ORIGINAL RESEARCH

A study to compare the effects of low dose intrathecal fentanyl and low dose intrathecal tramodol combined with 0.5% bupivacaine heavy in patients undergoing orthopaedic surgeries

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ABSTRACT

Background: Various adjuvants have been used with local anesthetics in spinal anesthesia to avoid intraoperative visceral and somatic pain and to provide prolonged postoperative analgesia.

Aims: To compare the intraoperative effects of a single low dose of intrathecal tramadol and intrathecal fentanyl with hyperbaric bupivacaine hydrochloride.

Materials and methods: Fifty patients undergoing Orthopaedic Surgery were randomly allocated to two groups to be given the following agents by intrathecal route: Group A: 0.5% Bupivacaine 3.0 ml and 25 micro grams fentanyl and Group B: received 0.5% Bupivacaine 3.0 ml and 25 milligrams tramadol. Intraoperative hemodynamics, pain scores (assessed using a visual analogue scale), post-operative pain relief and side effects in both groups was evaluated clinically.

Results: Intraoperatively no significant differences in BP, pulse rate and respiratory rate were noted. Time to full motor recovery was not delayed in any of the patients in both the groups. The mean duration of analgesia did not differ in both groups. Mean duration of analgesia in Group A was 562 minutes and in Group B was 551.2 min. Time for two segment regression did not differ in both the groups. The patients in both the groups showed minimal side effects, like nausea, vomiting and pruritis. The incidence of side effects were statistically in significant.

Conclusions: Both intrathecal tramadol and intrathecal fentanyl act synergistically to potentiate bupivacaine induced sensory spinal block. Excellent surgical anesthesia and an extended analgesia was observed in post-operative period with minimum side effects were observed in both groups.

Key words: Intrathecal; Tramadol; Fentanyl; Bupivacaine.

INTRODUCTION

Spinal anaesthesia is advantageous in that it uses a small dose of the anaesthetic, is simple to perform and offers a rapid onset of action, reliable surgical analgesia and good muscle relaxation. These advantages are sometimes offset by a relatively short duration of action and complaints of post-operative pain when it wears off. Due to lack of step-down units where nurses can look after epidural infusions and lack of equipment for PCA (Patient Controlled Analgesia), patients often have breakthrough pain post-operatively. If we can provide post-

operative analgesia in a simple and inexpensive manner, it may go a long way in alleviation of pain and suffering.

Spinal anaesthesia with hyperbaric Bupivacaine Hydrochloride is popular for longer procedures due to its prolonged duration. But there is a need to intensify and increase duration of sensory blockade without increasing the intensity and duration of motor blockade, and thus prolong the duration of postoperative analgesia. The addition of opioids has been suggested as a method to accomplish these goals. This study is designed to quantitatively examine the effects of adding fentanyl and tramadol to Hyperbaric Bupivacaine Hydrochloride spinal anaesthesia on duration and recovery of sensory and motor blockade.

MATERIALS AND METHODS

This study was conducted in the Department of Anaesthesiology at Gandhi Medical College over a period of 6 months form August2019 to January 2020.

After obtaining approval from the Ethical Clearance Committee of the hospital, 50 patients included in the study.

INCLUSION CRITERIA

ASA Grade I & II Physical Status aged between 20 to 80 years, scheduled for elective low limb surgeries under spinal anaesthesia.

EXCLUSION CRITERIA

Contra indications for Sub-arachnoid block.

The selection of patients were carried out randomly, depending on the lists of operations submitted by the surgical team on the previous day. A written informed consent was obtained from all these patients. Pre-anaesthetic checkup included general examination systemic examination of cardiovascular, respiratory, CNS systems and examination of the spine for any disease or deformity.

Routine investigation were carried out before taking up the patient for surgery. Premedication was standardized with – Tab. Ranitidine 150 mg PO the night before surgery and 2 hours before surgery. Tab. Diazepam 0.2 mg/ kg PO on night before surgery. All patients were kept nil per orally from midnight.All patients were instructed about the visual analogue scale for pain. 0- no pain and 10- worst ever pain.All patients were given injection Ondansetron 4mg I.V prior to SAB. Patients were explained the procedure of spinal anaesthesia at the time of pre- anaesthetic evaluation. After shifting the patients to the operation theatre, intravenous access was secured with 18gauge cannula. Under strict aseptic precautions LP was performed using 25 guage disposable Quincke type of spinal needle at L2 – L3 spinal intervertebral space by midline approach. The operating table was kept at a tilt of 45^0 head up. LP was performed in sitting position.

