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Anesthesiology

COMPARISION OF DEXMEDITOMEDINE , PETHIDINE & TRAMADOL IN POST NEURAXIAL SHIVERING

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ABSTRACT

BACKGROUND: Dexmedetomidine a selective α2 adrenergic agonist is gaining popularity as adjuvant to spinal anesthesia

AIM: The purpose of study was to comparision of dexmedetomidine.pethidine,& tramadol in post neuraxial shivering ,

METHODS **:** 90patients were recruited and randomly divided into 3 groups.

Group D- Dexmedetomidine 0.5mcg/kg.

Group-P: PETHIDINE 0.5mg/kg

Group T: Tramadol 0,5mg/kg through intravenous route the onset of shivering, cessation & recurrence of shivering noted in all three groups and com, pared with each other groups

RESULTS: There was significant time for cessation of shivering in group D id 6.3±1,34 minutes wth comparision in group P 7.73±0.97 minutes & group T 7l27±1.24 **minutes and the difference was statistically significant with p<0.005. The difference was statistically significant when dexmeditomidine group was compared with pethidine group (p<0.001) & also with Tramadol group(p=0.004), while there was no significant difference statistically when Tramadol group and pethidine group were compared(p=0.098).**

CONCLUSION: Dexmedetomidine .0.5mcg/kg seems to be an effective drug in treatment of post neuraxial shivering when compared to pethidine & tramadol in patients undergoing elecyive lower abdominal,urological,gynaecological & lower limb orhopedic surgeries.

KEYWORDS : Dexmeditomedine, Pethidine, Tramadol, Post Neuraxial Shivering

INTRODUCTION

Shivering, is defined as an involuntary, repetitive activity of skeletal muscles. It unsually occurs as a thermoregulatory response to cold, although non thermoregulatory shivering may also occur. It is a relatively common problem encountered after neuraxial anaesthesia. Although shivering is not a life threatening process, it can be a source of patient discomfort, and may interfere with the monitoring of ECG, BP &pulse oxygen saturation.It can also have deleterious metabolic and cardiovascular effects like increased expenditure of cardiac & systemic energy, increased oxygen consumption by approximately 100%, increased CO2 production & cardiac work.

Shivering also increases intraocular , intracranial pressure, and may contribute to increased wound pain, delayed wound healing, and delayed discharge from post-anaesthetic care. Shivering per se may aggravate post operative pain simply by stretching surgical incisions. The main causes of intra/post-operative shivering are temperature loss, increased sympathetic tone, pain, and systemic release of pyrogens. Spinal anaesthesia significantly impairs the thermoregulation system by inhibiting tonic vasoconstriction, which plays a significant role in temperature regulation. These factors predispose patients to hypothermia and shivering.

The treatment of shivering includes both pharmacological and nonpharmacological methods. The non-pharmacological management is by external heating like the use of forced air warming, blankets, warmed fluids.

Pharmacological interventions include Dexmeditomidine, Pethidine, Tramadol, Nefopam, Clonidine and ketamine. There is no gold standard treatment as the administration of all the available drugs is associated with various adverse effects3

Dexmeditomidine, a highly selective alpha2 adrenergic receptor agonist with a relatively high ratio of α2/α1 activity (1620 : 1).It has been used as a sedative agent and is known to reduce the shivering and vasoconstriction threshold. It is an effective drug without any major adverse effect and provides good haemodynamic stability.

Pethidine, an opioid derivative, is frequently recommended for the treatment of post-neuraxial anaesthesia shivering. It is a combined μ- and κ-receptor agonist. Activation of the κ-opioid receptors decreased the shivering threshold twice as much as the vasoconstriction threshold. It probably acts directly on the thermoregulatory centre or via opioid receptors5.

Tramadol has been commonly used drug for post-spinal anaesthesia shivering. It decreases the sweating, vasoconstriction and shivering thresholds6. But it has many adverse effects like nausea, vomiting, dizziness etc.which is uncomfortable to the patient. Clonidine has been used during last few years as it has better efficacy and less adverse effects compared to tramadol. But there is 5-10% incidence of hypotension and bradycardia withclonidine.

PATIENTS AND METHODS

The present study was a prospective randomized study & was undertaken to compare the efficacy of Dexmeditomidine, Pethidine & Tramadol in the treatment of post neuraxial anaesthesia shivering. After approval from the institutional ethical committee, the study was conducted in 90 patients of either sex between 18 to 70 years of age undergoing elective or emergency urological, gynaecological, orthopaedic & general surgical procedures done under neuraxial blockade, will be randomly allocated into three groups of 30 each.

