

**Original Research Paper****Effect of intravenous dexmedetomidine for prevention of perioperative shivering in transurethral resection of prostate surgery: A randomized prospective study**

Authors

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Dr Brijmohan Sharma, MD Anaesthesia**Abstract**

Aims: Shivering is discomforting to the patient and Anesthesiologist both. Various drugs have been employed to abolish the occurrence of shivering. The aim of this study was to explore the effectiveness of dexmedetomidine in suppressing the perioperative shivering in patients undergoing transurethral resection of prostate (TURP) in spinal anaesthesia.

Materials and Methods: 60 patients of ASA grade I and II, aged 40-80 years, underwent spinal anaesthesia for TURP procedures were allocated randomly into 2 groups with 30 patients in each group. Group D were administered 1 mcg/kg of dexmedetomidine IV in 10 ml normal saline, while group C received similar volume of saline after achieving adequate spinal block. Haemodynamic data were recorded during preop, intraop, and postop periods. Perioperative shivering was recorded as per Crossley and Mahajanscale¹². Side effects were also observed, recorded, and treated symptomatically. Statistical analysis was carried out using one-way ANOVA with Post Hoc Tukey HSD Test and Chi square test.

Results: Two groups were comparable regarding demographic profile. None of the patients in group D developed grade 3 shivering as compared to 10 patients in group C. ($P < 0.05$) Heart rate and mean arterial pressure also showed significant variation clinically and statistically in group D patients during and after surgery ($P < 0.05$). A high incidence of sedation ($P < 0.05$) was observed in group D, whereas the incidence of nausea and vomiting was higher in group C.

Conclusions: Dexmedetomidine seems to possess antishivering properties and was found to reduce the occurrence of shivering in patients undergoing spinal anaesthesia.

Keywords: Dexmedetomidine, Spinal anaesthesia, Shivering, TURP.

Introduction

Shivering is a common complaint in patients undergoing TURP under spinal anaesthesia and it

not only affects the comfort of the patient but also increases oxygen consumption and difficulty in monitoring the patient. The findings showed that

increased body metabolism during shivering can lead to myocardial ischemia¹. Postoperative shivering can increase intracranial and intraocular pressure and through inducing tenderness lead to postoperative pain². Incidence of shivering during neuraxial block may be reduced by warming the body surface skin³. The drugs including Meperidine⁴, Clonidine, Ketanserin⁵, Tramadol⁶ and Magnesium sulfate⁷ are effective for shivering after anesthesia and neuraxial block. Opioids have been used to treat and prevent postoperative shivering. However, some side effects such as respiratory depression, low blood pressure, nausea, and vomiting have limited the use of opiates after surgery⁸. Patients undergoing transurethral resection of the prostate (TURP) due to other underlying disease such as cardiovascular disease and aging have many problems. Dexmedetomidine, a congener of clonidine, is a highly selective α -adrenoceptor agonist. It has been used as a sedative agent and is known to reduce the shivering threshold⁹. Few studies which have explored its anti-shivering potential have inferred that dexmedetomidine is an effective drug without any major adverse effect and provides good haemodynamic stability⁹⁻¹¹. Therefore, the aim of this study was to evaluate the effect of IV dexmedetomidine and placebo on intra- and post-operative shivering in patients undergoing TURP with spinal anesthesia.

Material and Methods

The present study was approved by the ethics committee of the institution. This study was conducted as prospective, randomized, placebo controlled, double blind study.

Sixty patients of ASA grade I and II, age group 40 to 80 years male admitted for transurethral resection of prostatectomy (TURP) under spinal anaesthesia were included for study. Patients with cardiopulmonary diseases, hepatic dysfunction, renal dysfunction, psychiatric illness, allergy to drug, contraindication to spinal, severe diabetes, patients receiving vasodilators or medication likely to alter thermoregulation were excluded

