Efficacy of Dexmedetomidine as an Adjuvant to Low Dose Bupivacaine for Postoperative Analgesia in Patients Undergoing Transurethral Resection of Prostate under Subarachnoid Block

Veena Patodi¹, Kavita Jain², Aakriti Sharma³, Maina Singh⁴, Neena Jain⁵, Surendra Kumar Sethi⁶

^{1, 2, 3, 4, 5, 6} Department of Anaesthesiology, Jawahar Lal Nehru Medical College, Ajmer, Rajasthan, India.

ABSTRACT

BACKGROUND

Smaller dose of local anaesthetic agent in combination with an adjuvant provides the desired level of sensory block with adequate analgesia. This study aimed at evaluating the effect of dexmedetomidine as an adjunct to intrathecal bupivacaine in patients who underwent transurethral resection of prostate (TURP).

METHODS

A total of one hundred patients of ASA physical status I-III, aged 50 - 70 years undergoing TURP were enrolled to receive either intrathecal dexmedetomidine 5 µg + bupivacaine (0.5 %, 2 mL) (Group D, n = 50) or intrathecal bupivacaine (0.5 %, 2.5 mL) (Group B, n = 50) for subarachnoid block (total volume 2.5 mL in both groups). The onset time and duration of both sensory and motor block, duration of analgesia, rescue analgesic requirement, haemodynamic parameters and adverse effects were recorded.

RESULTS

The mean onset time of sensory (5.00 ± 1.85 vs. 10.28 ± 1.26 min) and motor blockade (7.66 ± 1.75 vs. 13.98 ± 3.24 min) were notably faster in Group D compared to Group B. (p < 0.05) The mean duration of sensory (65.38 ± 6.17 vs. 79.30 ± 13.51 min) and motor blockade (179.50 ± 8.63 vs. 362.50 ± 53.39 min) were also significantly prolonged in Group D (p < 0.05). Duration of analgesia was considerably increased in Group D (320.50 ± 32.52 min) in comparison to Group B (223.82 ± 30.46 min) (p < 0.05) without significant haemodynamic changes and adverse effects (p > 0.05).

CONCLUSIONS

Intrathecal dexmedetomidine 5 µg as an adjuvant to low dose bupivacaine was found to be more effective than bupivacaine alone, providing faster onset of both motor and sensory block with increased duration of analgesia, stable haemodynamics and minimal side effects.

KEY WORDS

Subarachnoid Block, Transurethral Resection of Prostate, Bupivacaine, Dexmedetomidine, Duration of Analgesia

Corresponding Author:

Dr. Maina Singh,

Department of Anaesthesiology,

Jawahar Lal Nehru Medical College

and Hospital, Ajmer, Rajasthan, India.

E-mail: mainasingh111@gmail.com

DOI: 10.14260/jemds/2020/832

How to Cite This Article:

Patodi V, Jain K, Sharma A, et al. Efficacy of dexmedetomidine as an adjuvant to low dose bupivacaine for postoperative analgesia in patients undergoing transurethral resection of prostate under subarachnoid block. J Evolution Med Dent Sci 2020;9(50):3794-3799, DOI: 10.14260/jemds/2020/832

Submission 02-09-2020,

Peer Review 27-10-2020,

Acceptance 03-11-2020,

Published 14-12-2020.

Copyright © 2020 Veena Patodi et al. This is an open access article distributed under Creative Commons Attribution License [Attribution 4.0 International (CC BY 4.0)]

BACKGROUND

Subarachnoid Block (SAB) is the most preferred anaesthesia technique in patients undergoing transurethral resection of prostate. It helps in early recognition of complications, reduces blood loss during surgery, eliminates the need of tracheal intubation and provides postoperative analgesia. Early ambulation helps in reducing chances of deep vein thrombosis especially in elderly patients. The management of postoperative pain remains a major challenge for an anaesthesiologist particularly in elderly patients despite of advancement and development of various methods or techniques including drugs like opioids and newer non-opioid analgesics, techniques of drug delivery (systemic, regional and local) and routinely performed minimally invasive surgical procedures. So, postoperative period is commonly, yet distressing experience in these patients.¹

