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TO COMPARE EFFICACY OF DEXMEDETOMIDINE AND TRAMADOL IN TREATING POST SUBARACHNOID BLOCK SHIVERING AND THEIR SIDE EFFECTS.

Dr. Shankar Agrawal	Peoples College of Medical Sciences & RC Campus, Bhanpur Road, Bhopal -462037
Dr.Sourabh Jain*	Peoples College of Medical Sciences & RC Campus, Bhanpur Road, Bhopal -462037 *Corresponding Author
Dr.Vaishali Waindeskar	AIIMS Campus, Bhopal, Madhya Pradesh, INDIA
Dr.Arti Jain	Peoples College of Medical Sciences & RC Campus, Bhanpur Road, Bhopal -462037
Dr.Akanksha Bansal	PG Resident, Department of Anaesthesiology, Peoples Medical College and Research Centre

ABSTRACT

Background: Shivering is a frequent complication of regional anaesthesia. This study aimed to compare efficacy of Dexmedetomidine and Tramadol in treating post subarachnoid block shivering and their side effects.

Methods: Prospective, experimental, randomized, comparative study of 60 patients of ASA grade-I & II of either gender, aged 18 to 60 years scheduled for elective surgeries, under subarachnoid block were allocated to two groups: Group T (n=30) received intravenous (IV) Tramadol 0.5 mg/kg and Group D (n=30) received IV Dexmedetomidine 0.5 µg/kg. Grade of shivering, time interval from treatment to cessation of shivering, hemodynamics and side effects were observed.

Results: Recovery time from shivering was 40.34(± 6.20) sec in Dexmedetomidine whereas 210.3(±26.97) sec in Tramadol group. Side effects nausea and vomiting in Tramadol group whereas sedation and bradycardia in Dexmedetomidine group were significant.

Conclusion: Dexmedetomidine offers better thermodynamics than Tramadol.

KEYWORDS : Dexmedetomidine ; Tramadol ; Subarachnoid block ; Shivering;

INTRODUCTION

Shivering, a common post-anaesthesia occurrence is defined as an involuntary, repetitive activity of skeletal muscles. The incidence of shivering has been found to be quite high, approximately 40-50% in different studies.[1] Shivering is a potentially serious complication, resulting in increased metabolic rate; oxygen consumption (up to 100-600%); carbon dioxide (CO2) production; ventilation and cardiac output ;adverse postoperative outcomes, such as increased surgical bleeding; and morbid cardiac events. Therefore, shivering may cause problems in patients with low cardiopulmonary reserves[2].

Shivering is a physiological response to core hypothermia in an attempt to raise the metabolic heat production. Main causes of intra/postoperative shivering are temperature loss, increased sympathetic tone, pain, and systemic release of pyrogens[2,3,4,5]. Spinal anaesthesia significantly impairs thermoregulation by inhibiting tonic vasoconstriction. It also cause redistribution of core heat from trunk (below the block level) to peripheral tissues. Postoperative shivering can be controlled both pharmacologically and non-pharmacologically. Non-pharmacological methods using equipment to maintain normal temperature of the body are effective but expensive and lack practicality, while the pharmacological methods using drugs like pethedine,tramadol, clonidine, doxapram, katenserin, nefopam,etc., are simple, cost-effective and easy to implement.

During the last decade, Tramadol has become favored and commonly used drug for post-spinal anaesthesia shivering. However, it has many adverse effects like nausea, vomiting, dizziness etc. which cause further discomfort to the patient.[6,7]

Dexmedetomidine is a highly selective α2-adrenoceptor agonist with potent effects on the central nervous system.[8,9] The stable haemodynamics and the decreased oxygen demand make it a very useful pharmacologic agent.[10,11,12] However, adverse effects such as bradycardia and hypotension limits its use.

Few studies have compared the antishivering effect of above mentioned drugs. Hence, this study aimed to compare therapeutic efficacy of Dexmedetomidine and Tramadol on post subarachnoid block shivering.

MATERIALAND METHODS:

This prospective, experimental, randomized, comparative clinical study was conducted in the department of Anaesthesiology attached to a tertiary care hospital from June 2015 to May 2016 after obtaining ethical clearance. Sixty ASA Grade-I & II patients of either gender, aged 18 to 60 years scheduled for elective surgeries under subarachnoid block were randomly allocated to two groups (D and T) after obtaining written informed consent.

Group D (*n*=30) received Dexmedetomidine 0.5 µg/kg IV
GroupT (*n*=30) received Tramadol 0.5 mg/kg IV

Patients with known hypersensitivity to Dexmedetomidine or Tramadol, ASA >2 class were excluded from the study. The patients were randomly allotted to one of the two groups using a random list.

Baseline pulse rate, non-invasive blood pressure (NIBP), oxygen saturation (SPO_2) and body temperature (axillary) were recorded before the commencement of surgery and thereafter at every 5 minutes from the spinal block (SAB), for 1st hour; and every 15 minutes, for the rest of the observation period.