from study. After taking written informed consent from patients preanaesthetic assessment of all the selected patients were done with complete history and physical examination. Routine investigations like complete blood count, blood sugar, blood urea, serum creatinine, chest X-ray and ECG were done. Patients were randomized into 2 groups of 30 patients each via sealed envelope technique. Group C (control): 10 ml normal saline IV given over a period of 10 min. Group D: 1 μ g/kg inj. dexmedetomidine in 10 ml normal saline slow IV over 10 min. All patients were kept nil orally for 6 hours before procedure. Uniform premedication of Inj. Glycopyrolate 0.2 mg IV was given 30 minutes before induction of anaesthesia. All the drugs administered by a person who not involved in study. Intradermal sensitivity test for Bupivacaine Hydrochloride was performed. After securing IV (18G) access patients were placed in supine position and preloaded with Ringer's lactate solution, 10ml/kg body weight over 15 mins. Before starting the procedure, in the operating room standard monitors were attached and all the baseline parameters such as heart rate (HR), non-invasive blood pressure (NIBP), oxygen saturation (SPO₂), electrocardiography (ECG) were recorded. Operating room (OR) temperature was maintain between 22–24°C. Supplemental oxygen was administered to all the patients at the rate of 5 lit/min with face mask and patients were covered with surgical drape, but not actively warmed. IV fluids and anaesthetics were administered at room temperature. Vital parameters such as HR, NIBP and SPO₂ were recorded at intervals of every 5min for first 30 min and every 15 min for rest of the surgical time and then 2 hours postoperatively. Subarachnoid anaesthesia was administered with 0.5% heavy bupivacaine (3.5 ml) at L3-L4 or L4-L5 interspace using 25G spinal needle under aseptic conditions. After achieving adequate SAB block Patients were randomly allocated into two groups: control group (group C): patients received 10 ml of normal saline IV, dexmedetomidine group (group D); patients received 10 ml of normal saline

containing 1 µg/kg of dexmedetomidine hydrochloride IV. Shivering was assessed by Crossley and Mahajanscale¹² where 0= No shivering, 1= Cyanosis and piloerection, 2 = Visible tremors only in one muscle group, 3 = Visible tremors in more than one muscle group, and 4 = intense shivering, tremors of the head, arm. During surgery, shivering score was assessed and recorded at 15 min intervals. If grade was ≥3 prophylaxis was considered as failure. Perioperatively, if shivering occurs it was treated with warm blanket and reassurance till Grade 2. From Grade 3 onwards 50 mg IV Tramadol as used as rescue drug. Adverse effects nausea, vomiting, bradycardia (<50beats/min), hypotension (MAP <20% of baseline) and dizziness were noted. The degree of sedation was graded on a four point scale as per Filos et al.¹³ Grade 1: Awake and alert, Grade 2: Drowsy, responsive to verbal stimuli, Grade 3: Drowsy, arousable to physical stimuli, Grade 4: Unarousable. Any complication if occurred was treated with appropriate medications.

The observations were subjected to tabulation and analysis using one-way ANOVA with Post Hoc

Tukey HSD Test and Chi square test. p value<0.05 was considered to be statistically significant.