Hyperbaric bupivacaine 0.5 %, a local anaesthetic, is commonly used in SAB for TURP. However, postoperative analgesia remains a concern in SAB as sole local anaesthetic is associated with comparatively shorter duration of analgesia and therefore patients demand for early rescue analgesic postoperatively. Patients undergoing TURP are generally elderly with various comorbidities. In these patients even usual doses of bupivacaine may lead to severe haemodynamic instability which can be detrimental. Sensory block cephalad to T10 level may mask the clinical signs associated with bladder perforation and may hamper its early diagnosis and management. Moreover, because of the limited cardiovascular and respiratory reserves in older patients undergoing TURP, it is important to limit the cephalad spread to lessen haemodynamic changes.²

Various factors like dose, volume and baricity of local anaesthetic drug, position of the patient, site of injection etc. affect the height of sensory block following subarachnoid block. Numerous neuraxial adjuvants like midazolam, buprenorphine, nalbuphine, fentanyl and α_2 agonists have been used in order to prolong the effect of SAB and enhance the quality of analgesia while simultaneously reducing the adverse effects associated with higher dose of local anaesthetic agent alone. Smaller doses of local anaesthetic in combination with adjuvants provide the desired level of sensory block with adequate analgesia.³

Dexmedetomidine, a selective α_2 -adrenergic agonist with high degree of specificity for this particular receptor ($\alpha_2:\alpha_1$, 1620:1), possess hypnotic, anxiolytic, sympatholytic, opioid-sparing and analgesic properties while providing better haemodynamic stability.⁴ Due to its unique properties, we have used it as an additive to intrathecal bupivacaine to prolong the postoperative analgesia with minimal haemodynamic changes.

We hypothesised that using dexmedetomidine (5 μ g) as an adjuvant to intrathecal low dose bupivacaine would enhance the duration of postoperative analgesia with minimal haemodynamic changes and side effects. So, this randomised double blinded study was conducted to compare the duration of analgesia, characteristics of subarachnoid block, haemodynamic changes and total analgesic requirements, after administration of intrathecal dexmedetomidine (5 μ g) combined with a low dose of bupivacaine 0.5 % (10 mg) versus a higher dose (12.5 mg) in elderly patients undergoing TURP.

METHODS

After Institutional Ethical Committee approval, this randomised double blinded study was undertaken on one hundred male patients aged between 50 to 70 years undergoing TURP belonging to ASA status I-III after taking written informed consent. Based on a previous study,⁵ the sample size was calculated to be 40 patients which were randomly included in each group to demonstrate a power of 0.9 and type 1 error of 0.05. To allow for study error and attrition, 50 patients were included in each group. The study population was randomly allocated into two groups (Group B and Group D) with fifty patients (n = 50) each using computer generated table of random numbers. (Figure 1) The patients who did not give consent, sensitive or allergic to study drugs, patients on α_2 adrenergic agonist or antagonist and with contraindications to subarachnoid block were excluded from the study.

The study drug solutions were prepared by a resident anaesthesiologist who was not involved in monitoring or study analysis. Dexmedetomidine (1 mL contains 100 μ g / mL) was diluted with normal saline in a 10 mL syringe (10 μ g / mL). From this, 0.5 mL of dexmedetomidine was drawn with the help of a 1 mL insulin syringe and added to the 10 mg of hyperbaric bupivacaine in Group D under all strict aseptic precautions. The total volume of drug solution in each group was 2.5 mL. Patients in Group B received intrathecal bupivacaine 0.5 %, 2.5 mL (12.5 mg) while Group D received intrathecal bupivacaine 0.5 %, 2.0 mL (10 mg) + dexmedetomidine 5 μ g (0.5 mL).

On arrival of the patient in the operation theatre, the standard monitoring was applied including arterial Oxygen Saturation (SpO₂), Non-Invasive Blood Pressure (NIBP) and electrocardiogram (ECG). The baseline parameters i.e. heart rate (HR), NIBP and SpO₂ were recorded. An intravenous cannula of 18 or 20 G was inserted and crystalloid infusion (Inj. Ringer Lactate 500 mL) was started. Under all strict aseptic precautions SAB was given using a 25-gauge Quincke spinal needle at L₃ - L₄ intervertebral space and study drug (the resident anaesthesiologist who was performing the block, also blinded to the study drug and provided with prefilled syringes of study drugs) was then injected after free flow of Cerebrospinal Fluid (CSF).

Onset of sensory block was defined as the time from intrathecal drug injection to the achievement of T₁₀ level by pin prick method. Duration of sensory block was defined as the time from commencement of block till two segment regression from the highest level of sensory blockade.

