

# Efficacy of Epidural Tramadol as Adjuvant to Bupivacaine to Reduce Post-Anesthesia Shivering: Comparison with Intravenous Tramadol HCl in Elective Caesarian Section

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## ABSTRACT

**Objective:** Central neuraxial blocks have been mainstay for elective caesarian sections. Epidural anesthesia is better tolerated haemodynamically and provides titer able analgesia and prolonged duration of analgesia. Shivering in perioperative period is reported as high as 65% in general anesthesia and 33% in central neuraxial anesthesia. Intravenous tramadol has been used for decades to treat perioperative shivering. Epidural tramadol as adjuvant to local anesthesia increases quality and duration of anesthesia. We aimed to note efficacy of epidural tramadol.

**Study Design:** Prospective, Randomized Control Trial study.

**Place and Duration of Study:** This study was conducted at the Operation theatres of Sahara Medical College, Narowal from January, 2020 to July, 2020.

**Materials and Methods:** Total number of 250 patients included in study randomly divided in group 1 and 2, received epidural and intravenous tramadol consecutively. SPSS software was used to analyze statistics.

**Results:** Group 1 resulted in 7 patients with shivering mean time to shivering was 41.42+7.29 minutes and mean APGAR was 7.56+1.14, 9.83+0.41, 9.99+0.08 at 1, 5 and 10 minutes consecutively. Group 2 resulted in 6 patients with shivering mean time to shivering was 43.66+4.27 minutes and mean APGAR was 8.48+0.85, 9.78+0.62, 9.97+0.15 at 1, 5 and 10 minutes consecutively. Shivering and time to shivering between 2 groups were insignificant with significance level of  $p=0.777$  and  $p=0.524$  consecutively. APGAR at 1 minute was significant with level of  $p<0.001$  whereas at 5 and 10 minutes improved and became insignificant with  $p=0.478$  and  $p=0.315$  levels consecutively. Nausea vomiting was insignificant between 2 groups  $p=0.856$ .

**Conclusion:** Epidural tramadol is as effective as intravenous tramadol for perioperative shivering.

**Key Words:** Epidural tramadol shivering.

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## INTRODUCTION

In elective caesarian section different methods of anesthesia has been chosen according to patient's anxiety and preference<sup>1,2</sup>. All methods have their own goods and bads.<sup>3</sup> Traditionally spinal anesthesia when compared with general anesthesia is considered better choice for elective Caesarian section in many aspects like less postoperative nausea, vomiting, DVT, Bleeding and decreased use of opioids.<sup>4</sup>

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Epidural anesthesia is better tolerated haemodynamically and provides titer able analgesia and duration of analgesia.<sup>5</sup> Shivering in perioperative period is reported as high as 65% in general anesthesia and 33% in central neuraxial anesthesia.<sup>6</sup> Intravenous tramadol has been used for decades to treat perioperative shivering.<sup>7,8</sup> Epidural tramadol as adjuvant to local anesthesia increases quality and duration of anesthesia.<sup>9</sup> Although epidural tramadol HCl has been used for better quality of anesthesia but its effect on shivering is still undocumented so we aimed to note efficacy of epidural tramadol for perioperative shivering. We used 100mg preservative free tramadol as adjuvant to bupivacaine which is safe dose<sup>10</sup> and compared it with 0.5mg/kg intravenous tramadol for prophylactic use.

## MATERIALS AND METHODS

The prospective, randomized control trial study was conducted at the Operation theatres of Sahara Medical College from January, 2020 to July, 2020.

**Sample size and technique:** Total 250 patients included in randomized control trial who received

epidural block for caesarian section randomly divided into 2 groups, group 1 received epidural tramadol and group 2 received intravenous tramadol.

**Primary outcome:**

Shivering

Time to shivering after epidural block in minutes

**Side effects like**

1. Apgar score at 0,5,10 minutes
2. Perioperative Nausea vomiting

**Inclusion criteria**

- Age between 18-35 years
- ASA 1,2
- Elective Caesarian section

**Exclusion criteria**

- Patient reluctance
- Infection of injection site
- Bleeding disorder tendency
- Previous PONV
- Preexisting neurological deficit
- PIH and GDM

