

Research Article**A STUDY TO COMPARE DEXMEDETOMIDINE, TRAMADOL AND PETHIDINE IN THE PREVENTION OF INTRAOPERATIVE SHIVERING AFTER SPINAL ANAESTHESIA****Dr Jyothi Sheelavantar¹, Dr Manjushree P Babladi², Dr Harshita Muralidhar³**¹Senior Resident, Department of Anaesthesiology, Mahadevappa Rampure Medical College, Kalaburagi, India²Assistant Professor, Department of Anaesthesiology, Mahadevappa Rampure Medical College, Kalaburagi, India³Senior Resident, Department of Anaesthesiology, Gulbarga Institute of Medical Sciences, Kalaburagi, India**ABSTRACT****Background**

Shivering is a common and distressing experience to patients which occurs either during or immediately after the surgery. It is defined as an involuntary, repetitive activity of skeletal muscles ¹Spinal anaesthesia impairs the thermoregulatory system by inhibiting vasoconstriction, and results in redistribution of core heat to the periphery from the trunk. Both these effects predispose patients to hypothermia and shivering². Shivering leads to increase in oxygen consumption, carbon dioxide production, catecholamine production, lactic acidosis, increase in intraocular pressure and Intracranial pressure.

Pharmacological methods for treatment of hypothermia is by commonly used drugs like pethidine, tramadol, dexmedetomidine, clonidine, etc. Pethidine is used for the prevention and treatment of shivering. Studies on tramadol showed its efficacy in the treatment of shivering. Tramadol produces adverse effects like nausea, vomiting, dizziness etc.² Dexmedetomidine is a selective α_2 adrenergic agonist and has 1600 times greater selectivity for the α_2 adrenoceptor. It produces sedation, anxiolysis, hypnosis, analgesia, sympatholysis and has antishivering properties. As less number of studies are available, the present study is undertaken to know the clinical efficacy of dexmedetomidine, tramadol and pethidine in the prevention of intraoperative shivering in patients after spinal anaesthesia.

Aim:

1. To study the efficacy and to compare dexmedetomidine, tramadol and pethidine in the prevention of intra operative shivering.
2. To study the side effects caused by the study drugs like nausea, vomiting, sedation.

Materials and methods:

Present study will be conducted on the patients at Basaveshwar Teaching and General Hospital attached to Mahadevappa Rampure Medical College, Kalaburagi.

Sample size: 90 (30 in each group)

Duration of study: 01 August 2022 to 31st January 2024 (18 months).

Results:

P value at 15 minutes is 0.045 which is <0.05 and is statistically significant. P value at 30 minutes is 0.003 which is <0.01 and so, highly significant. Study showed that dexmedetomidine group was more effective in preventing shivering than other two groups.

Conclusion:

Dexmedetomidine is more effective in the prevention of shivering when compared with pethidine and tramadol. Pethidine is also equally effective in the prevention of shivering and is more efficient than tramadol.

Keywords: Dexmedetomidine, Tramadol, pethidine, shivering, spinal anaesthesia

INTRODUCTION:

Shivering is defined as an involuntary, repetitive activity of skeletal muscles. The incidence of shivering varies but is very high and the incidence is approximately 40 – 50%¹. Spinal anesthesia impairs the thermoregulatory system by inhibiting vasoconstriction, which plays an important role in temperature regulation.^{3,4} Spinal anesthesia results in redistribution of core heat to the periphery from the trunk [below the level of block]⁵. Both these effects predispose patients undergoing spinal anesthesia to hypothermia and shivering.

Pharmacological methods for treatment of hypothermia is the next resort to treat all these patients. A number of drugs were studied and are being used. Most commonly used drugs include meperidine, tramadol, dexmedetomidine, clonidine, alfentanil, ketanserin, magnesium sulphate, nefopam etc.,

Meperidine/pethidine is the drug which is being used for the prevention and treatment of shivering for many decades. Many studies on tramadol showed its efficacy in the treatment of shivering. Tramadol produces adverse effects like nausea, vomiting, dizziness etc., which can create further discomfort to the patient^{7,8}. Dexmedetomidine is a selective α_2 adrenergic agonist and has 1600 times greater selectivity for the α_2 adrenoceptor compared with the α_1 receptor. It produces sedation, anxiolysis, hypnosis, analgesia, sympatholysis and has anti shivering properties⁹.

MATERIALS AND METHODS:

After approval from ethical committee, informed written consent was taken from 90 patients of ASA grade I and II undergoing elective lower abdominal surgeries under spinal anaesthesia. This is a prospective randomised study, patients were randomly divided into 3 groups, each consisting of 30 patients

Group D - Inj Dexmedetomidine 0.5mcg/ml in 100ml NS

Group P - Inj Pethidine 0.5mg/ml in 100ml NS

Group T - Inj Tramadol 0.5mg/ml in 100 ml NS

After spinal anaesthesia each patient were assessed for shivering according to grades, heart rate, blood pressure and temperature and also side effects like nausea

vomiting, bradycardia.

Inclusion criteria:

- 1] ASA grade I or II
- 2] Age 18 to 65 years
- 3] Undergoing Spinal anesthesia
- 4] Lower abdominal and lower limb surgeries.

Exclusion criteria

- 1] Known hypersensitivity or allergy to study drugs.
- 2] Cardio-pulmonary, renal or hepatic impairment.
- 3] Known history of substance or alcohol abuse
- 4] Patients who received any pre-medication
- 5] An initial core temperature $>37.5^{\circ}\text{C}$ or $<35.5^{\circ}\text{C}$
- 6] Blood transfusion during surgery
- 7] Hypo- or hyperthyroidism
- 8] Convulsions or psychiatric disorder
- 9] Pregnancy and lactation.