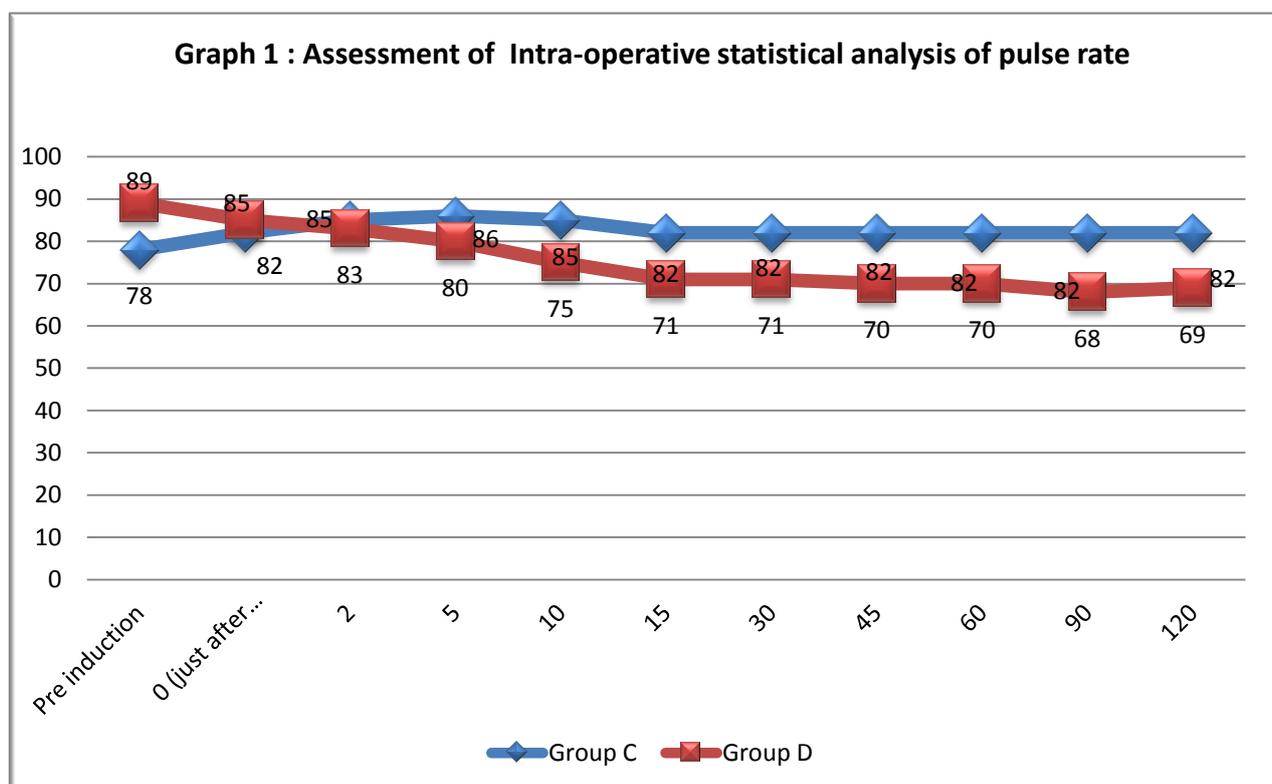
Results

Both groups were comparable with respect to age, weight& duration of surgery.

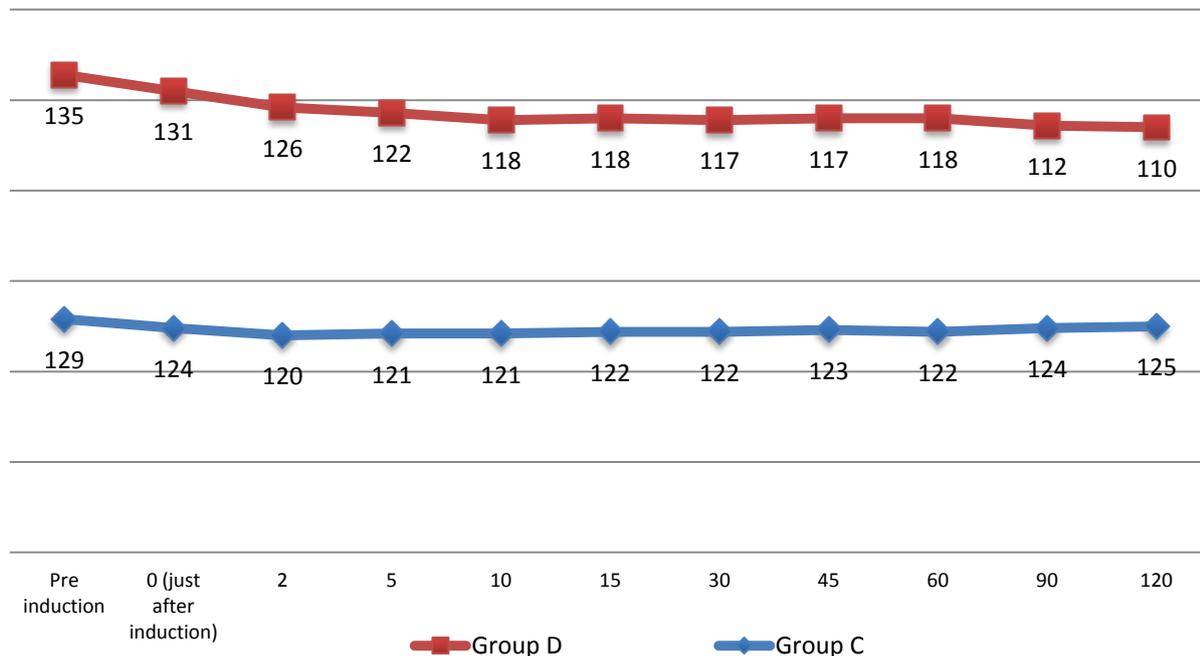
Table 1 Demographic distribution of patients in both groups