Patients were monitored continuously using electrocardiography, NIBP and pulse oximetry. In supine position before the spinal injection baseline arterial blood pressure and heart rate was recorded.

Patients were randomly allocated into two following groups

Group A: SAB with addition of 25 mcg fentanyl to 3ml of 0.5% Bupivaaine hydrochloride (hyperbaric)

Group B: SAB with addition of 25 mg tramadol to 3ml of 0.5% Bupivacaine hydrochloride (hyperbaric).

Base line Heart Rate and blood pressure was noted down before SAB. After spinal anaesthesia all the patients were turned supine, pulse rate and blood pressure was recorded immediately and at 5,10, 15, 30, 60,120, 180 minutes.

Level of sensory blockade was checked with a 23G hypodermic needle immediately after SAB and at 5, 10, 15, 30, 60, 120, 180 minutes.
Level of motor blockade was also assessed by using the^{0} Bromage scale immediately after SAB and at 5, 10, 15, 30,60,120,180 minutes.
(^{0}Bromage scale 0-full flexion of knees and feet; 1 – just able to flex knees, full flexion of feet; 2-unable to flex knees, but some flexion of feet possible, 3-unable to move legs or feet).
Time for two-segment regression of sensory level in minutes was also noteddown.
The following side effects due to intrathecal administration of fentanyl were noted down during the perioperative and postoperative period. Nausea, vomiting, pruritis, shivering, desaturation or hypoxaemia (SpO2 < 90%), respiratory depression (RR < 10), hypotension, sedation, urinary retention. Hypotension was defined as decrease in systolic blood pressure more than 30% of base line and was treated with Inj. Ephedrine 6 mg increments IV. Inj. Atropine was given when heart rate decreases > = 20% of base line. The retention of if any urine was noted in the non – catheterised patients.
The duration was calculated from the time when the block was given. The patients were followed up for 24 hours after surgery. They were asked to point out the intensity of their pain on the linear visual pain scale. VAS score along with heart rate and blood pressure was recorded in the recovery room (3 hours after SAB), evening of surgery (6 hours after SAB) and on the first post-operative day (24 hours after SAB).
During the post-operative period the injections of analgesics or opiods were avoided until demanded by the patients due to pain. The time at which supplementation given was noted down along with drug and dosage. This point corresponded to poor analgesia on the scale. Total dose of analgesics administered to the patients in 24 hours was noted. Pain assessment was conducted by a single observer. The time taken for complete motor and sensory recovery was noted.
The duration of motor blockade was taken from the time of injection of the drug to the time when the patient was able to move his ankle. The duration of sensory blockade was taken from the time of injection of the drug to the time when the patient was able to appreciate pain in the S1 dermatome (i.e the heel).

STATISTICAL METHODS

The data were analyzed as follows. First, the descriptive statistics were computed. These included the range, mean and standard deviation (SD) for quantitative variables, and category frequency counts for qualitative variables. The median was also computed, wherever relevant, such as when the distributions were skewed. Next, inferential statistical analysis was undertaken as described below.
In the first phase of the analysis, the groups were compared on baseline socio demographic and clinical variables to examine whether or not they were similar at intake into the study. In the second phase of the analysis, specific hypotheses were examined, such as the change in scores across time relative to baseline scores. The independent sample (Student's) t test was employed to compare the means of two independent groups after confirming homogeneity of variances as determined using the (2-tailed) F max test. When distributions were significantly non-normal, and when the variances were highly restricted, quantitative variables were split into below and above median categories, and the groups were then compared using the Chi square or Fisher's exact tests.
The Chi square test was used to compare the frequency distributions (proportions) of qualitative variables across 2 or more groups. The Yates Continuity corrected Chi square statistic was not computed for 2x2 contingency tables because this is nowadays considered to be unnecessarily conservative. Fisher's exact (two-tailed) probability was computed when the

requirements for the 2x2 Chi square were not met. Alpha for significance for all inferences was set at P<0.05. All tests of hypotheses, wherever applicable, were two-tailed.

