

## Original Research Article

## Examination of Three Distinct Dosages of Dexmedetomidine for Counteraction of Postspinal Sedation Shivering in Transurethral Resection of Prostate (TURP) Medical Procedure

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**Abstract: Background:** The ideal portion of dexmedetomidine for shivering control with the most un-hemodynamic disturbances is still under research. Postanesthetic shivering (PAS) is an unsavory and possibly serious difficulty. Not very many investigations have been finished in regards to the ideal compelling portion of dexmedetomidine for the counteraction of postspinal anesthesia (SA) shivering. Accordingly, we expected to look at and assess three distinct portions of intravenous dexmedetomidine and to explore the ideal portion of dexmedetomidine that successfully forestalls shivering in patients going through transurethral resection of the prostate (TURP). **Materials and Methods:** In this randomized, twofold visually impaired, planned study, 135 patients of the American Society of Anesthesiologists I and II booked for elective TURP under SA were selected. Patients were haphazardly apportioned into one of the three gatherings getting dexmedetomidine: Group P: 0.5 µg/kg, Group Q: 0.75 µg/kg, and Group R: 1.0 µg/kg. The essential result of the review was intraoperative rate of shivering. The optional results, like hemodynamic boundaries. **Results:** Shivering score of various gatherings uncovered measurably huge lower occurrence and seriousness of shivering in Group Q and Group R when contrasted with Group P (P = 0.0395). Occurrences of sickne, bradycardia, and hypotension were more in Group R when contrasted with Group P and Group Q. Axillary temperature and sedation scores were equivalent among various gatherings (P > 0.05). **Conclusion:** Dexmedetomidine in the dose of 0.75 µg/kg furnishes sufficient antishivering impact with added advantage of sedation and less hemodynamic disturbance.

**Keywords:** Dexmedetomidine, shivering, SAB, transurethral resection of prostate (TURP).

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## INTRODUCTION

Shivering is an exceptionally upsetting encounter for postoperative patient in postanesthesia care unit (PACU) like torment, sickness and regurgitation. The frequency of shivering is assessed to be basically as high as half 60% in the ordinary populace going through broad sedation (GA) [1]. Shivering is likewise a typical issue experienced after neuraxial (spinal and epidural) sedation too. An occurrence of shivering of up to 55% has been reported [2]. It can bring about expanded oxygen interest up to

400% of typical and prompt metabolic confusions, for example, hypoxemia, hypercarbia, and lactic acidosis. Hence, shivering might be unfavorable in patients with low cardiovascular and pneumonic stores. It likewise increases intraocular and intracranial tension and may add to expanded injury torment, postponed wound mending, and deferred release from PACU [3]. Shivering is more normal in transurethral resection of the prostate (TURP) that might be because of retention of a lot of watering liquid at room temperature. Quick decrease in center temperature begins with bladder water system during TURP as unheated water system

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liquid is utilized and could be a huge etiological problem of the creation of the hemodynamic responses [4]. Thus, patients going through TURP are more inclined to foster shivering which could be discomforting as well as pernicious to them.

Taking into account these unwanted results of shivering, measures expected to forestall it in the perioperative period are significant. Preliminaries have been led that have contrasted dexmedetomidine and different medications and furthermore showed the viability of dexmedetomidine for treatment as well as avoidance of postanesthesia shivering [2, 5]. Very couple of studies have assessed the ideal compelling portion of dexmedetomidine for the counteraction of postspinal sedation (SA) shivering. We expected to research the portion of dexmedetomidine that really forestalls shivering without huge secondary effects in patients going through TURP under SA who have a high rate of perioperative shivering.