Motor block was assessed using Modified Bromage scale (0: No motor block, 1: Inability to raise extended leg; able to move knees and feet, 2: Inability to raise extended leg and move knee; able to move feet, 3: Complete motor block of the lower limbs). Onset of motor block was defined as the time from intrathecal drug injection to achieving Bromage scale 3. Duration of motor block was defined as the time from onset of motor block till complete recovery (Bromage scale 0).⁶

Assessment of pain was done by using VAS (Visual Analogue Scale) score which is a standard 10 cm scale (0 - no pain and 10 - worst possible pain). Duration of analgesia was defined as the time from giving subarachnoid block to the first rescue analgesic requirement. Rescue analgesic (tramadol 100

mg IV) was given when VAS ≥ 4 and the time was noted. VAS score was recorded postoperatively for 24 hours.⁷

The various haemodynamic parameters: HR, Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP) and SpO₂ with any side effects or complications (hypotension, bradycardia, nausea and vomiting) were observed and recorded. All the patients were monitored for HR and MAP every 2 min for initial 10 min after SAB, then every 5 min until 30 min followed by every 15 min till completion of the surgery.

Hypotension ($> 20\%$ decrease in MAP) was managed with mephentermine (6 mg) as IV boluses. Bradycardia (HR < 50 / min) was managed with atropine (0.6 mg) IV stat. Hypoxaemia

(SpO₂ $< 92\%$) was managed with oxygen supplementation by oxygen face mask at the rate of 4 - 5 l / min.

Statistical Analysis

Statistical analysis was done using SPSS version 20.0 (IBM SPSS Statistics Inc., Chicago, Illinois, USA). The data were checked for normality before statistical analysis using Shapiro-Wilk test. The quantitative parametric data were analysed using t-test while non-parametric data were analyzed using Mann-Whitney U-test. Chi-square test and Fisher exact test were used to analyse the qualitative data. A value of $p < 0.05$ was considered to be statistically significant.

RESULTS

The two groups were similar in terms of demographic profile like mean age, weight, ASA physical status classification and duration of surgery. (Table 1). The onset time of sensory block was significantly earlier in Group D (5.00 ± 1.85 min) in contrast to Group B (10.28 ± 1.26 min). The duration of sensory block was significantly increased in Group D (79.30 ± 13.51 min) compared to Group B (65.38 ± 6.17 min); ($p < 0.05$). (Table 2)

Parameters	Group B (n = 50)	Group D (n = 50)	P Value
Age (years)	59.94 $\pm$ 6.40	60.80 $\pm$ 6.80	0.78
Weight (kgs)	64.70 $\pm$ 5.70	63.70 $\pm$ 10.02	0.98
ASA (I / II / III)	40 / 9 / 1	37 / 11 / 2	0.72
Duration of Surgery (min)	23.90 $\pm$ 9.31	22.06 $\pm$ 6.25	0.24

Table 1. Demographic Data and Duration of Surgery in the Two groups

*Data represented as Mean $\pm$ SD and number

†Group B: Bupivacaine; Group D: Bupivacaine + Dexmedetomidine

‡P > 0.05 : not significant; Mann-Whitney U-test

Block Characteristics (min)	Group B (n = 50)	Group D (n = 50)	P Value
Onset of Sensory Block	10.28 ± 1.26	5.00 ± 1.85	0.0001
Onset Of Motor Block	13.98 ± 3.24	7.66 ± 1.75	0.0001
Duration of Sensory Block	65.38 ± 6.17	79.30 ± 13.51	0.0001
Duration of Motor Block	179.50 ± 8.63	362.50 ± 53.39	0.0001
Duration of Analgesia	223.82 ± 30.46	320.50 ± 32.51	0.0001

Table 2. Comparison of Block Characteristics in the Two Groups

*Data represented as Mean ± SD

†Group B- Bupivacaine; Group D- Bupivacaine + Dexmedetomidine

‡P < 0.0001, Highly Significant; Mann-Whitney U-test

The mean duration of analgesia was 223.82 ± 30.46 min and 320.50 ± 32.51 min in Group B and D respectively which was also significantly prolonged in Group D ($p < 0.05$) (Table 2). HR, SBP, DBP, MAP and SpO₂ were comparable in both groups noted at different time intervals ($p > 0.05$); (Figure 2) (Figure 3) VAS scores were significantly lower in Group D when compared to Group B ($p < 0.05$) (Figure 4) The requirement of rescue analgesic was significantly lesser in Group D in comparison to Group B. (Figure 5)