Study Group D (n=30) patients receiving 0.5 mcg/kg dexmeditomedine.
Study Group P(n=30)patients receiving 0.5mg/kg pethidine.
Study Group T:(n=30)patients receiving 0.5mg/kg tramadol.

The hemodynamic parameters such as heart rate(HR), Mean arterial pressure(MAP), oxygen saturation(SpO2), time for cessation of shivering, recurrence episodes, sedation profiles were recorded and compared in all the three groups.

PRE ANAESTHETIC EVALUATION

A thorough pre anaesthetic evaluation was done for all patients a day before the proposed surgery.

The criteria for the inclusion of a patient in the present study was as follows.

INCLUSION CRITERIA:
- Adult patients aged between 18-70 yrs of both sex
- Patients belonging to ASA grade 1 and 2
- Posted for elective or emergency spinal/combined spinal epiduralanesthesia.
- Patients giving informed written consent.

EXCLUSION CRITERIA
- Patients belonging to ASA grade 3 and 4.
- Age more than 70 and less than 18.
- Any contra –indication to spinal anesthesia like hypotension,coagulation defects, spine abnormalities, local site infection.
- Patients with valvular heart diseases.
- Allergic to drugs.
- Patient refusal.

The investigations done were:
A. Complete blood picture
B. PT, aPTT, platelet count
C. HIV, HBsAg & HCV screening
D. Random blood sugar, Blood urea, Serum creatinine.
E. ECG, 2D Echo

PROCEDURE
In the operation theatre, an 18G venous cannula was inserted and preloading done with Ringer's Lactate solution 10 ml/kg before giving spinal anaesthesia and maintained at 6 ml/kg/h after spinal anaesthesia. Before starting the procedure, standard monitors were attached and all the baseline parameters such as heart rate (HR), non-invasive blood pressure (NIBP), oxygen saturation (SPO2), electrocardiography (ECG), and body temperature (axillary) were recorded.

Under aseptic conditions spinal anaesthesia was administered with 0.5% heavy bupivacaine (15 mg) at L3-4 or L4-5 interspace using 25G Quincke's spinal needle. All operation theatres were maintained at an ambient temperature of around 24°C-25°C. Supplemental oxygen was administered to all the patients at the rate of 5 l/min with face mask and patients were covered with drapes but not actively warmed. IV fluids and anaesthetics were administered at room temperature.

Vital parameters such as HR, NIBP, and SPO2 were recorded pre operatively and at 5 min, 10 min, 15 min, 30 min after the administration of the respective drugs. Continuous ECG monitoring was done.

Shivering was graded using a four point scale by Wrench.

Grade 0: No shivering,
Grade1: One or more of the following: Piloerection, peripheral vasoconstriction, peripheral cyanosis, 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.

Shivering was considered treated only when it was regressed within 15 minutes after drug administration. Patients who developed either grades 3 or 4 shivering were included in the study. Either of the three drugs was given as slow IV bolus injection. Dexmeditomidine 0.5µg/kg slowly infused for 3-5 minutes. The drugs were diluted to a volume of 5 ml in a 5 ml syringe. The time in minutes at which shivering started after spinal anaesthesia (onset of shivering), severity of the shivering, time to the disappearance of shivering and response rate (shivering ceasing within 15 min after treatment), recurrence of shivering was also noted. In case there was recurrence of shivering, patients were treated with an additional dose of dexmeditomidine (0.5 µg/kg IV) or tramadol (0.5 mg/kg IV) in the respective groups. Adverse effects such as nausea, vomiting, bradycardia (<50/min), hypotension (>20% of baseline), dizziness;

STATISTICALANALYSIS
- All the values observed were analyzed & expressed as mean±SD.
- Student's t test is applied for parametric data like Age, Weight, HR, MAP, Onset of shivering, Cessation of shivering
- Chi square test is applied for non- parametric data like gender, recurrence of shivering, adverse effects.
- A probability value (P) less than 0.05 was regarded as statistically significant and P value more than 0.05 regarded as statistically insignificant.