## METHODS

This study was led in the wake of being endorsed by the Institute Ethics Committee and was enrolled with the Shaheed Monsur Ali Medical College, Dhaka (SMAMC), Bangladesh. It's duration from January 2020 to December 2021. Patients having a place with the American Society of Anesthesiologists-Physical Status I and II and matured somewhere in the range of 40 and 70 years going through elective TURP were chosen for this planned, randomized, twofold visually impaired study. Patients with a background marked by cardiopulmonary disorders, cerebrovascular mishap, uncontrolled diabetes mellitus, and hepatic and renal brokenness, were prohibited from the review. Patients having starting internal heat level  $>38^{\circ}\text{C}$  or  $<36^{\circ}\text{C}$  and who got blood bonding intraoperatively were additionally rejected from the review.

135 patients were haphazardly allotted into three gatherings (Groups P, Q, and R were given dexmedetomidine 0.5  $\mu\text{g}/\text{kg}$ , 0.75  $\mu\text{g}/\text{kg}$ , and 1.0  $\mu\text{g}/\text{kg}$  of body weight, individually) by PC created randomization. The review drug was weakened with typical saline and volume made to 50 ml and given intravenously north of 10 min soon after organization of SA. The patients were exposed to point by point clinical assessment and routine examinations to reject any fundamental problem. The review convention was cleared up for the patient and composed informed consent was acquired from every member. No premedication was given. On appearance of the patient in the working room, intravenous access was laid out (either hand or lower arm) and standard screens - harmless pulse (NIBP), electrocardiogram, fringe blood vessel oxygen immersion (SpO<sub>2</sub>), and axillary surface temperature test were connected; and revival offices were made accessible. The gauge pulse (HR), NIBP, breath rate, SpO<sub>2</sub>, and temperature were recorded. The activity theater was kept up with at a steady mugginess

half 55% and temperature of  $21^{\circ}\text{C}$ - $23^{\circ}\text{C}$ . Water system and intravenous liquids were managed at room temperature. Prior to performing SA, 10 ml/kg/h of lactated Ringers' liquid was managed that was decreased to 6 ml/kg/h in the wake of giving SAB. Observing rules for asepsis and antisepsis, SAB was founded at L 3-4 or L 4-5 intervertebral space. In the wake of evoking free progression of the cerebrospinal liquid, 3 ml of 0.5% hyperbaric bupivacaine was infused utilizing a suitable needle. The review drug was ready by a free clinician not associated with the review. The anesthesiologist playing out the block and noticing the patient was dazed to the treatment bunch. Neither the patient nor the going to anesthesiologist who additionally gathered the information knew about the gathering assignment. HR, respiratory rate, and SpO<sub>2</sub> were recorded each 5 min (after SA was given) for 1 h and afterward every 15 min till release from PACU. Internal heat level was noticed each 15 min. Sedation was surveyed each 10 min according to Ramsay Sedation Score [5]: (1) Anxious and upset or both; (2) Cooperative, situated, and quiet; (3) Responsive to orders just; (4) Brisk reaction to light glabellar tap or uproarious hear-able improvement; (5) Sluggish reaction to light glabellar tap or boisterous hear-able boost; and (6) Unresponsive. Shivering was evaluated each 5 min on a scale like that approved by Tsai and Chu [6]: 0: No shivering; 1: Piloerection or fringe vasoconstriction yet no apparent shivering; 2: Muscular movement in only one muscle bunch; 3: Muscular action in more than one muscle bunch however not summed up; and 4: Shivering including the entire body.

On the off chance that the shivering score was 3 or above at 15 min after SA, the prophylaxis was viewed as incapable and 25 mg pethidine was given intravenously. If a patient created indicative bradycardia ( $<60/\text{min}$ ) or HR  $<50/\text{min}$ , 0.5 mg intravenous atropine was given. Hypotension was characterized as lessening in mean blood vessel pressure (MAP) of  $<25\%$  from the standard. Hypotension was treated with 6 mg mephentermine as an intravenous bolus and afterward with additional intravenous mixture of lactated Ringers' so in as required. If there should arise an occurrence of sickness and heaving, 10 mg intravenous metoclopramide was given. Any unfavorable impacts like hypotension, bradycardia, sensitivity, and sickness were dealt with and recorded.