Figure 2. Comparison of Intraoperative HR in the Two Groups

Post-Operative Complications / Side Effects	Group B (n = 50)		Group D (n = 50)		P-Value
	Number (n)	%	Number (n)	%	
Bradycardia	1	2.0	2	4.0	0.3
Hypotension	1	2.0	0	0.0	0.31
Nausea	0	0.0	0	0.0	-
Vomiting	0	0.0	0	0.0	-

Table 3. Comparison of Side Effects in the Two Groups

*Chi square test

Figure 3. Comparison of Intraoperative MAP in the Two Groups

Figure 4. Comparison of VAS Scores at Different Time Intervals in the Two Groups

Figure 5. Comparison of Rescue Analgesic Requirement in the Two Groups

Hypotension was noted in only one patient in Group B, which was managed using vasopressors like mephentermine as IV bolus. Bradycardia was noted in one patient in Group B and two in Group D which was easily treated with atropine 0.6 mg iv. None of the study patients complained of nausea and vomiting. No other significant postoperative adverse effects were observed in two groups. ($P > 0.05$) (Table 3).

DISCUSSION

Transurethral resection of prostate is a routinely performed procedure for benign prostatic hyperplasia. The present study aimed to evaluate the efficacy of using dexmedetomidine as an adjuvant to intrathecal bupivacaine (particularly in low dose) in patients who underwent transurethral resection of prostate for postoperative analgesia while achieving the desired (T₁₀) level for intraoperative anaesthesia.

A few studies have been undertaken to assess the analgesic effect of intrathecal dexmedetomidine as an additive to local anaesthetic in subarachnoid block especially in patients

undergoing TURP. Moreover, various studies have used bupivacaine in higher doses. But in elderly patients even usual doses of bupivacaine may cause severe haemodynamic instability so it is very important to limit the cephalad spread to lessen the associated haemodynamic changes. In order to prevent such complications, dexmedetomidine can be used as an adjuvant to low dose hyperbaric (0.5 %) bupivacaine to enhance the postoperative analgesia while achieving adequate anaesthesia intraoperatively. Although there are several factors affecting the level of subarachnoid block, but the total dosage of drug and not the volume, concentration, or site of injection may be the determining factors.⁸⁻¹⁰ Therefore, by decreasing the dose of intrathecal local anaesthetic we can limit the level of blockade. Most anaesthesiologists are concerned about that the reduced dose of local anaesthetic may provide insufficient or partial spinal blockade.

Thus, many trials have undertaken to reduce the effective dose of intrathecal local anaesthetics while improving the quality of block simultaneously by using various drugs as adjuvants like opioids, clonidine etc.^{11,12} But adjuvants, apart from enhancing the quality of block, may cause adverse effects including nausea or vomiting,^{12,13} pruritus,^{11,12,14} hypotension, bradycardia and undue sedation^{15,16,17} So, a drug is required which should have properties of providing prolonged duration of analgesia along with no or minimal haemodynamic changes and side effects.

Dexmedetomidine mediates its analgesic effects via spinal α -2 receptors. It has been reported to enhance the quality of block in terms of prolonged analgesia when used in addition to local anaesthetic drugs for various blocks like subarachnoid, epidural and caudal blocks. It can be used in varying doses (3 to 15 μ g) as an adjuvant to bupivacaine under SAB. The prolongation in duration of analgesia seems to be dose dependent.¹⁸ At our institute, bupivacaine (10 mg) is commonly used to obtain a block of shorter duration with faster recovery of motor function in elderly patients undergoing TURP. Although the results are favourable but we are more concerned about the enhancement of postoperative analgesia in these patients.