Variables	Group C (n=30)		Group D (n=30)	
	Mean	±SD	Mean	±SD
Age (yr)	64.96	7.85	66.83	7.43
Weight (kg)	63.59	6.78	66	8.1
Duration of surgery (min)	115.86	19.41	105.66	23.55

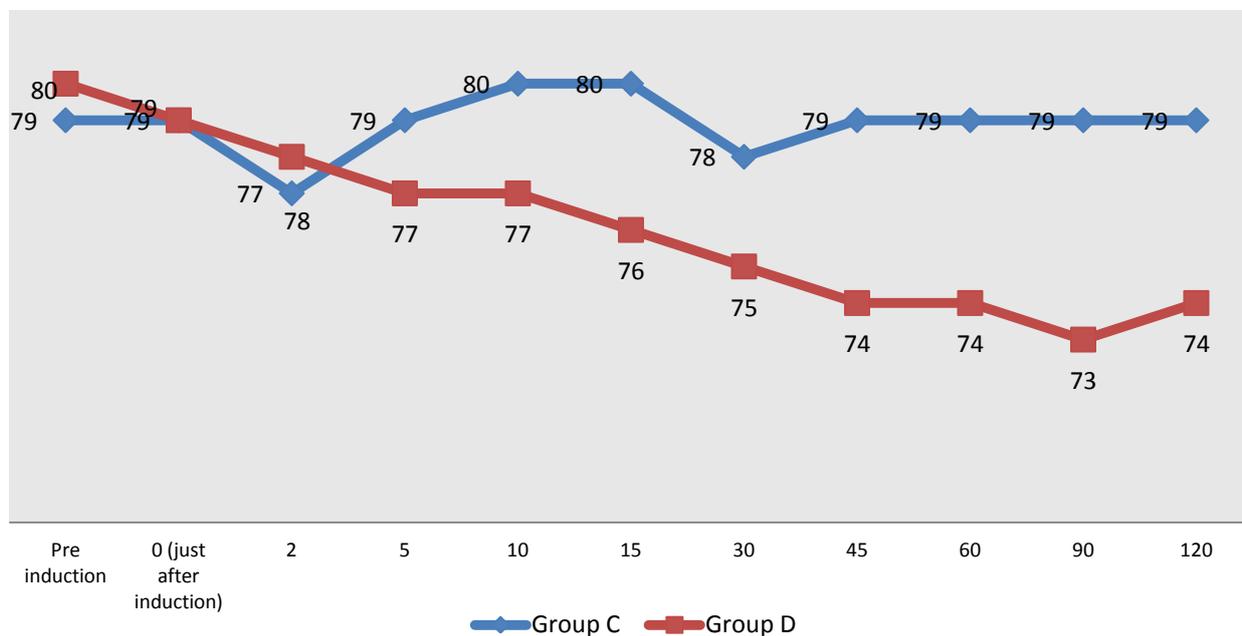
Baseline haemodynamic data were comparable in both groups. Heart rate was significantly lower in group D after 5 min after drug administration & remain lower afterward. SBP was lower at 90& 120 min while DBP was lower at 45,60 & 90 min interval in group D (p<0.05).Spo2 and respiratory rate were comparable at whole time interval.



Graph 2: Assessment of Intra-operative statistical analysis of systolic blood pressure