## Statistical analysis

The rate of shivering connected with SAB from a past report was 55% in patients getting no mediation to forestall it. Subsequently, the example size expected to accomplish 30% outright decrease in the occurrence of postanesthesia shivering in relationship with dexmedetomidine was least 42 patients in each gathering with a force of 80%,  $\alpha$  blunder of 0.05, and  $\beta$  mistake of 0.2 [2]. Thus, 50 patients in each gathering (complete 135) were incorporated to consider dropouts

and withdrawals from the review. Engaging insights were utilized to depict the standard attributes. Dichotomous results were analyzed by Fisher's precise test/Chi-square test as relevant. Mathematical information were communicated as mean and standard deviation. Subjective information were communicated as recurrence and rate. Chi-square test (Fisher's accurate test) was utilized to analyze the connection between subjective factors. One-way examination of fluctuation followed by Tukey's test was utilized to dissect the distinctions among the gatherings in segment profiles, temperature changes, HRs, and MAPs. The inside bunch information were investigated utilizing rehased measures examination of fluctuation followed by Bonferroni's test.  $P < 0.05$  was thought of as measurably critical. All patients who were randomized were remembered for the investigation. The examination was performed utilizing GraphPad InStat form 3.1 (Graphpad Software Inc. San Diego, CA, USA).

## RESULTS

160 patients were surveyed for qualification, among them nine patients would not take part and 16 patients didn't meet incorporation standards. Each of the 135 patients randomized into various gatherings finished the concentrate as displayed in partner chart (Figure 1). The segment information of the three gatherings were equivalent ( $P > 0.05$ ) (Table 1). The examination of shivering score of various gatherings in the current review uncovered genuinely critical lower frequency and seriousness of shivering in Group Q and Group R when contrasted with Group P ( $P = 0.0395$ ) (Table 2) and (Figure 2). Gauge SpO2 and respiratory pace of various gatherings were tantamount ( $P > 0.05$ ). Huge intragroup variety in MAP and HR was found in all gatherings when contrasted with gauge ( $P < 0.001$ ) (Table 3) and (Figure 3), (Figure 4). The intergroup correlation of hemodynamics showed a huge diminishing in HR at 45 min between Group R and P ( $P < 0.05$ ).

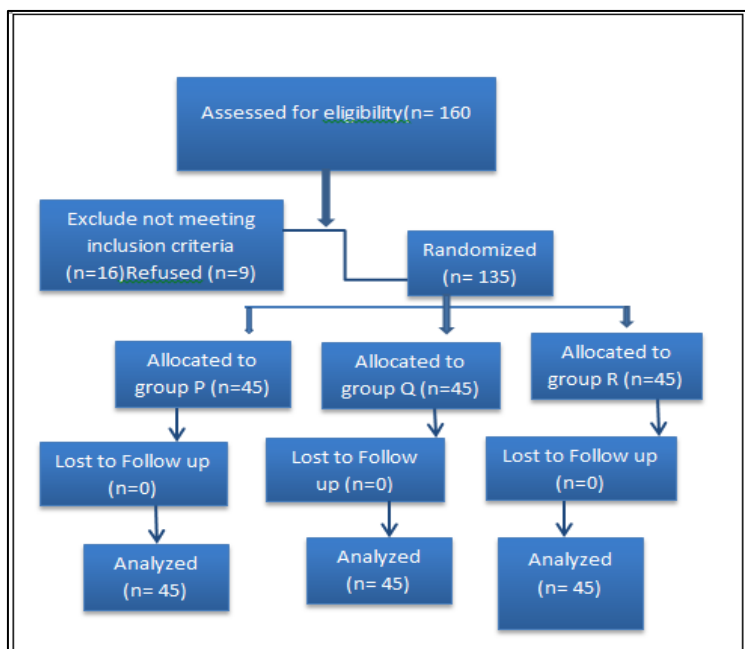


Figure 1: Consort outline

Table 1: Patient characteristics and duration of surgery

Variables	Group p (n=45)	Group Q (n=45)	Group R(n=45)	P- value
Age	54.32+9.130	54.68± 8.731	53.78 ±7.921	0.7123
Weight	63.35+5.98	62.64± 5.860	62.4 ± 5.584	0.7896
ASA (1/2)	26/19	26/19	31/14	>0.05
Surgery Duration	46.14 ± 7.508	45.9 ± 8.077	46.98 ± 8.513	0.7802