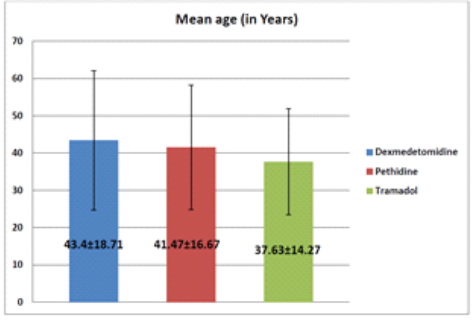
OBSERVATION AND RESULTS
The study was conducted in 90 adult patients belonging to ASA grade I & II of either sex aged between 18-70 years posted for elective/emergency urological, gynecological,, orthopedic & general surgical procedures done under neuraxial anaesthesia. The sample population were randomly allocated to three groups, group D (receiving Dexmeditomidine 0.5 µg/kg), group P (receiving Pethidine 0.5 mg/kg), group T (receiving Tramadol 0.5 mg/kg).The results are given below.

AGE DISTRIBUTION:
The minimum age of the patient was 18 years and the maximum age was 70 years in the study groups. There is no significant difference in the three groups with respect to mean age of the study participants and the results were comparable. (F=0.934; p>0.05). The results are shown in table 1 and figure 1 below

Table 1: Mean age of the study participants

Mean age (in years)			
Dexmeditomidine (n=30)	Pethidine (n=30)	Tramadol (n=30)	p-value
43.4±18.71	41.47±16.67	37.63±14.27	P=0.397

Figure 1: Age Distribution



SEX DISTRIBUTION:
Table 2: Sex wise distribution of the study participants

Gender	Dexmeditomidine (n=30)	Pethidine (n=30)	Tramadol (n=30)	p-value
Male	25 (83.33%)	26 (86.67%)	21 (70%)	X2 = 2.917 P=0.232
Female	5 (16.67%)	4 (13.33%)	9 (30%)	

Males were the predominant participants in the three groups. There is no significant difference between the three groups with respect to gender. ($\chi 2$=2.917;p=0.232). The gender wise distribution is shown in table 2 above & figure 2 below.

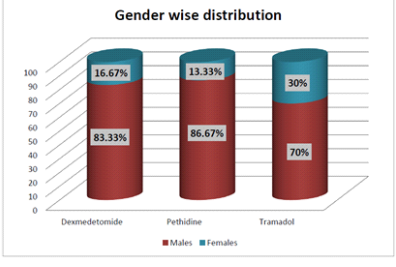


Figure 2: Gender wise distribution

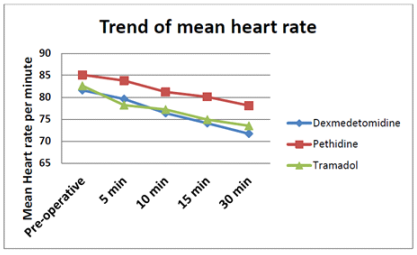
HEART RATE
The preoperative mean heart rate among group D was 81.6±7.67, in group P was 85.1±6.14 and in group T was 82.6±5.26. The difference in the heart rate of the participants between three groups is not statistically significant pre-operatively. (p>0.05)

After giving the drug, the reduction in the heart rate is better observed in the Dexmeditomidine group than the Pethidine and Tramadol group & there is considerable decrease in heart rate at 5 minutes & 10 minutes after the drug administration & the difference is highly significant statistically. (p<0.005). The same is represented in the table 4 and figure 4 below.

Table 3: Distribution by the Mean heart rate of the study participants

Mean Heart Rate (per minute)				
Duration	**Dexmeditomidine**	**Pethidine**	**Tramadol**	**p-value**
Pre-operative	81.6±7.67	85.1±6.14	82.6±5.26	0.101
5 min	79.6±7.72	83.8±5.58	78.2±4.52	0.002
10 min	76.4±6.66	81.2±5.01	77.2±3.44	0.001
15 min	74.1±6.56	80.1±5.37	74.9±4.16	0.000
30 min	71.7±6.58	78.1±5.18	73.5±4.48	0.000

Figure 3 : Mean Heart rate distribution of the study participants



ONSET OF SHIVERING:

Shivering was noticed within 20.27±5.92 minutes in dexmeditomidine group, 18.53±4.98 min in pethidine group, 19.43±5.28 min in tramadol group after neuraxial blockade, and the p value was 0.463.

There is no significant difference in onset of shivering between three groups. (p>0.05) which is represented in the table 7 & figure 7 below.

Table 4 : Distribution by the Mean onset of shivering in the three groups

Onset of Shivering(in minutes)			
Dexmedetomidine	Pethidine	Tramadol	p-value
20.27±5.92	18.53±4.98	19.43±5.28	P=0.463

There was no statistically significant difference in the onset of shivering when compared between dexmeditomidine and pethidine (p=0.223), tramadol and pethidine(p=0.499), dexmeditomidine and tramadol groups (p=0.564). The values compared is shown in the tables 4 & the figure4a below.