In our study, dexmedetomidine (5 μ g) with bupivacaine (10 mg) produced similar peak level of sensory blockade in comparison to the control group but with a faster mean time to reach the T₁₀ block level and a prolonged duration of sensory block. Our results were satisfactory regarding duration of analgesia in comparison with similar study done by Chattopadhyay et al.⁵

The primary objective of our study was to observe the effect of dexmedetomidine on duration of analgesia. The duration of first rescue analgesic requirement was significantly prolonged in Group D (320.50 $\pm$ 32.51 min) in comparison to Group B (223.82 $\pm$ 30.46 min). Our study showed that intrathecal dexmedetomidine leads to prolongation of sensory blockade, motor blockade and time to first request of analgesia. The prolonged duration of analgesia was explained by the action of dexmedetomidine on receptors present on substantia gelatinosa of the dorsal horn of the spinal cord which inhibits both the firing of nociceptive neurons as well as release of the substance P, a nociceptive neurotransmitter.¹⁹ The results of our study are similar to a study done by Chattopadhyay et al who found that the total duration of analgesia achieved was 220 $\pm$ 15.1 min in control

group and 300 $\pm$ 25.3 min in dexmedetomidine group. Similarly, Akhter et al²⁰ found that the time to first analgesic request was 272.1 $\pm$ 39.0 min in control group, while this was 339.7 $\pm$ 47.4 min in dexmedetomidine group which was also in concordance with the results of our study.

The onset of sensory block was found to be significantly earlier in dexmedetomidine group in our study. The results were comparable with those of Chattopadhyay et al in which effect of 7.5 mg of 0.5 % hyperbaric bupivacaine hydrochloride was compared with 3 μ g of dexmedetomidine hydrochloride combined with 6 mg of 0.5 % hyperbaric bupivacaine hydrochloride who found a duration of 12.7 $\pm$ 3.9 min in control group and 10.7 $\pm$ 3.5 min in dexmedetomidine group. This finding could be attributed due to higher concentration of bupivacaine (10 mg) and dexmedetomidine (5 μ g) used in our study in order to attain an early and adequate level of anaesthesia.

In this study, we have observed that the duration of sensory block was notably prolonged in Group D. Our results coincide with Kaur N et al.²¹ Similarly, the time of commencement of motor block was significantly faster in Group D. The results of our study were comparable with those of Al Mustafa et al²² who found a significantly faster onset of motor block in intrathecal Group D5 (13.0 $\pm$ 3.4 min) and in Group D10 (10.4 $\pm$ 3.4 min) as compared to control group (18.0 $\pm$ 3.3 min).

In our study, there was no intraoperative need for rescue analgesia as was seen in study done by Chattopadhyay et al where seven patients out of sixty required fentanyl (100 μ g). The duration for first rescue analgesic requirement was longer in the Group D which coincides with the study done by Al Mustafa et al who found that the time for providing first rescue analgesia was significantly prolonged in dexmedetomidine groups (246.4 $\pm$ 25.7 min in D5 group and 302.9 $\pm$ 36.7 min in D10 group). Postoperative rescue analgesic demand was notably lesser in dexmedetomidine group in 24 hours.

There were some limitations in our study. A fixed dose of dexmedetomidine (5 μ g) was used in our study and there was undesirable prolongation of motor blockade. The height of patients was not considered in our study which also affects the intrathecal dose requirement of local anaesthetics. We have not done follow up for sedation or any signs of neurotoxicity due to dexmedetomidine perioperatively. Also VAS score used to assess the pain intensity in our study was subjected to pain tolerance and psychological condition of a patient.

CONCLUSIONS

Intrathecal dexmedetomidine (5 μ g) can be effectively used as an adjuvant to low dose bupivacaine (10 mg) as it provides faster onset of both sensory and motor block, prolonged duration of analgesia with stable haemodynamics, and minimal side effects, in elderly patients undergoing transurethral resection of prostate.

Data sharing statement provided by the authors is available with the full text of this article at jemds.com.

Financial or other competing interests: None.

Disclosure forms provided by the authors are available with the full text of this article at jemds.com.