Table 2: Perioperative shivering score of the patients

Shivering score	Group p (n=45)	Group Q (n=45)	Group R(n=45)	P- value
0	36 (72)	45 (90)	45 (90)	0.0365 (Chi square test)
1	2 (4)	1 (2)	1 (2)	
2	11 (22)	4 (8)	4 (8)	
3	1 (2)	0	0	
4	0	0	0	

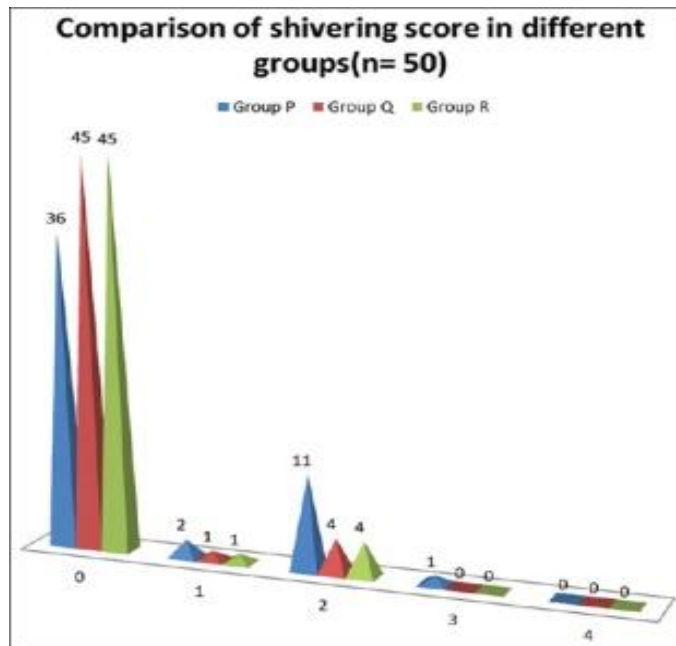


Figure 2: Comparison of shivering score of different groups

Table 3: Comparison of mean arterial pressure (mmHg) of different groups

Time Interval	Group P	Group Q	Group R
Baseline	99.16 ± 10.247	96.16 ± 10.922	95.28 ± 10.306
5	95.64 ± 10.760	93.98 ± 10.346	92.34 ± 10.346
10	88.56 ± 9.773	86.26 ± 9.765	85.5 ± 11.072
15	86.24 ± 9.884	83.54 ± 9.344	82.62 ± 9.959
30	85.54 ± 10.672	81.78 ± 8.892	81 ± 9.127
45	87.76 ± 10.495	85.02 ± 8.646	83.56 ± 10.459
60	90.32 ± 9.195	87.28 ± 8.825	85.86 ± 8.792
75	94.79 ± 9.410	92.78 ± 9.466	90.844 ± 9.293
90	107.25 ± 1.893	102.8 ± 888	93.67 ± 11.930