Table 4a:

GROUPS **Onset of shivering (in minutes)**			p-value	
Student T-tests	A (20.27±5.92)	B (18.53±4.98)	0.223	Not significant
	B (18.53±4.98)	C (19.43±5.28)	0.499	Not significant
	C (19.43±5.28)	A (20.27±5.92)	0.564	Not significant

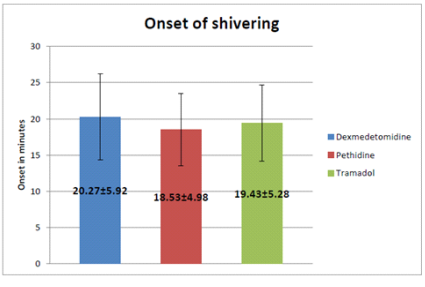


Figure 4: Distribution by the Mean onset of shivering in the three groups.

CESSATION OF SHIVERING:

Dexmeditomidine took 6.3±1.34 min, pethidine 7.73±0.97 and tramadol have taken 7.27±1.14 min for the cessation of shivering, from the time of administration of the respective drugs. Dexmeditomidine group produced an early cessation of the shivering compared to Pethidine and Tramadol group, the difference is highly significant statistically. (p<0.005) & the results are shown in the given table 8 below.

When the mean time of cessation of shivering was compared among the tramadol and dexmeditomidine groups (p=0.004) & between pethidine and dexmeditomidine groups (p < 0.001), the results were statistically highly significant, but when tramadol group is compared with pethidine the p value was 0.098 and the results were clinically and statistically nill significant & the same is represented in the table 8a & figure 8 below..

Table 5: Distribution by the Mean time of cessation of shivering

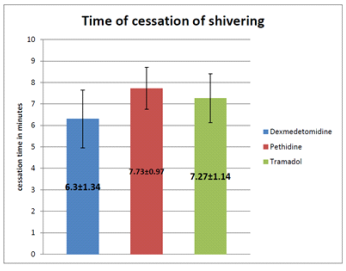
Cessation of Shivering (in minutes)			
Dexmeditomidine (n=30)	**Pethidine (n=30)**	**Tramadol (n=30)**	**p-value**
6.3±1.34	7.73±0.97	7.27±1.14	P<0.000

When the mean time of cessation of shivering was compared among the tramadol and dexmeditomidine groups (p=0.004) & between pethidine and dexmeditomidine groups (p < 0.001), the results were statistically highly significant, but when tramadol group is compared with pethidine the p value was 0.098 and the results were clinically and statistically nil significant & the same is represented in the table 5a & figure 5 below.

Table 5a

	Group Cessation of shivering (in minutes)	**p- value**		
Student T test	D (6.3±1.34)	P (7.73±0.97)	<0.001	Significant
	P (7.73±0.97)	T (7.27±1.14)	0.098	Not significant
	T (7.27±1.14)	D (6.3±1.34)	0.004	Significant

Figure 5 : Distribution by the Mean time of cessation of shivering



RECURRENCE OF SHIVERING:

Recurrence of shivering was seen highly in tramodol group (5 patients) and 4 patients in pethidine group, 3 patients in dexmeditomidine group. More number of participants in the Tramadol group (16.67%) showed recurrence of shivering compared to Dexmeditomidine (10%) and Pethidine group (13.33%). But, the difference is not significant statistically. (p>0.05)This is shown in the table 9 below.

Table 6: Distribution by the recurrence of shivering in study participants

Recurrence of shivering	**Dexmeditomidine (n=30)**	**Pethidine (n=30)**	**Tramadol (n=30)**	**p-value**
Yes	3 (10%)	4 (13.33%)	5 (16.67%)	X2=0.577 P=0.749
No	27 (90%)	26 (86.67%)	25 (83.33%)	

The incidence of recurrence of shivering was statistically nil significant when the comparison was made between dexmeditomidine and pethidine groups (p=0.688), pethidine and tramadol groups (p=0.718), and dexmeditomidine and tramadol groups (p=0.448) & the same is represented in the tables 6a,6b,6c & figure 9 below

Table 6 a:

Recurrence of shivering	Dexmeditomidine (n=30)	Pethidine (n=30)	p-value
Yes	3 (10%)	4 (13.33%)	X2=0.162 P=0.688
No	27 (90%)	26 (86.67%)	