RESULTS

Table-1: patient's characteristics in present study

		Group A	Group B	Significance
Ag e	**Range**	21-74	18-75	T= 1.27
	Mean	35.5	30.6	Df=48
	S.D	14.2	12.8	P=0.21
SEX	**Male**	21	18	X2=1.05 df=1
	Female	4	7	P=0.31
Base line Heart Rate	**Range**	59- 106	66- 105	T=0.54
	Mean	80.3	82.0	Df=4.8
	S.D	11.4	10.6	P=0.59
Baseline systolic blood pressure	**Range**	105- 160	100- 150	t=1.17
	Mean	128- 9	124.6	Df=48
	S.D	14.5	11.2	P=0.25
Baseline diastolic blood pressure	**Range**	58- 100	70- 100	T=0.20
	Mean	79.6	79.1	Df=48
	S.D	10.2	7.9	P=0.84

The two groups did not differ significantly in age, sex and baseline hemodynamic parameters. (Df = degree of freedom)

Table-2: Shows heart rate at different intervals.

	Group A	Group B	Significance		
Base Line 0	80.3 (11.4)	82.0 (10.6)	F= 0.17	P=0. 68	df=1 48
5	76.0 (9.8)	78.5 (11.6)	F=0.17	P=0. 68	df=1 48
10	73.8 (10.7)	73.7 (11.3)	F=0.17	P=0. 68	df=1 48
15	71.0 (10.5)	71.5 (11.4)	F=0.17	P=0. 68	df=1 48
30	69.7 (12.7)	71.1 (10.9)	F=0.17	P=0. 68	df=1 48
60	67.3 (12.7) (n=25)	71.6 (10.0) (n=21)	T=1.33	P=0. 19	df=4 4
120	70.8 (11.4) (n=17)	70.4 (10.5) (n=9)	T=0.07	P=0. 95	df=2 4

F= Fischers test, T= Student 't' test

There was significant difference in heart rate over time in both groups but there was no significant difference between Groups in the pattern of decrease in heart rate.

Table-3: shows systolic blood pressure at different intervals

Systolic blood pressure	Group A	Group B	Significance		
Base line 0	128.9 (14.5)	124.6 (11.2)	F=2.01	P=0. 16	df= 148
5	121.1 (14.5)	116.8 (13.2)	F=2.01	P=0. 16	df= 148
10	115.9 (16.8)	110.5 (16.8)	F=2.01	P=0. 16	df= 148
15	115.4 (12.5)	111.2 (12.2)	F=2.01	P=0. 16	df= 148
30	115.5 (13.4)	109.7 (14.7)	F=2.01	P=0. 16	df= 148
60	114.8 (12.0) (n=25)	113.0 (11.9) (n=21)	T=0.51	P=0. 62	df= 44
120	120.1 (11.1) (n=17)	112.1 (12.6) (n=9)	T=1.70	P=0. 10	df= 24

Diastolic blood pressure					
Base line 0	79.6 (10.2)	79.1 (7.9)	F=0.97	P=0. 33	df= 148
5	75.1 (9.6)	74.8 (9.4)	F=0.97	P=0. 33	df= 148
10	72.0 (11.3)	68.6 (9.7)	F=0.97	P=0. 33	df= 148
15	72.4 (9.3)	69.2 (10.1)	F=0.97	P=0. 33	df= 148
30	72.4 (8.3)	68.0 (12.1)	F=0.97	P=0. 33	df= 148
60	71.2 (7.6) (n=25)	71.7 (9.5) (n=21)	T=0.22	P=0. 83	df= 44
120	70.8 (8.0) (n=17)	68.1 (13.6) (n=9)	T=0.63	P=0. 54	df= 24

There was significant difference in systolic blood pressure over time in both groups but there was no significant difference between Groups in the pattern of decrease in systolic blood pressure.

There was significant difference in diastolic blood pressure over time in both groups but there was no significant difference between Groups in the pattern of decrease in diastolic blood pressure.

Table-4: shows visual analogue scale immediate post op, 6 hrs and 24 hrs.

Visual analogue scale	**Group A Mean (Sd)**	**Group B Mean (Sd)**
0	0	0.1 (0.4)
6	0.6 (1.4)	0.6 (0.7)
24	2.7 (1.5)	1.7 (1.2)

Visual analog scale 6 hours post operatively was significantly more likely to be > than 0 in Group A as compared to Group B. Visual analog scale 24 hours post operatively was significantly more likely to be > than 2 in Group A.