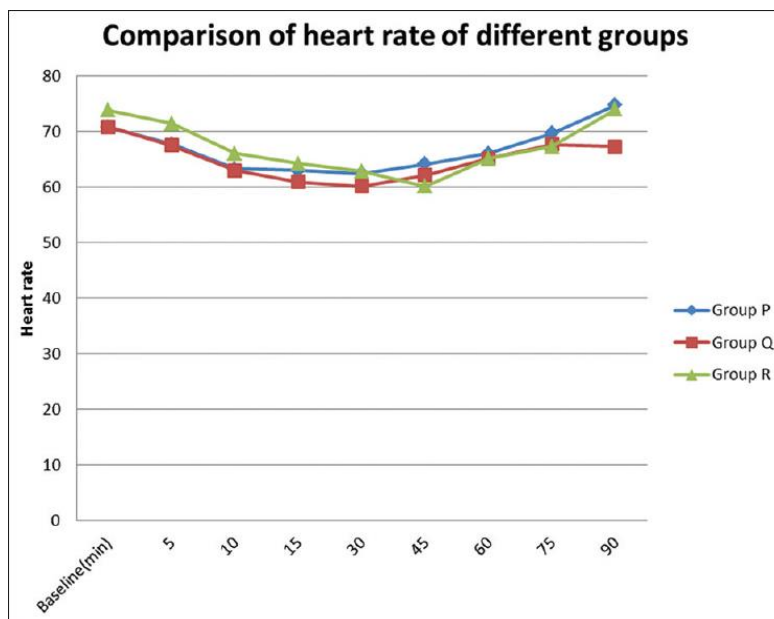
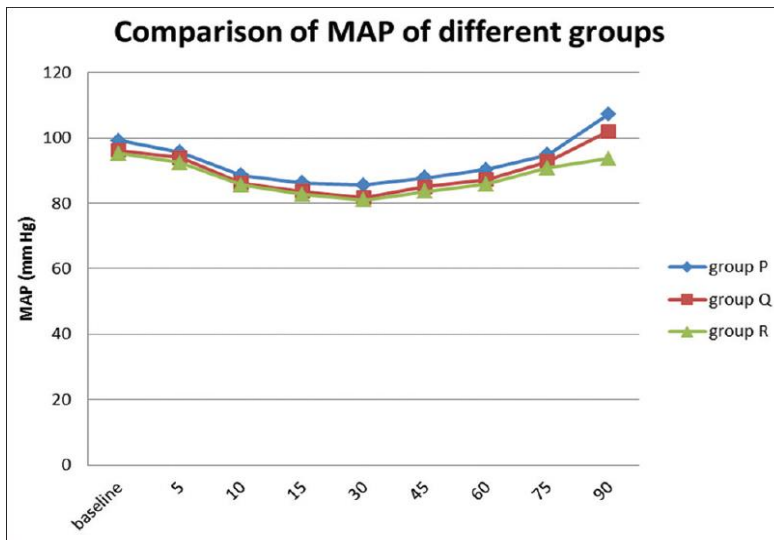


Figure 3: Comparison of heart rate of different groups



**Figure 4: Comparison of mean arterial pressure of different group**

Correlation of axillary temperature of various gatherings uncovered no huge contrasts among gatherings ( $P > 0.05$ ), however tremendous contrasts were noted inside bunches when contrasted with gauge values ( $P < 0.001$ ) (Table 4). Examination of sedation score of various gatherings in the ongoing review uncovered no huge variety ( $P > 0.05$ ) (Table 5). In the

current review, the occurrence of sickness/spewing, bradycardia, and hypotension was more in Group R when contrasted with Group P and Group Q. Notwithstanding, just the occurrence of hypotension was genuinely critical ( $P < 0.05$ ) (Table 6) and (Figure 5).