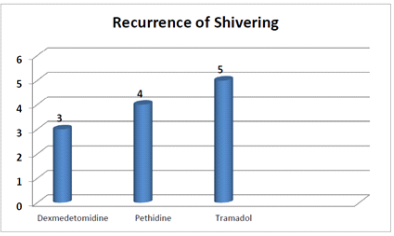
Table 6 b:

Recurrence of shivering	Dexmeditomidine (n=30)	Pethidine (n=30)	p-value
Yes	4 (13.33%)	5 (16.67%)	X2=0.131 P=0.718
No	26 (86.67%)	25 (83.33%)	

Table 6 c:

Recurrence of shivering	Dexmeditomidine (n=30)	Pethidine (n=30)	p-value
Yes	3 (10%)	5 (16.67%)	X2=0.577 P=0.448
No	27 (90%)	25 (83.33%)	

Figure 6 : Distribution by the recurrence of shivering in study participants



ADVERSE EFFECTS:

There is a significantly higher number of Hypotension (26.67%) and Bradycardia (16.67%) cases in Dexmeditomidine group compared to Pethidine and Tramadol group (p<0.05) & is highly significant statistically. Nausea and vomiting was observed more in the Tramadol group (13.33%), but it is nil significant statistically (p>0.05) & the same is shown in the table 10 given below.

Table 7: Distribution by the adverse effects in study participants

Adverse effects	Dexmeditomidine (n=30)	Pethidine (n=30)	Tramadol (n=30)	p-value
Hypotension	8 (26.67%)	0	3 (10%)	P=0.02
Bradycardia	5 (16.67%)	0	0	P=0.005
Nausea & Vomiting	0	1 (3.33%)	4(13.33%)	P=0.22 (NS)

When the incidence of hypotensive episodes were compared between dexmedetomidine and pethidine groups the results were highly significant statistically (p=0.002). And the incidence of bradycardia in dexmedetomidine group was 16.67% and the difference was statistically highly significant (p=0.019) & it is presented in the tables 10a,10b,10c & figure 10 given below.

Table 7a:

Adverse effects	Dexmeditomidine (n=30)	Pethidine (n=30)	p-value
Hypotension	8 (26.67%)	0	P=0.02
Bradycardia	5 (16.67%)	0	P=0.019
Nausea & Vomiting	0	1 (3.33%)	P=0.313 (NS)

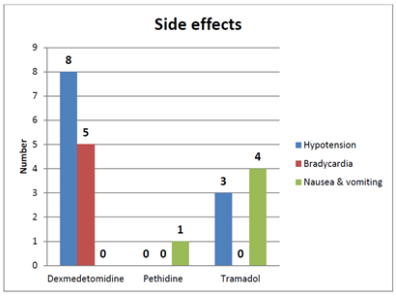
Table 7b:

Adverse effects	Dexmeditomidine (n=30)	Pethidine (n=30)	p-value
Hypotension	8 (26.67%)	3 (10%)	P=0.09 (NS)
Bradycardia	5 (16.67%)	0	P=0.06 (NS)
Nausea & Vomiting	0	4 (13.33%)	P=0.121 (NS)

Table 7c:

Adverse effects	Dexmeditomidine (n=30)	Pethidine (n=30)	p-value
Hypotension	0	3 (10%)	P=0.236 (NS)
Bradycardia	0	0	P=1.000 (NS)
Nausea & Vomiting	1 (3.33%)	4 (13.33%)	P=0.350 (NS)

Figure 7 : Distribution by the adverse effects in study participants



DISCUSSION

Shivering is a routine and common occurance in patients undergoing surgeries on the lower extremities & abdomen, under spinal and epidural anaesthesia. The causes for shivering are multifactorial. Shivering is elicited when the preoptic region of the hypothalamus is cooled. There is extensive vasodilatation due to sympathetic paralysis produced consequent to spinal and epidural anaesthesia, especially with sensory loss extending upto T10 or T6 segments, Usually the autonomic loss of sensation will be 2 segments higher than the sensory blockade, and such extensive vasodilatation produced in the entire lower limbs, abdomen & the back of abdomen (sacral, lumbar & lower dorsal areas) leads to enormous heat loss from the body.

The neurotransmitter pathways involved in shivering are multiple and involve opioids, α2 adrenergic, serotonergic, and anticholinergic receptors. Hence, drugs acting on these systems which include opioids (pethidine, nalbuphine, or tramadol), ketanserin, propofol, doxapram, clonidine, ketamine and nefopam are utilized in the treatment of shivering. However, adverse effects such as hypotension, hypertension, sedation, respiratory depression, nausea and vomiting limit their use. Shivering is visible only in the upper chest, neck, upper limbs, face & head as the lower limbs & abdomen are paralyzed due to spinal/epidural blockade.