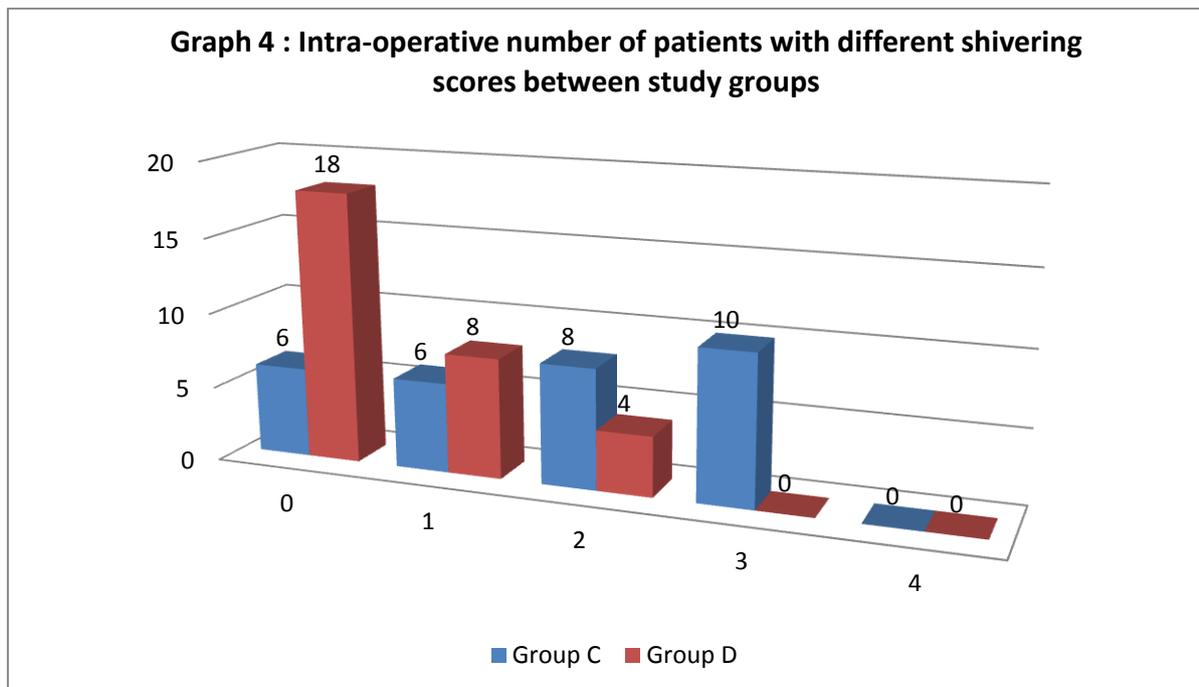


Graph 3 : Assessment of Intra-operative statistical analysis of diastolic blood pressure



In group C, 6 patients had no shivering as compared to 18 patients in group D While 10 patients developed grade 3 shivering which

required treatment whereas, none of the patient in group D developed grade 3 shivering because of effective prophylaxis (p-value <0.05).



Our results showed higher degree of sedation (grade 3) in Group D In control group most of the

patients (77%) were awake and alert (grade 1). This was statistically significant ($p < 0.05$)