**Table 4: Comparison of axillary temperature (°C) of different groups at different time intervals**

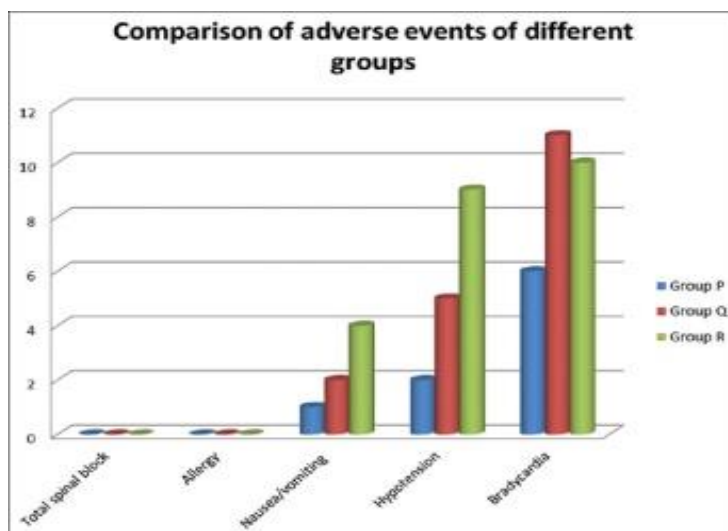
Time Interval	Group P	Group Q	Group R
Baseline	37.028 ± 0.1310	36.986 ± 0.1262	36.982 ± 0.1438 ±
15	36.188 ± 0.1745	36.142 ± 0.1527	36.170 ± 0.1693
30	35.984 ± 0.2728	35.984 ± 0.2698	36.016 ± 0.2142
45	35.940 ± 0.2000	35.948 ± 0.2410	35.990 ± 0.1542
60	35.898 ± 0.1868	35.932 ± 0.2208	35.960 ± 0.1370
75	35.909 ± 0.1757	35.940 ± 0.1487	35.953 ± 0.1471
90	36.000 ± 0.0816	35.900 ± 0.1000	35.900 ± 0.1000

**Table 5: Sedation score of patients at different time intervals (number of patients expressed as per sedation score 1/2/3/4/5/6)**

	Group P	Group Q	Group R
Baseline	0/50/0/0/0/0	0/50/0/0/0/0	0/50/0/0/0/0
10	0/34/16/0/0/0	0/32/17/1/0/0	0/34/15/1/0/0
20	0/22/25/3/0/0	0/21/21/6/2/0	0/20/25/5/0/0
30	0/20/18/11/1/0	1/21/14/11/3/0	0/16/20/14/0/0
60	0/25/12/13/0/0	0/20/25/5/1/0	0/27/16/6/1/0

**Table 6: Patients' perioperative adverse events**

Adverse Events	Group P	Group Q	Group R	P - Value
Total spinal block	0	0	0	
Allergy	0	0	0	
Nausea/ Vomiting	1	2	4	>0.05
Hypotension	2	5	9	<0.05
Bradycardia	6	11	10	>0.05



**Figure 5: Comparison of adverse events in different groups**

## DISCUSSION

The human temperature directing component is complicated that ordinarily keeps up with the internal heat level inside a tight reach (36.5°C-37.5°C) known as "interthreshold range." If the center temperature decreases underneath this reach, the body answers by vasoconstriction and shivering which increments heat creation two to five folds [7]. The specific system of shivering during SAB isn't known. The potential instruments incorporate disturbance of focal thermoregulation, inward reallocation of body endlessly heat misfortune to the climate. Risk factors for hypothermia in SAB are maturing, level of tangible block, temperatures of the nearby sedative utilized, working room, and intravenous solutions [8]. The current review uncovered that in Group P, 28% of patients shuddered, though comparing figures in Group Q and Group R were 10% each. Among the people who shuddered, larger part had Grade 2 shivering: 22% in Group P and 8% each in Group Q and Group R. One patient in Group P had Grade 3 shivering and required treatment, while none required treatment in Group Q and Group R. In our review, correlation of shivering score of various gatherings uncovered genuinely critical lower occurrence and seriousness of shivering in Group Q and Group R when contrasted with Group P ( $P = 0.0395$ ).

In a past report contrasting meperidine with dexmedetomidine [2], frequency of shivering in meperidine bunch was 10%, in the fake treatment bunch was 55%, though in dexmedetomidine bunch was 15% which is like that saw in Group Q and Group R of our review. In one more study [5], the occurrence of shivering was 18% in dexmedetomidine bunch (1 µg/kg followed by 0.4 µg/kg/h implantation) contrasted with fake treatment (53% rate).