Vasoconstriction and shivering are restricted to the upper body during spinal anaesthesia, as they are inhibited below the level of blockade through sympathetic and somatic neural block.

Cutaneous heat loss can be decreased by covering the skin (e.g.with surgical drapes, blankets or plastic bags). A single layer of an insulator reduces the heat loss by approximately 30%; unfortunately adding additional layers does not proportionately increase the benefit.67 Devices like Baer-Hugger which circulate hot air around the human body at a temperature nearer to the human body temperature.

Forced air warming is generally the most effective available method,68 but any method or combination of methods that maintain the core temperature above 360C is adequate.Forced air warming or a combination of forced air warming along with fluid warming is required to maintain normal intraoperative and postoperative core temperatures.29 The OT room temperature if maintained around 24-260C also minimizes the incidence of shivering.

The other measures to minimize the incidence of shivering is to administer the IV fluids, blood & blood products during the operation by use of IV fluid & blood warmers & warming them close to the human body temperature. So many drugs have been used to treat & minimize shivering during regional anaesthesia.

The use of cold irrigating solutions like Normal saline for irrigating the wounds, in the lower limbs during orthopaedic surgeries , urological surgeries, use of antibacterial irrigating solutions like ciprofloxacin & metronidazole at room temperature also contribute to further heat loss & thus cause shivering.

So irrigating solutions should be used after warming them closer to human body temperature. One more measure by which heat loss and shivering can be minimized is to use warm, humidified oxygen via nasal prongs throughout surgery. Potential risk factors for hypothermia in spinal anaesthesia include ageing, level of sensory block, temperature of the operation theatre and IV solutions. In this study, all operation theatres (OTs) maintained an ambient temperature of 23-25°C, and all fluids and drugs were at room temperature during the surgery.

Demographic factors such as age, gender, duration of anaesthesia and surgery have also been matched to reduce any confounding bias. Dexmeditomidine is an α2 adrenoceptor agonist, with anti hypertensive, sedative, analgesic, and anti shivering properties. The antishivering effects of α2 adrenoceptor agonists are mediated by binding to α2 receptors that mediate vasoconstriction and the antishivering effects. In addition, it has hypothalamic thermoregulatory effects. Dexmedetomidine, a potent alpha 2-adrenergic receptor agonist,has been used as a sedative agent and is known to reduce the shivering threshold. It acts by decreasing the vasoconstriction and shivering thresholds.1 One dose of prophylactic administration of intraoperative dexmeditomidine(1.0 μg/kg) before the end of the surgery reduced vasoconstriction, as well as shivering.63 In a study done by Abdel

Ghaffer HS et al41, dexmeditomidine 0.5microgram/kg was proved effective in the treatment of shivering

Pethidine, an opioid derivative, is frequently recommended for the treatment of postneuraxial naesthesia shivering. Pethidine is a combined μ- and κ-receptor agonist. Pethidine may act via the κappa rather than μ-opioid, receptors. Activation of the κ- opioid receptors decreased the shivering threshold twice as much as the vasoconstriction threshold. Because pethidine has activity in k-receptors, correlation between anti-shivering effect of pethidine, and agonist activity of k-receptor has been suggested in many studies.64,65,66 It can be said that anti-shivering effects of pethidine in spinal anesthesia are resulted by its systemic absorption. It has been shown that the anti-shivering effects of IV pethidine are seen in 0.6 and 1.8 μg/ml of plasma concentration, while plasma level of pethidine 400-700 ng/ml is related to its analgesic effects. However, pethidine probably acts directly on the thermoregulatory centre, and not only through receptor activation.

Tramadol is an opioid analgesic with opioid effect mainly mediated via mu receptor with minimal effect on kappa and delta receptors. It also activates the= mono aminergic receptors of the descending spinal inhibitory pain pathway. Tramadol a synthetic opioid agonist prevents shivering by inhibiting the reuptake of norepinephrine and serotonin, hence activating the descending inhibitory spinal pathways.70 The anti shivering action of tramadol is probably mediated via its opioid or serotonergic and noradrenergic activity or both. It is well established agent in the treatment of post-anaesthetic shivering.