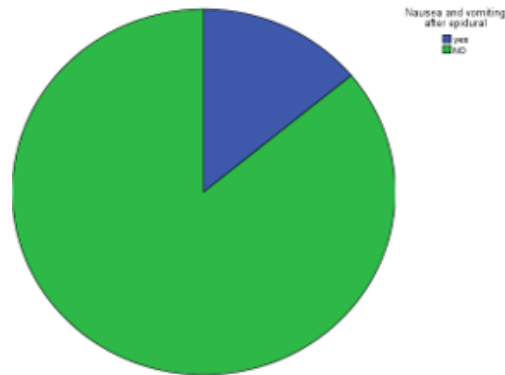
**Data collection procedure:** Ethical review board allowed proceeding with our study. We conducted study on 250 patients and made sure informed consent. Patients randomly divided into 2 groups, group 1 who received 100mg tramadol epidural and group 2 received 0.5mg/kg tramadol for shivering prophylaxis. All patients received epidural anesthesia in lumbar space L3-L4-L5 by experienced anesthesiologist. After giving test dose of xylocaine with adrenaline, we injected 0.5% bupivacaine 20ml and 100mg preservative free tramadol HCl in group 1 and bupivacaine alone in group 2 patients in epidural space. Standard 1 and 2 monitoring started and continued for next 2 hours. Injection synephrine is used to maintain haemodynamics. After assessing the block level surgery started. Shivering and time to shivering noted and along with all data collected entered in Performa.

**Data analysis procedure:** SPSS Version 16 used to analyze statistics. Data collected from performa and entered in software. Descriptive statistics calculated for quantitative data like age, shivering, time to shivering,

nausea vomiting as mean and standard deviation. ANNOVA test applied to determine significance of variables.

**RESULTS**

Group 1 resulted in 7 patient with shivering mean time to shivering was 41.42+7.29 minutes and mean APGAR was 7.56+1.14,9.83+0.41,9.99+0.08 at 1,5 and 10 minutes consecutively. Group 2 resulted in 6 patients with shivering mean time to shivering was 43.66+4.27 minutes and mean APGAR was 8.48+0.85,9.78+0.62,9.97+0.15 at 1,5 and 10 minutes consecutively, table 1 shows the said results. Shivering and time to shivering between 2 groups were insignificant with significance level of p=0.777 and p=0.524 consecutively. APGAR at 1 minute was significant with level of p< 0.001 whereas at 5 and 10 minutes improved and became insignificant with p=0.478 and p=0.315 levels consecutively. Table 2 shows the ANNOVA test for significance of variables. There was no significant difference in ages of patients between two groups mean age was 26.91+4.51 and 27.91+4.74 with p=0.089. Nausea vomiting was insignificant between 2 groups p=0.856. Group 1 and 2 had mean age of 26.91+4.51, 27.91+4.74 consecutively. Pie plots total number of nausea vomiting cases included in study.



**Figure No.1: Pie chart for nausea vomiting**

**Table No.1: Descriptive analysis of variables**

Group of patients		Age of patient	Time to shivering in minutes	APGAR at 1 minute	APGAR at 5 minutes	APGAR at 10 minutes
group 1	Mean	26.9120	41.4286	7.5600	9.8320	9.9920
	N	125	7	125	125	125
	Std. Deviation	4.51702	7.29971	1.14582	.41613	.08944
group 2	Mean	27.9120	43.6667	8.4800	9.7840	9.9760
	N	125	6	125	125	125
	Std. Deviation	4.74174	4.27395	.85760	.62970	.15366
Total	Mean	27.4120	42.4615	8.0200	9.8080	9.9840
	N	250	13	250	250	250
	Std. Deviation	4.64851	5.96679	1.11019	.53317	.12573

**Table No.2: ANOVA for variables**

		Sum of Squares	df	Mean Square	F	Sig.
shivering	Between Groups	.004	1	.004	.081	.777
	Within Groups	12.320	248	.050		
	Total	12.324	249			
Time to shivering in minutes	Between Groups	16.183	1	16.183	.433	.524
	Within Groups	411.048	11	37.368		
	Total	427.231	12			
Nausea and vomiting after epidural	Between Groups	.004	1	.004	.033	.856
	Within Groups	30.096	248	.121		
	Total	30.100	249			
APGAR at 1 minute	Between Groups	52.900	1	52.900	51.650	.000
	Within Groups	254.000	248	1.024		
	Total	306.900	249			
APGAR at 5 minutes	Between Groups	.144	1	.144	.506	.478
	Within Groups	70.640	248	.285		
	Total	70.784	249			
APGAR at 10 minutes	Between Groups	.016	1	.016	1.012	.315
	Within Groups	3.920	248	.016		
	Total	3.936	249			
Age of patient	Between Groups	62.500	1	62.500	2.915	.089
	Within Groups	5318.064	248	21.444		
	Total	5380.564	249			