Dexmedetomidine (1 µg/kg more than 10 min followed by mixture of 0.4 µg/kg/h) was contrasted and

saline in a preliminary for counteraction of post-SA shivering. The creators found that 56.7% patients of saline gathering shuddered, though just 10% of patients getting dexmedetomidine had shivering [8]. These outcomes especially verify our discoveries. In our review, 10% of patients of each Group Q and Group R had shivering.

In a past preliminary, patients booked for elective laparoscopic complete hysterectomy under GA, got dexmedetomidine or typical saline and were dispensed in four different groups [9]. It was reasoned that 0.75 or 1.0 µg/kg body weight of dexmedetomidine gave viable prophylaxis against postoperative shivering as well as pain relieving impact albeit potential for intraoperative prerequisite for atropine, sedation in prompt recuperation period, and postponed extubation time with dexmedetomidine were noted.

In a past report, the creators found 0.5 µg/kg of dexmedetomidine powerful for counteraction of post SAB shivering in patients going through arthroscopic surgery [10]. However, as opposed to this preliminary, in our review, the occurrence of shivering was 28% in Group P (dexmedetomidine 0.5 µg/kg). This was essentially higher than the frequency in Group Q (10%) and Group R (10%). Creators in another trial contrasted dexmedetomidine and pethidine and tramadol for the treatment of postneuraxial sedation shivering, closed 0.5 µg/kg of dexmedetomidine to be effective [11]. In a review, the examiners looked at dexmedetomidine 0.5 µg/kg, 0.3 µg/kg, or 0.2 µg/kg [12]. They found that among the three dosages researched, dexmedetomidine 0.3 µg/kg really treated shivering related with SAB with unobtrusive hemodynamic and sedation impacts. In any case, in our preliminary, we didn't find dexmedetomidine in that frame of mind of 0.5 µg/kg to be as successful in the anticipation of postanesthesia shivering. This distinction might be ascribed to the patient choice and sort of a medical procedure. The last option study was led in minor medical procedures, for

example, herniorrhaphy with negligible blood misfortune/liquid shift. Our review was performed on patients going through TURP who were more inclined to foster shivering.

Another review analyzed fake treatment (saline) with dexmedetomidine (1.0 µg/kg followed by 0.5 µg/kg/h mixture) for avoidance of shivering in patients going through laparoscopic gynecologic medical procedures under GA [13]. Investigators revealed the occurrence of shivering to be 46.6% in fake treatment bunch and 10% in dexmedetomidine bunch. This coordinates with the occurrence of shivering in Group Q and Group R of our review. Nonetheless, in this review, GA was given; our review was finished under SA. Nonetheless, when dexmedetomidine was utilized at 1 µg/kg body weight (Group R), huge bringing down of HR was seen at 45 min when contrasted with dexmedetomidine at portion 0.5 µg/kg body weight. Same finding was seen in a couple past studies [8, 14].

Dexmedetomidine utilized in any portion (0.5/0.75/1 µg/kg) significantly affected SpO<sub>2</sub> and respiratory rate. This finding features that dexmedetomidine has restricted respiratory impacts in remedial doses [15]. Comparison of axillary temperature of various gatherings uncovered no tremendous contrasts among gatherings, yet huge contrasts were noted inside bunches when contrasted with gauge values. This finding was supported by past trials [8, 11, 14]. There was no huge variety in sedation at every one of the three dosages which were again pair with not many past trials [8, 14], 16].

There are a few limitations in our study. We conducted this study only in patients undergoing elective TURP. It is to be seen whether our findings can be extrapolated to other group of patients and surgical procedures.

## CONCLUSION

We found that both 0.75 µg/kg and 1 µg/kg dose of dexmedetomidine were equally effective for prevention of post-SAB shivering. The higher dose of 1 µg/kg was associated with higher incidence of side effects such as bradycardia and hypotension making 0.75 µg/kg dose most ideal dose for the purpose.

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