Table-5: Sensory and motor variable in both groups

		Group A	**Group B**	**Significance**
Time of request for analgesia.	**Mean**	562.0	551.2	T=0.28
	Sd	152.1	115.0	P=0.78
Respect to total analgesic requirement	**Mean**	106.8	99.2	T=0.90
	Sd	34.7	24.1	P=0.37
Time to full motor requirement.	**Mean**	228.8	227.8	T=0.13
	Sd	27.4	27.2	P=0.90
Time to 2 segment regression of sensory level	**Mean**	93.2	95.4	T=0.36
	Sd	23.9	19.3	P=0.72
Time for complete motor sensory recovery.	**Mean**	243.6	240.2	T=0.42
	Sd	30.8	26.1	P=0.68

Both the groups did not differ significantly with respect to total analgesic requirement, time to full motor requirement, Time to 2 segment regression of sensory level and time for complete motor sensory recovery.

Table-6: Side effects in present study

Side Effects	**Group A**	**Group B**
Nausea	Nil	Nil
Vomiting	Nil	Nil
Pruritus	2	2
Shivering	2	0

Desaturation or hypoxemia (SpO2 < 90%)	Nil	Nil
Sedation	Nil	Nil
Urinary retention	Nil	Nil

DISCUSSION

Effective pain control is essential for optimum care of patients in the post- operative period. However, despite advances in the knowledge of pathophysiology of pain, the pharmacology of analgesics and the development of more effective techniques, patients continue to experience considerable pain after surgery. If a method of analgesia is to be successful and available to large number of patients, it must be suitable for use in a general surgical ward and should require only simple routine nurse monitoring.

The drugs commonly used for spinal subarchnoid block are lignocaine and bupivacaine. One disadvantage with spinal anesthesia using local anesthetics alone is that analgesia ends with the regression of the block, which means that there is an early post-operative need for analgesia post-operative pain, apart from causing discomfort has other deleterious effects involving mainly the cardio-respiratory system.

In recent years, the use of intrathecal narcotics has become widespread, albeit at the cost of an increased risk for respiratory depression. Tramadol, in contrast, is a centrally acting analgesic that has minimal respiratory depressant effects, by virtue of its 6000 fold decreased affinity for mu receptors compared to morphine.[2]

Although epidural tramadol has been demonstrated to provide adequate post- operative analgesia in patients undergoing major abdominal surgery and caesarean sections, its efficacy after intrathecal administration has not been studied sufficiently. Hence we thought it would be appropriate to study the effects of intrathecal administered tramadol and compare it with a commonly used intrathecal administered opioid like fentanyl.

Fentanyl has a rapid onset and shorter duration of action following intrathecal administrations. It prolongs the duration of bupivacaine induced sensory blockade. This suggests a potential synergism between fentanyl and bupivacaine as reported in an animal study by Wang et al[4] andGielen MJM et al[5] in 1993 reported that fentanyl is one of the safest opioids. Orthopedic patients were chosen as most orthopedic procedures can be done under spinal anesthesia.

The present study was done among patients posted for limb surgeries under spinal anaesthesia at Gandhi Hospital. The study was conducted among 50 patients posted for limb surgeries for a period of one year from August 2019 to January 2020with an aim to the effects of low dose intrathecal fentanyl and low dose intrathecal tramadol combined with 0.5% bupivacaine (heavy).

A total of 25 mg of intrathecal tramadol was considered adequate for the study based on the work carried out by Alhashemi and Kaki et al[5] where 25 mg of intrathecal tramadol was proven to be safe during the spinal anaesthesia. Although Frikha et al.[6]used 50 mg tramadol, Parthasarathy and Ravishankar et al[7] used 10 mg and Chakraborty et al[8]used 20 mg of tramadol in their studies, but 25 µg of fentanyl is equipotent with 25 mg of tramadol according to report by Duthie[9]. Duthie[9] also reported that tramadol has the same analgesic potency as pethidine, one fifth (1/5) that of nalbuphine, one-tenth (1/10) that of morphine and one -thousandth (1/1000) that of fentanyl. One of the advantages of using intrathecal fentanyl is its rapid onset[10]. In the present study also 25 µg fentanyl was added to 0.5% Bupivacaine hydrochloride (hyperbaric) in group A and in group B 25 mg tramadol was added to 0.5% Bupivacaine hydrochloride (hyperbaric) which was similar to the above studies.