Subarachnoid block was given with inj. Bupivacaine 0.5% (10-15 mg) at L3-4 or L4-5 interspace using 26 gauge spinal needle and sensory block up to T6-7 dermatome was achieved. All operation theatres in which the operations were performed maintained an ambient temperature of 21- 24°C. No means of active re-warming were used. Intravenous fluids and anaesthetic drugs were administered at room temperature. Grade of shivering was determined by Wrench classification[13] as :

Grade 0: No shivering
Grade 1: One or more of the following: Piloerection, Peripheral vasoconstriction, peripheral cyanosis with, but without visible muscle activity
Grade 2: Visible muscle activity confined to one muscle group
Grade 3: Visible muscle activity in more than one muscle group
Grade 4: Gross muscle activity involving the whole body

Patients who developed either grade 3 or grade 4 shivering were included in the study. Either of the two drugs was given as slow IV bolus injection. Time at which shivering started after spinal anaesthesia (onset of shivering), severity of the shivering, time to disappearance of shivering (in seconds) and response rate (shivering

ceased after treatment within 15 minutes) were recorded. If shivering did not subside by 15 minutes, the treatment was considered to be ineffective. Recurrence of shivering was also noticed until the patient left the operation theatre. Patients who did not respond or in whom recurrence of shivering occurred were treated with additional dose of study drug. Side effects like nausea, vomiting, bradycardia (<50/min), hypotension (>20% fall from baseline), dizziness; and sedation score were recorded. Sedation score was assessed with a four-point scale as per Filos.[14]

1: Awake and alert
2: Drowsy, responsive to verbal stimuli
3: Drowsy, arousable to physical stimuli
4: Unarousable

Bradycardia, hypotension and vomiting were treated with atropine, mephentermine and ondensetrone respectively, in titrated doses when required.

Statistical analysis was done using suitable statistical software. Student *t* test and Chi-square test were applied for the interpretation of results. A *p* value < 0.05 was considered statistically significant.

OBSERVATION AND RESULTS:

Table 1: Time duration for recovery from shivering in D and T Group

		TIME DURATION (Seconds)	
Groups	**Number**	**Mean**	**SD**
Group D	30	40.34	6.20
Group T	30	210.30	26.97
Student 't' test value	31.093		
p value	0.001(HS)		
HS= highly significant, SD= standard deviation			

Table 2: Side effects among D & T Group

Groups	**Nausea/Vomiting**		**Chi Square Value**	**p Value**
	Absent	Present		
Group D	30	0	15	0.000108
Group T	12	18		(HS)
	Bradycardia			
Group D	4	26	38.57	0.020 (HS)
Group T	28	02		
	Hypotension			
Group D	10	20	30	0.150 (HS)
Group T	30	0		
	Dizziness			
Group D	28	2	3.268	0.07 (NS)
Group T	23	7		
	Sedation			
	Grade 1 Grade 2			0.0012(HS)
Group D	13 17			
Group T	26 04			

Dexmedetomidine is as effective as Tramadol in treating post subarachnoid block shivering. Time interval from injecting the study drug to cessation of shivering was quite less with Dexmedetomidine (40.34±6.20seconds) than with Tramadol (210.3±26.97 seconds) [Table 1]. The response rate was 100% in both group. Incidence of recurrence of shivering post-operatively was 4/30 in group T while 1/30 in group D. Side effects hypotension and bradycardia in group D while nausea and vomiting in group T were significantly high. Insignificant difference was noted between the two groups in relation to dizziness. Incidence of sedation (Grade 2) was 17/30 in group D while it was 4/30 in group T and the difference was highly significant (p= 0.0012) [Table 2].

DISCUSSION:

Postoperative shivering is an unpleasant experience for the patient affecting the quality of recovery.

Various researchers have compared many drugs with each other to find an ideal agent to prevent intra and postoperative shivering. *Tsai YC, Chi KS et al*[15] did a comparison of tramadol, amitriptyline, and meperidine for postepidural anesthetic shivering in parturients. *Bilotta F et al*[16] studied Nefopam and Tramadol for the prevention of shivering during neuraxial anesthesia.

We chose Dexmedetomidine and Tramadol in our study because of their anti-shivering property and compared their efficacy in treating post sub-arachnoid block shivering as well as side effects. The same anti-shivering property was studied in various researches done by Kim YS et al[17], Bajwa SJ et al [11,18] ,Elvan EG, Oc B, Uzun S et al[9] and Blaine Easley R, Brady KM et al.[19]Kim YS et al[17] searched for an optimal dose of prophylactic dexmedetomidine for preventing postoperative shivering. Bajwa SJ et al [11,18]found reduction in the incidence of shivering with peri-operative dexmedetomidine. Elvan EG, Oc B, Uzun S et al[9] used dexmedetomidine in postoperative shivering in patients undergoing elective abdominal hysterectomy.Blaine Easley R, Brady KM et al [19] studied dexmedetomidine for the treatment of post-anesthesia shivering in children.

Tramadol is an opioid analgesic .The anti-shivering action of tramadol is probably mediated via its opioid or serotonergic and noradrenergic activity or both. [6,15,16,]

In the present study, factors that influence the occurrence of shivering, like temperature of IV fluids etc, were not tightly controlled, but this should not affect the validity of our study because the present study is focused on response to treatment used rather than incidence of shivering; and by randomization, both groups were subjected to similar degrees of influence of these factors.

In present study, we found that Dexmedetomidine is as effective as Tramadol in treating post-spinal anaesthesia shivering. In addition, the time interval from the commencement of treatment to cessation of shivering is quite less with dexmedetomidine (40.34±6.20 sec) than with tramadol (210.3±26.97sec).Result of our study is coinciding with another similar comparative study of Dexmedetomidine and Tramadol for post-spinal anaesthesia shivering done by Geeta Mittal *et al*[10].

In conclusion, both Dexmedetomidine (0.5 µg/kg) and Tramadol (0.5 mg/kg) can be used for treating post sub-arachnoid block shivering but Dexmedetomidine is more efficacious than Tramadol but should be used cautiously in hemodynamically unstable patient.

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