Main aim of the study was to compare the efficacy ofdexmeditomidine, pethidine , tramadol in the treatment of post neuraxial shivering ,and was conducted in 90 adult patients of ASA grade 1 & 2 aged 18-70 yrs,randomly allocated into 3 groups-A(receiving 0.5mcg/kg of Dexmeditomidine),groupB (receiving 0.5mg/kg of Pethidine), group C (receiving 0.5mg/kg ofTramadol) during elective or emergency surgical procedures done under neuraxialanaesthesia. In the present study all the three groups A,B,C were comparable withregards to the demographic variables and was statistically not significant.

Onset of Shivering

In the present study the time of onset of shivering in group A receiving dexmeditomidine was 20.27±5.92 min, group B receiving pethidine was 18.53±4.98 min & in group C receiving tramadol was 19.43±5.28 min and there was no significant difference in the onset of shivering on administration of neuraxial blockade between the 3 groups(p= 0.463) mostly because the age groups and the type of surgeries were almost similar in all the three groups. This correlated with the comparative study done by Lim Fern et al1 where also there was no difference in the time of onset of shivering between the three groups(p> 0.05).

Cessation of shivering:

In the present study, the time taken for cessation of shivering was 6.3±1.34 min in group A, 7.73±0.97 min in group B, 7.27±1.14 min in group C and clearly showing that Dexmeditomidine group produced early cessation of shivering compared to pethidine & tramadol groups and the difference is highly significant statistically (p<0.005) and the results are in correlation with the study done by **Lim Fern et,al**

When intergroup comparison was made between groups A &C(dexmeditomidine & tramadol), and between groups A & B(dexmeditomidine &pethidine)it clearly shows that there was statistically significant difference in the timeof cessation of shivering between both the groups where dexmeditomidine clearlyshowed early cessation of shivering than Tramadol group(p=0.004) and pethidinegroup(p<0.001). These results are in correlation with the studies done by **GeethaMittal et al45, Tanveer Singh kundra et al32,Abdel ghaffer et al41,Akshitha Singlaet al.34**

However the cessation of shivering in dexmetomidine group and tramadol group was much faster in the present study than in the study done by Akshita singla et al34,and the difference probably may be due to the higher operating room temperatures maintained in the present study. In the present study,the time of cessation of shivering showed statistically highly significant difference when group B(pethidine) was compared with group C(tramadol) where tramadol group showed early cessation of shivering and the result is in correlation with the study done by **Nahid Manocherian et al.4**

Haemodynamic changes

In the present study, intra operative hemodynamic changes such as HR, MAP, SpO2 preoperatively and at 5 min, 10 min, 15 min,30 min after the drug administration were recorded and compared between the three groups. The preoperative heart rate among the Dexmeditomidine group was 81.6±7.67/min, in pethidine group was 85.1±6.14/min & in tramadol group was 82.6±5.26/min and the values showed gradual decreasing trend from the time of drug administration & .the reduction in the heart rate was better observed in the Dexmeditomidine group than the pethidine & tramadol groups & was statistically significant with p<0.005. Preoperatively the mean arterial pressure in the dexmeditomidine group was 94.8±10.17mmHg,in pethidine group was 94.1±10.82mmHg & 91.1±9.33mmHg in tramadol group, and at any time after the administration of the drug, the three groups did not show any statistically or clinically significant difference with p>0.005.

Hypotension & Bradycardia are known haemodynamic effects of Dexmeditomidine. In the present study, among the 30 individuals receiving Dexmeditomidine , 8 (26.67%) patients developed hypotension(p=0.02) , 5 (16.67%) patients developed Bradycardia (p=0.005) and the differences were statistically and clinically significant among the three groups. This is in corrlelation with the study done by **Lim Fern et al1** which showed higher incidence of hypotension and bradycardia with dexmeditomidine group among the three groups.

The difference in the oxygen saturation(SpO2) levels measured were both clinically & statistically nil significant preoperatively and even after 30 min after the drug administration with p>0.005 mostly because the dose of the drugs which are used in the present study cannot cause respiratory depression sufficient enough to result in desaturation.

Recurrence.

In the present study, moremore number of participants in the Tramadol group (16.67%) showed recurrence of shivering compared to Dexmeditomidine (10%) and Pethidine group (13.33%). But, the difference is not significant statistically. When intergroup comparison was made between all the three groups,the incidence of recurrence of shivering was statistically nil significant.

Sedation score

Incidence of sedation was noted by using Ramsay sedation score and it was observed that the difference in the sedation score of the participants between the three groups was not statistically significant at any point of time(p>0.05) but there was mild sedation in the patients receiving dexmeditomidine clinically which is not considerably high. No patients who recieving tramadol were experiencing sedation because of such a low dose used & this was statistically nil significant. These results are in correlation with the study done by **Lim Fern et al1.**

The quality and duration of sedation with dexmeditomidine ismanageable. The sedation effect of dexmeditomidine is characterized by short termand easy arousability. None of the agent used produced respiratory depression.ithas been shown that alpha 2 adrenergic agonists causes a minimal respiratory depression.