REFERENCES

- [1] Pitkanen M. Spinal (subarachnoid) blockade. In: Cousins MJ, Carr DB, Horlocker TT, et al. eds. *Neural blockade in clinical anesthesia and pain medicine*. Vol. 4. Philadelphia: Lippincott Williams & Wilkins 2009; p. 221.
- [2] Lynch M, Anson K. Time to rebrand transurethral resection of the prostate? *Curr Opin Urol* 2006;16(1):20-4.
- [3] Grewal A. Dexmedetomidine: new avenues. *J Anaesthesiol Clin Pharmacol* 2011;27(3):297-302.
- [4] Virtanen R, Savola JM, Saano V, et al. Characterization of the selectivity, specificity and potency of medetomidine as an alpha 2-adrenoceptor agonist. *Eur J Pharmacol* 1988;150(1-2):9-14.
- [5] Chattopadhyay I, Banerjee SS, Jha AK, et al. Effects of intrathecal dexmedetomidine as an additive to low-dose bupivacaine in patients undergoing transurethral resection of prostate. *Indian J Anaesth* 2017;61(12):1002-8.
- [6] Breen TW, et al. Epidural anesthesia for labor in an ambulatory patient. *Anesth Analg* 1993;77(5):919-24.
- [7] Smith C, Birnbaum G, Carter JL, et al. Tizanidine treatment of spasticity caused by multiple sclerosis: results of a double-blind, placebo-controlled trial. *US Tizanidine study group. Neurology* 1994;44(11 Suppl 9):S34-S42.
- [8] Sheskey MC, Rocco AG, Bizzarri-Schmid M, et al. A dose-response study of bupivacaine for spinal anesthesia. *Anesth Analg* 1983;62(10):931-5.
- [9] Ruppen W, Steiner LA, Drewe J, et al. Bupivacaine concentrations in the lumbar cerebrospinal fluid of patients during spinal anaesthesia. *Br J Anaesth* 2009;102(6):832-8.
- [10] Veering BT, Immink-Speet TTM, Burm AGL, et al. Spinal anaesthesia with 0.5 % hyperbaric bupivacaine in elderly patients: effects of duration spent in the sitting position. *Br J Anaesth* 2001;87(5):738-42.
- [11] Akcaboy EY, Akcaboy ZN, Gogus N. Low dose levobupivacaine 0.5 % with fentanyl in spinal anaesthesia for transurethral resection of prostate surgery. *J Res Med Sci* 2011;16(1):68-73.
- [12] Erdil F, Bulut S, Demirbilek S, et al. The effects of intrathecal levobupivacaine and bupivacaine in the elderly. *Anaesthesia* 2009;64(9):942-6.
- [13] Vaghadia H, Neilson G, Lennox PH. Selective spinal anesthesia for outpatient transurethral prostatectomy (TURP): randomized controlled comparison of chloroprocaine with lidocaine. *Acta Anaesthesiol Scand* 2012;56(2):217-23.
- [14] Kuusniemi KS, Pihlajamäki KK, Pitkänen MT, et al. The use of bupivacaine and fentanyl for spinal anesthesia for urologic surgery. *Anesth Analg* 2000;91(6):1452-6.
- [15] Eisenach JC, De Kock M, Klimscha W. Alpha (2)-adrenergic agonists for regional anesthesia. A clinical review of clonidine (1984-1995). *Anesthesiology* 1996;85(3):655-74.
- [16] Strebel S, Gutzler JA, Schneider MC, et al. Small-dose intrathecal clonidine and isobaric bupivacaine for orthopedic surgery: a dose-response study. *Anesth Analg* 2004;99(4):1231-8.
- [17] Elia N, Culebras X, Mazza C, et al. Clonidine as an adjuvant to intrathecal local anesthetics for surgery: systematic review of randomized trials. *Reg Anesth Pain Med* 2008;33(2):159-67.
- [18] Sudhesh K, Harsoor Ss. Dexmedetomidine in anaesthesia practice: a wonder drug? *Indian J Anaesth* 2011;55(4):323-4.
- [19] Kuraishi Y, Hirota N, Sato Y, et al. Noradrenergic inhibition of the release of substance P from the primary afferents in the rabbit spinal dorsal horn. *Brain Res* 1985;359(1-2):177-82.
- [20] Akhter M, Mir AW, Ahmad B, et al. Dexmedetomidine as an adjunct to spinal anesthesia in urological procedures. *International Journal of Contemporary Medical Res* 2017;4(1):154-8.
- [21] Kaur N, Goneppanavar U, Venkateswaran R, et al. Comparative effects of buprenorphine and dexmedetomidine as adjuvants to bupivacaine spinal anaesthesia in elderly male patients undergoing transurethral resection of prostate: a randomized prospective study. *Anesth Essays Res* 2017;11(4):886-91.
- [22] Al-Mustafa MM, Abu-Halaweh SA, Aloweidi AS, et al. Effect of dexmedetomidine added to spinal bupivacaine for urological procedures. *Saudi Med J* 2009;30(3):365-70.