The mean age of the study population was 35.5 years in fentanyl group and in the tramadol group was 30.6 years and there was no significant difference between the groups.

In the present study there were 39 males and 11 females. Male predominance was found both in fentanyl and tramadol groups with no significant difference between the groups.
In a study conducted by Cagney B et al[11] the mean age of fentanyl group and tramadol group was 33 years. They also reported male predominance in their study which was which was similar to the present study. Dalvi NP et al[12] reported no statistically significant difference between the demographic data which was similar to the present study. Talluri S et al[13] study also reported similar gender ratio but the mean age in group F was 47.22±10.49 and mean age in group T was 45.78±9.08 which was comparable among two groups but was high when compared to the present study. Mitra S et al[14] had reported the mean age in the fentanyl group was 26.55 years and in the tramadol group was 31.65 years which was similar to the present study. They also reported male predominance in both the groups with no significant difference between the groups which was similar to the present study. Hosseini H et al[37] had also reported similar age distribution in their study. Afolayan et al[15] in their study had reported the mean age in the fentanyl group was 28.5 yrs and in the tramadol group was 28.7 yrs which was similar to the present study but in their study female were more in both the groups which in contrast to the present study but there was no significant difference between the gender and drugs used. Rothray SS et al[16] also reported no statistical significant difference among the two groups regarding demographic profile like age, sex which was similar to the present study.
Preoperative baseline systolic, diastolic blood pressures and heart rate were analyzed and there was no statistically significant difference between the groups which was comparable to the studies conducted by Talluri S et al[13], Rothray SS et al[16] Dalvi NP et al[12] also reported that the baseline pulse rate and systolic blood pressure were comparable in both the groups. There was no statistically significant difference between the pulse rate and systolic pressure in both the groups throughout the observation period.
In the present study there was significant fall in blood pressure with in both groups during the initial 30 minutes but there was no significant difference between groups in the pattern of decrease in systolic or diastolic blood pressure during this period. Other studies have shown that neuraxial opioids reduce sympathetic outflow and that the addition of fentanyl to spinal analgesia is associated with an increased likelihood of hypotension after epidural blockade. Alheshmi J.A et al[5] in 2003 found that intrathecal tramadol did not seem to influence the intra operative hemodynamic profile. There was no statistically significant difference between the pulse rate and systolic pressure in both the groups throughout the observation period as reported by Dalvi NP et al[12] which was similar to the resent study.
The mean heart rate, systolic and diastolic blood pressures were comparable in both the groups preoperatively, intraoperatively, and postoperatively as reported by Dandona S et al[17] which was similar to the present study. Singh AP[18] study had also reported that there was no statistical significant between the changes in the intraoperative hemodynamic parameters and type of drugs used during surgery which was similar to the present study. Hussain A et al[19] study had reported that the incidence of hemodynamic side effects like decreased blood pressure, bradycardia, and other side effects like somnolence and dryness of mouth were minimum and well tolerated by the patients studied. The respiratory rate of the patients also remained unaffected which was similar to the present study.
None of the patients in our study experienced respiratory depression. Baraka A et al[20] in 1993 found that mean PaO2 values did not change in the epidurally administered tramadol group. Similar findings were also observed by Yaddanapudi C.N. et al[21] studied with epidurally administered tramadol. Reuben S. S et al[22] studied different dosages from 0 to 50 mcg of fentanyl and observed that not a single patient had respiratory depression. Hussain A et al[19] study had also reported the respiratory rate of the patients also remained unaffected after the addition of tramadol to bupivacaine.Talluri S et al[13]., had reported that

the preoperative, intraoperative systolic, diastolic blood pressures and heart rate were similar in both the groups and there was no statistically significant difference between group F and group T at different time intervals at which they were measured which was similar to the present study.

The mean duration of analgesia in the fentanyl group was 562.0 minutes and in tramadol group was 551 minutes. This is a considerably longer duration of analgesia when compared to using a local anesthetic alone. The two groups did not differ significantly with regard to the mean duration of analgesia or with regard to the total dose of analgesics required in 24 hours. Brijesh Jain et al[23] in 2000 found that intrathecal tramadol 25 mg added to bupivacaine provided a mean duration of post- operative pain relief of about eight hours, which is similar to our finding. Baraka A et al[20] found that tramadol given epidurally provided good post-operative pain relief.