When intergroup comparision was made between any of the three groups in the present study, sedation score were not showing any statistically significant difference but dexmeditomidine group was found to have higher sedation clinically and this is in correlation with the study done by **Akshita Singla et al34** In a study done by **Bicer C et al62**, dexmeditomidine group recorded higher sedation scores than the pethidine group which was significant both 78clinically and statistically mostly due to the higher dosage of dexmeditomidine (1microgram/kg) used rather than low dose used in the presentstudy.

Nausea and vomiting

In the present study 4 patients (13.335%) experienced nausea & vomiting in group C, 1 patient (3.33%) in group B, and no patient in group A(p=0.22). This result was comparable with the study done by Lim Fern et al1 where PONV was seen only 5% among the 3 groups(p>0.05) When intergroup comparisions was made between dexmeditomidine & tramadol groups, nausea & vomiting episodes were more in tramadol group than dexmeditomidine group and this study is in correlation with the study done by Akshita Singla et al34 and Tanveer Singh kundra et al32, 79

LIMITATIONS OF THE STUDY

The present study has got some limitations which include

1. The IV fluids are administered at room temperature which could've

led to hypothermia.
2. The study didn't control tightly the various factors which might influence the incidence of shivering like the temperature of drugs & IV fluids.
3. Lengthy operations should have been investigated to know the later effects of these drugs.
4. The operating room temperatures may not be strictly maintained and this can be an influencing factor on the drug effects resulting in varying results

SUMMARY

The present study was conducted in 90 patients of ASA grade 1 & 2 aged between 18-70 yrs scheduled for elective or emergency urological, gynaecological, orthopaedic and general surgical procedures done under neuraxial anaesthesia. The patients were randomly allocated into 3 groups, group A, B & C of 30 each.

The baseline vital parameters like HR, MAP, SpO2 were recorded preoperatively and at 5, 10, 15, 30 min after the onset of shivering after the administration of drugs. Time taken for onset of shivering after neuraxial blockade,cessation of shivering after drug administration, recurrence rates, adverse effects & sedation scores were compared.

The time for cessation of shivering in group A (dexmeditomidine) group is 6.3±1.34 minutes, group B (pethidine) is 7.73±0.97 minutes and in group C is 7.27±1.14 minutes and the difference was statistically significant with $p<0.005$. The difference was statistically significant when dexmeditomidine group was compared with pethidine group ($p<0.001$) & also with Tramadol group($p=0.004$), while there was no significant difference statistically when Tramadol group and pethidine group were compared($p=0.098$). Among the dexmeditomidine group three patients(10%), four patients in pethidine group(13.33%), five patients in tramadol group(16.67%) developed recurrence of shivering episodes & the difference is not significant statistically($p=0.749$, $p>0.05$) but was statistically significant only when dexmeditomidine group was compared with tramadol group.

Hypotension was seen in eight patients(26.67%) in dexmeditomidine group, three patients in tramadol group(10%) & none in pethidine group showing a statistical significance with $p=0.02$($p<0.05$). Bradycardia developed only in dexmeditomidine group among five patients(16.67%) & the difference was statistically significant ($p=0.005$). PONV was seen in four patients in tramadol group(13.33%) & one patient in pethidine group(3.33%) & none in dexmeditomidine group with statistically insignificant difference ($p=0.22$).

The results have shown that the time taken by dexmeditomidine for the cessation of shivering was less when compared with that of pethidine & tramadol whereas hypotension & bradycardia was very higher in dexmeditomidine group than other two groups & PONV was higher among the tramadol group. Sedation scores were almost equal in the three groups.

CONCLUSION

From the present study it can be concluded that,
1. All the three drugs in the present study can be used for treating post spinal anaesthesia shivering,
2. Dexmeditomidine 0.5mcg/kg was more effective than tramadol 0.5mg/kg & pethidine 0.5mg/kg. for treating patients with post spinal anaesthesia shivering,
3. Sedation scores were almost equal in all the three groups and were slightly more in the dexmeditomidine group clinically, but not statistically significant
4. Both tramadol & pethidine were found to have similar efficacy for treating post neuraxial shivering & were found to be quite reliable in their efficacy.
5. Dexmeditomidine caused higher incidence of hypotension & bradycardia.

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