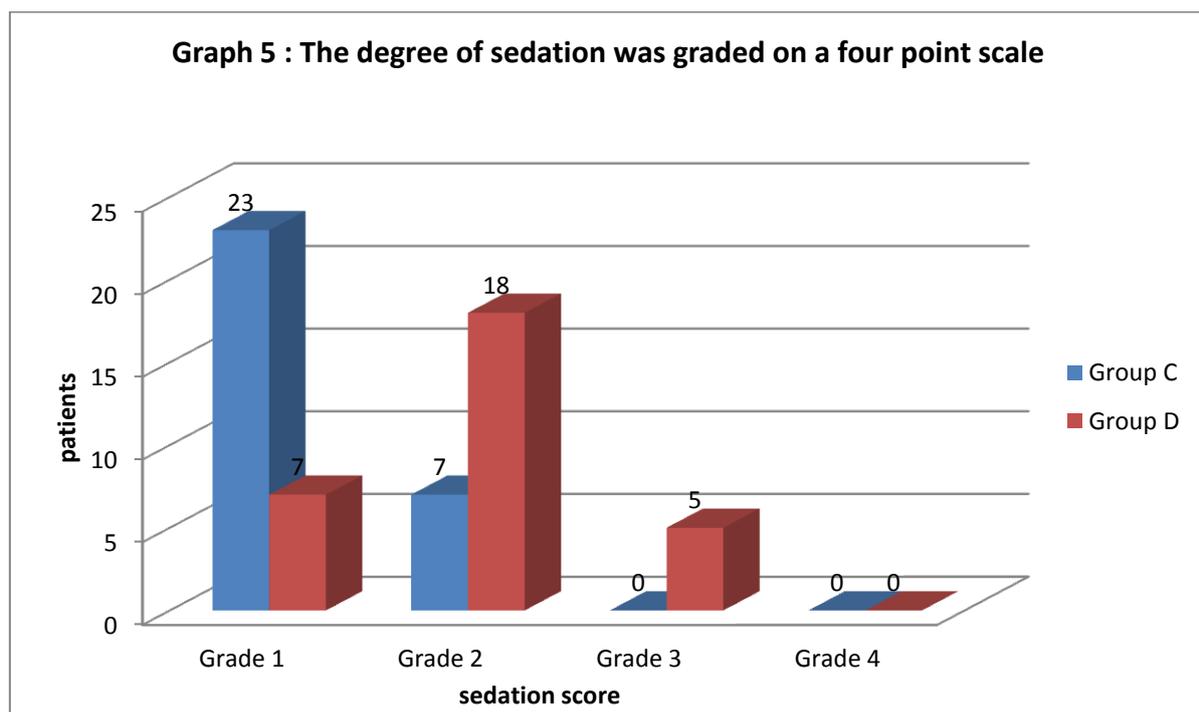


Table 2 Incidence of side effects and complications

Complications	Group C (n=30)	Group D (n=30)
Nausea	9(30%)	3(10%)
Vomiting	03(10%)	1(3.33%)
Hypotension	-	2(6.66%)
Bradycardia	-	2(6.66%)

In group C patients had high incidence of nausea (30%) and vomiting (10%) as compared to group D (nausea - 10%, vomiting - 3.33%). Hypotension (6.66%) and bradycardia (6.66%) developed in group D patients only.

Discussion

Intra- and postoperative shivering is very unpleasant and annoying for patients and can lead to multiple complications. The possible mechanisms of shivering during spinal anaesthesia include impairment of central thermoregulation, internal redistribution of body heat, and heat loss to the environment. Potential risk factors for hypothermia in spinal anaesthesia include ageing, level of sensory block, temperature of the operation theatre and IV fluids. Since most of the patients taken up for the TURP surgery fall under old age group, shivering can be more harmful to them which points towards one fact that preventing it is far better than treating after shivering occurs. Numerous drugs have been used for control of shivering like opioids, clonidine, ketamine, nefopam, doxapram etc. but none has been completely successful. Dexmedetomidine is an α adrenoceptor agonist, with antihypertensive, sedative, analgesic, and anti-shivering properties¹¹. The anti-shivering effects are mediated by binding to α receptors that mediate vasoconstriction and the anti-shivering effect. In addition, it has hypothalamic thermoregulatory effects¹⁴.

In this study we used inj. Dexmedetomidine 1 mcg /kg just after spinal anaesthesia to find out the antishivering & haemodynamic effect in patients undergoing transurethral resection of prostatectomy. We found in our study that Compared to the control group, SBP, DBP and HR values measured perioperatively were significantly lower in the dexmedetomidine group, and these hemodynamic findings were reported in other studies, as well. Use of α 2-receptor agonists for prevention of postanesthesia shivering can be complicated by their principal pharmacological effects, namely hypotension and bradycardia

.These results were in accordance to **Usta B et al¹⁰ & Karaman S et al¹⁵**. Results of our study showed that none of the patient in Group D had grade 3 shivering as compared with Group C. Our study supported by **Karaman S et al¹⁵** in which incidence of shivering 10% in the Dexmedetomidine group as compared to 46.6% in the placebo group. similar results observed in study done by **Bajwa SJ et al⁹ , Usta B et al¹⁰, Prabhakaran K et al¹⁶, Ghasemi M et al¹⁷ & Liu ZX et al¹⁸**. Our results showed higher degree of sedation (grade 3) in Group D than Group C. In control group most of the patients (77%) were awake and alert (grade 1). These finding is supported by **Prabhakaran K et al¹⁶ & Kim YS et al¹⁹**.

Higher incidence of nausea and vomiting was found in group C. This was probably due to tramadol which used as rescue drug for treating shivering in control group. Patients in group D had minimal incidence of nausea and vomiting. These findings supported by study conducted by **Bajwa SJ et al⁹**. We conclude that dexmedetomidine seems to possess anti-shivering properties in a dose of 1 μ g/kg. Though it produces sedation but it did not have any major clinical impact on the overall recovery from anaesthesia.

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