared to non-pharmacological intervention.

## CONCLUSION

Dexmedetomidine seems to possess anti-shivering properties at a dose of 0.75 µg/kg and was found to reduce the occurrence of shivering in patients undergoing general anaesthesia with minimal side effects like sedation, bradycardia and hypotension which did not affect the patient's outcome. Though both dexmedetomidine and tramadol have analgesic activity, tramadol is more effective and did not have much of hemodynamic alterations. Tramadol is a cheaper alternative to dexmedetomidine in reducing both shivering and pain in postoperative patients. Pharmacological intervention to reduce shivering is more effective than non-pharmacological methods.

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

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