## DISCUSSION

Redistribution of heat due to sympatholytic vasodilation and compensatory thermal deregulation are main causes of shivering in central neuraxial anaesthesia which is worsened with cold environment, cold intravascular fluids and surgical exposure of patients.<sup>11</sup> Various methods employed to decrease the incidence of perioperative shivering included pharmacological and non-pharmacological, non-pharmacological included warming patient and environment with air warmers and warm intravenous fluids.<sup>12</sup> shivering increases metabolism causing hypoxemia leading to metabolic acidosis and increases catecholamine surges.<sup>13,14</sup>

Pharmacological interventions had been successfully employed which mostly included post shivering treatment like intravenous meperidine, clonidine, ketamine, fentanyl, magnesium, xylocaine, dexamethasone, tramadol, propofol, ketanserin and doxapram. Only few available options for prophylaxis like tramadol which is intended for different purpose but gives additional benefit of shivering prophylaxis.<sup>15</sup>

Masood Entezariasl compared dexamethasone and pethidine intravenous for prophylaxis of perioperative shivering and found that dexamethasone is more effective than pethidine in term of preventing the perioperative shivering, 47.5% placebo group, 10%

dexamethasone group and 37.5% pethidine group had shivering with  $p=0.001$ .<sup>16</sup> Additional benefit of dexamethasone was its anti-emetic effect while pethidine gave better analgesia postoperatively but with higher incidence of perioperative nausea vomiting.

Sarmila Guha compared prophylactic use of clonidine and tramadol and concluded in favour of tramadol for lesser complications like hypotension, bradycardia and sedation but of shivering was insignificant between 2 groups. ( $p>0.05$ )<sup>17</sup> Although Sarmila favoured tramadol for better analgesia but clonidine had its its own merit of patient being more calm provided blood pressure and heart rate was managed.

Bahman Hasannasab in his trial compared meperidine, doxapram, ketamine groups with perioperative shivering of 2.5%,10% and 7.5% consecutively. ( $p=3.9$ ). They also noticed those groups who received ketamine and meperidine required analgesia long after the procedure. ( $p<0.001$ ) ketamine and meperidine group had complication like nausea vomiting and anxiety but still their effect on shivering masked their complications.

Sang-Hwan Do noticed that magnesium decreases postoperative analgesic requirement and also decreases perioperative shivering.<sup>19</sup>

Ahmad Rastegarian first time noticed the efficiency of intrathecal meperidine and found that intrathecal

meperidine significantly reduces perioperative shivering. ( $p < 0.04$ )<sup>20</sup> Meperidine intrathecal was used in lesser quantity but with better analgesic quality with additional benefit on shivering.

P. Alfonsi compared intravenous lidocaine, fentanyl and meperidine. He found meperidine significantly superior to other two in terms of prophylaxis of shivering as meperidine inhibited shivering in lower body temperature. ( $p < 0.01$ )<sup>21</sup>

In all Data available we found all medicines discussed above were effective in preventing perioperative shivering with some drug's superiority to other due to their efficacy or their side effects. Some drugs like clonidine, doxapram etc. were solely prescribed either for prophylaxis or treatment of perioperative shivering without any other indication. Some drugs were used for other indication and they were resulted beneficiary side effect of inhibition of shivering like tramadol.

There was only one study in Data showing efficacy of central neuraxial meperidine for perioperative shivering. In our settings meperidine is not available in contrast to tramadol which is freely available and being widely used as adjuvant to central neuraxial blocks for better, quick and prolonged analgesia. Tramadol is also considered as drug of choice for perioperative shivering in local practice. We took idea to study tramadol central neuraxial from its above discussed indication and it is proved to be as effective as intravenous tramadol for perioperative shivering. This way we got not only better analgesia but also had lesser shivering.

Limitation of our study was that it is conducted in a specific population and in a defined period of time. We recommend more observational studies for more accurate Data.

## CONCLUSION

Epidural tramadol is as effective as intravenous tramadol for perioperative shivering.

**Recommendation:** We recommend further studies on different populations and multi center trials as little Data is available in this regard.

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### Author's Contribution:

Concept & Design of Study:	Asif Nadeem
Drafting:	Muhammad Muazzam Butt
Data Analysis:	Muhammad Muazzam Butt
Revisiting Critically:	Asif Nadeem, Muhammad Muazzam Butt
Final Approval of version:	Asif Nadeem

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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