Sukanya Mitra et al[14] had reported patients needing supplementary analgesia and time to first supplementary analgesia had no difference between the fentanyl and tramadol group which was similar to the present study. Tramadol when used with 0.5% hyperbaric bupivacaine intrathecally, significantly prolongs postoperative analgesia after lower limb orthopaedic surgeries as reported by Hussain A et al[19] Naina P Dalvi et al[12] found out that fentanyl 25 confers prolonged duration of sensory and motor blockade than tramadol when added to hyperbaric bupivacaine which was similar to the present study. Hussain A et al[19] study showed that the duration of analgesia provided by intrathecal administration of 20 mg tramadol with 15 mg of 0.5% hyperbaric bupivacaine was significantly longer than that provided by intrathecal bupivacaine alone. In the study by Routray et al[16], no significant difference in duration of analgesia was found between intrathecal fentanyl 25µg and tramadol 25mg which was similar to the present study. Talluri S et al[13] had reported that the duration of analgesia was significantly prolonged in group F compared to group T which was contrast to the present study. Alheshmi J.A et al[5] found that intrathecal tramadol did not seem to influence the intra operative hemodynamic profile. Dandona S et al[17] had reported that mean total duration of motor block, the time of request of the first analgesia in the fentanyl group was more than the tramadol group indicating superior analgesia by fentanyl.

In the present study Visual analog scale at post op, 6hrs was similar in both the groups whereas at 24 hrs postop fentanyl group had mean 2.7 which was high when compared to tramadol group 1.7. Visual analog scale 24 hours post operatively was significantly more likely to be > than 2 in Group A. Visual analog scale 6 hours post operatively was significantly more likely to be > than 0 in fentanyl group as compared to tramadol group which was similar to the study conducted by Sukanya Mitra et al[14]. Dalvi NP et al[12] had also reported that the mean VAS scores was low in fentanyl group when compared to tramadol group which was similar to the present study. Rothray SS et al[16] study had reported that Visual analogue scale 6 hours, post operatively was significantly more likely to be in Group T as compared to Group F. Visual analog scale 24 hours post operatively in group T was significantly more likely to be than in Group F which was in contrast to the present study. Talluri S et al[13] study had reported that the visual analogue scale scores recorded at different time intervals was high in fentanyl group when compared to tramadol group and a statistically significant different between the two groups.

The total analgesic requirement and the time to full motor recovery did not differ significantly between the two groups which was similar to the study conducted by Routray et al[16].

In the present study we found that the time for two-segment regression of sensory level did not differ significantly between the groups. An average of 90 min was the time taken for two segment regression of sensory level in both groups. Harbhaj Singh et al[24] found in their studies that intrathecal fentanyl intensifies and increases the duration of sensory anesthesia.

The time to reach peak sensory block and the mean time for two segment regression of sensory block were insignificant between both the groups as reported by Talluri S et al[13] and Routray et al[16] which was similar to the present study.

As far as side effects of intrathecal opioids were concerned patients in both groups had minimal side effects. Only two patients in both minimal side effects. Only two patients in both groups had pruritus. Routray SS et al[16] also reported minimal side effects in their study aslo pruritus was the only side effect. The prophylactic use of ondansetron in both groups would explain the incidence of minimal pruritus and nausea in our study. Afolayan JM et at[15] study had reported the high incidence of minor side effects when compared to the present study. They reported 16.1% patients in the tramadol group and 3.2% in the fentanyl group had vomiting's.

Hussain A et al[19] had found that the incidence of somnolence and dryness of mouth were minimum and well tolerated by the patients. Dalvi NP et al[12] reported high incidence of side effects when compared to the present study. They found out 23.3%, 10% from fentanyl group and 46.6%, 36.7% patients from tramadol group had nausea and vomiting respectively. 36.7% patients complained of pruritus from the fentanyl group which was high when compared to the present study. Nausea/vomiting was seen in 13% patients in fentanyl group and 16% patients in tramadol group as reported by Dandona S et al[17] which was high when compared to the present study. Talluri S et al[13] had reported that pruritis was seen in 10% patients in fentanyl group and none of the patients had pruritis in tramadol group whereas in the present study pruritis was seen in both the groups.

CONCLUSIONS

Addition of either intrathecal tramadol or fentanyl to bupivacaine produced comparable hemodynamic changes, post-operative analgesia, sensory blockade without prolonging motor recovery. Addition of both opioids produced minimal intraoperative and postoperative side effects.

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