RESULTS:

Most of the patients in the study belonged to age group 41-50 years, with Mean age of 39.97 years. 73 Male, 17 Females were involved in the study. The number of patients who belong to ASA I were 23 in tramadol group, 23 in pethidine group and 24 in dexmedetomidine group. The number of patients who belong to ASA II were 7 in tramadol group, 7 in pethidine group and 6 in dexmedetomidine group.

Table 1 : Number of patients who had shivering

Time(mins)	Tramadol	Pethidine	Dexmedetomidine	P value
0	0	0	0	
5	0	0	0	
10	0	0	0	
15	6	0	0	0.045
30	11	2	1	0.003
45	3	0	1	0.384

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60	1	0	0	0.364
75	1	1	0	0.403
90	0	0	0	
105	0	0	0	
120	0	1	0	0.364

None of the patient in any of the groups had shivering at 0, 5 and 10 minutes. In tramadol group, at 15 minutes, 2 patients had shivering of grade 3, 3 patients had shivering of grade 2 and 1 patient had shivering of grade 1. In other 2 groups, there was no shivering. At 30 minutes, 8 patients in tramadol group had grade 3 shivering and 3 patients had grade 1 shivering, while in pethidine group, 2 patients had grade 3 shivering and in dexmedetomidine group, 1 patient had grade 1 shivering.

At 45 minutes, 2 patients in tramadol group had grade 3 shivering and 1 had grade 1 shivering, no patients in pethidine group had shivering, 1 patient in dexmedetomidine group had grade 3 shivering. At 60 minutes, 1 patient in tramadol group had grade 1 shivering, no patients in other groups had shivering. At 75 minutes, 1 patient in tramadol group had grade 1 shivering, 1 patient in pethidine group had grade 3 shivering and no patient in dexmedetomidine group had no shivering.

At 90 minutes and 105 minutes no patient had shivering. At 120 mins, 1 patient in pethidine group had grade 1 shivering, patients in other groups had no shivering. P value at 15 minutes is 0.045 which is <0.05 and is statistically significant. P value at 30 minutes is 0.003 which is <0.01 and so, highly significant. P value at other duration are not significant.

The mean heart rate was similar in all the three groups with mean heart rate around 80 beats per minute. The P value is > 0.05 and hence, not significant.

The systolic blood pressure was comparable between all the three groups with insignificant P values. The systolic blood pressure mean varied around 120 mmHg and diastolic blood pressure 70mmHg.

In this study we used Inj Tramadol 0.25mg/kg IV bolus as Rescue drug. In our study 12 patients (40%) needed additional rescue anti shivering drug in tramadol group. 3 patients in pethidine group and 1 patient in dexmedetomidine group required rescue drug. The P value for this is 0.001 which is highly significant.

In this study, 2 patients from dexmedetomidine group had a fall in systolic blood pressure.

In this study, no patient from tramadol group or pethidine group had bradycardia, but, three patients from dexmedetomidine group had a fall in heart rate of less than 60 beats per minute. The P value is 0.067 which is not statistically significant.

DISCUSSION

Lower abdominal and lower limb surgeries are usually done under spinal anaesthesia. The ease and safety profile compared with general anaesthesia makes spinal anaesthesia the procedure of choice whenever possible. Inguinal hernioplasty, debridement and Jaboulay's procedure for hydrocele, split skin grafting in the lower extremities, appendicectomy, hemorrhoidectomy, lateral anal sphincterotomy, etc., are among the most common surgical procedures performed under spinal anaesthesia. Hernioplasty, hydrocele sac excision and eversion, and the debridement accounted for the majority of surgical procedures performed in our current study.

This study was formulated in such a way to address these two problems. Dexmedetomidine, a selective α_2 agonist produces arousable sedation, hypnosis, anxiolysis and antishivering properties. It can cause decrease in heart rate and blood pressure. Tramadol is a semi synthetic opioid which controls shivering and also sedation. It has a high incidence of vomiting and in various studies, it is found to be approximately 70%⁷. So, all the patients in our study were given Inj. Ondansetron 4mg I.V. irrespective of the study group. Pethidine is a synthetic opioid which is a time tested gold standard drug used for the control of shivering. Pethidine also causes sedation.

Shivering

Of the three medications used in the trial, dexmedetomidine was found to be more effective than the other two in preventing shivering, as evidenced by the fact that only one patient out of 30 who received dexmedetomidine experienced shivering. This result is in accordance with the report by **Lim fern et al**⁸ study which also had a similar outcome. Tramadol group patients had the highest incidence of shivering with 12 patients in that group had shivering grade >2. In pethidine 3 patients had shivering grade >2. This result is a bit of change when compared to **Lim fern et al**⁸ as in both tramadol and pethidine group. When compared with **Mittal et al**⁹ study, which was a 2 drug comparison between dexmedetomidine and tramadol, showed that both drugs were equally effective but dexmedetomidine had a faster onset of action.

Sedation

Mittal et al⁹ concluded the study as sedation due to dexmedetomidine provides additional comfort to the patient. The sedation score was higher in dexmedetomidine group starting from 5 minutes as observed in **Bozgeyik et al**¹⁰ as this has the similar result in our study too.

Side effects

Hypotension and bradycardia are known hemodynamic effects of dexmedetomidine but only few patients have those side effects which is acceptable as concluded by **Lim fern et al**⁸. Hypotension and bradycardia were seen in dexmedetomidine group but is of lesser incidence as concluded by **Usta B et al**¹¹ which was the similar observation in our study also.

CONCLUSION

1. Dexmedetomidine is more effective in the prevention of shivering when compared with pethidine and tramadol.
2. Dexmedetomidine has an added advantage of adequate reliable sedation.
3. Pethidine is also equally effective in the prevention of shivering and is more efficient than tramadol.

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