AIM OF THE WORK

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The aim of this study was to compare the addition of either dexmedetomidine or fentanyl to intrathecal bupivacaine as regards: the onset and duration of sensory and motor block, hemodynamic effects, postoperative analgesia and adverse effects of either drug.

PATIENTS

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The present study was carried out on 60 patients (approved to be sufficient by the department of statistics, High Institute of Public Health, University of Alexandria), aged 18-50years old, of both sexes, of height ranging from 160-190cm,[124] with American Society of Anaesthesiologists (ASA) I and II health status, admitted to the Alexandria Main University Hospitals and scheduled for elective lower abdominal or lower limb surgeries.

Exclusion criteria were

1. Pregnant and lactating females.
2. Patients allergic to studied medications.
3. Patients with heart block & dysrhythmias.
4. Hypertensive patients.
5. Patients on therapy with adrenergic receptor antagonist, calcium channel blocker, &/or angiotensin converting enzyme (ACE) inhibitor.
6. Patients with opium addiction & sedative drugs consumption.
7. Patients with contraindications for spinal anaesthesia.

Patients were randomly categorized by closed envelope method in a double blinded study into three equal groups (20 patients each):[125]

- **Group B:** Patients received 3ml (15mg) of 0.5% hyperbaric bupivacaine + 0.5ml of normal saline intrathecally.
- **Group F:** Patients received 3ml (15mg) of 0.5% hyperbaric bupivacaine + 0.5ml (25 microgram) of preservative free fentanyl intrathecally.[98]
- **Group D:** Patients received 3ml (15mg) of 0.5% hyperbaric bupivacaine + 0.5ml (5 microgram) of diluted, preservative-free dexmedetomidine intrathecally.[126, 62]

METHODS

METHODS

After the approval of the local ethical committee, consent was taken from each patient confirming his/her acceptance of intrathecal anaesthesia, after knowing the technique and its possible complications.

Pre-operative screening of all patients included

- History taking.
- Complete physical examination.
- Laboratory investigation:
  1. Complete Blood Picture.
  2. Prothrombin time, activated partial thromboplastin time and INR.
  3. Liver enzymes: Aspartate transaminase, Alanine transaminase.
  4. Serum urea and creatinine.
  5. Fasting Blood Sugar.

Patients were premedicated by H2 antagonist (ranitidine 50mg, intramuscularly, 2 hours preoperatively). Before commencing regional anaesthesia, standard monitoring was established using multichannel monitor (Hewlett-Packard, Viridia 24, Germany) as follow:

- Electrocardiogram (ECG) for heart rate and rhythm. (Beat/min).
- Non-invasive measurement of arterial blood pressure. (Mean blood pressure in mmHg).
- Oxygen saturation. (SpO2%).

They were given intravenous lactated Ringer's solution 10 ml/kg as volume preload. Spinal anesthesia was be performed in the sitting position at the L3-4interspace with midline or paramedian approach by using a 25 gauge Quinke's spinal needle with all aseptic precautions. Injection was done according to the following groups:

- **Group B:** Patients received 3ml (15mg) of 0.5% hyperbaric bupivacaine + 0.5ml of normal saline intrathecally.
- **Group F:** Patients received 3ml (15mg) of 0.5% hyperbaric bupivacaine + 0.5ml (25 microgram) of preservative free fentanyl intrathecally.
- **Group D:** Patients received 3ml (15mg) of 0.5% hyperbaric bupivacaine + 0.5ml (5 microgram) of diluted, preservative-free dexmedetomidine intrathecally.

Injection was given over 10-15 sec, immediately after completion of the injection patients lied supine. Low flow oxygen (4L/minute) was administered via oxygen mask.

Measurements

The following parameters were measured:

I. Patient data

1. Patient's age (in years).
2. Patient's height (in cm).

II. Duration of the operation: (in minutes)

III. Hemodynamic measurements

1. Heart rate (HR in beat / min).
2. Non-invasive measurement of mean arterial blood pressure (MABP in mmHg).
3. Oxygen saturation (SpO2 %).

All previous parameters were continously monitored and recorded at the following periods:

1. Before spinal anaesthesia.
2. Immediate after spinal analgesia and every 15 minutes, for 90 min and at the end of surgery.
3. Every hour for 6 hours postoperative.

IV. Assessment of sensation

All durations were calculated considering the time of spinal injection as time zero. Sensory analgesia was assessed by iced cubes to measure the following:

1. Onset of sensory block (defined as time in minutes to reach highest sensory level) tested every minute after intrathecal injection till reaching the highest level).
2. Sensory level of analgesia (defined as segmental level of highest sensory analgesia).
3. Duration of sensory block (defined as the time in minutes it takes for sensory level to decrease to dermatomal level S1) measured from the highest obtained sensory level every 15 minutes.[124]

Postoperatively

1. Pain intensity was evaluated by using a visual analogue scale (VAS) starting from the first pain experienced by the patient till the end of study with 0 corresponding to no pain and 10 to the worst pain imaginable, it was assessed at the first, second, forth, sixth, eighth, hour and every four hours till 24 hours.[127]
2. Time to first request of analgesia (defined as the time elapsed from the time of spinal injection till reaching VAS>4) was recorded and treated by intramuscular diclofenac sodium in a dose of 1mg/kg to be repeated if needed after 12 hours but if pain persists after one hour from the first dose, 25mg pethidine will be given intravenously.[125]
3. The total analgesic dose of both diclofenac sodium and pethidine taken within the first 24 hours were recorded.

V. Assessment of motor function

Motor blockade was evaluated as follows:

1. Onset of motor block. (Defined as time in minutes from the end of drug injection intrathecally until patient is unable to move hip, knee and ankle)[128] tested every minute after intrathecal injection.
2. Duration of motor block in minutes was recorded from the time of the onset of the block to the time when the patient was able to lift legs in bed against gravity, tested every 15 min. This is according to the following modified Bromage-score:[129]
   - The patient is able to move the hip, knee and ankle. (0)
   - The patient is unable to move the hip but is able to move the knee and ankle.(1)
   - The patient is unable to move the hip and knee but able to move the ankle.(2)
   - The patient is unable to move hip, knee or ankle.(3)

VI. Side effects

The incidence of adverse effects such as hypotension, bradycardia, nausea, vomiting, shivering, pruritus, respiratory depression and sedation was recorded.

Hypotension, defined as a decrease of systolic blood pressure by more than 30% from baseline or fall below 90mmHg[125], was treated by intravenous fluids and intravenous increments of 3mg ephedrine. Total ephedrine dose was recorded.

Bradycardia, defined as heart rate less than 50bpm[125], was treated by 0.6mg of intravenous atropine

Respiratory depression, defined as respiratory rate <10, was assessed for any needed airway support.

Sedation was assessed by Ramsay Sedation Score[130].This was also assessed for any needed airway support.

Table (II): Ramsey Sedation Score.[130]

Score	Response
1	Anxious or restless or both
2	Cooperative, oriented and tranquil
3	Responding to commands
4	Brisk response to stimulus
5	Sluggish response to stimulus
6	No response to stimulus

(Scores 1, 2 and 3 are Awake, 4, 5 and 6 are Asleep)

These side effects were assessed at the first; second, forth, sixth, eighth, hour and every four hours till 24 hours.

Statistical analysis

Statistical analysis of the data

Data were fed to the computer using IBM SPSS software package version 20.0.

Qualitative data were described using number and percent. Comparison between different groups regarding categorical variables was tested using Chi-square test.

Quantitative data were described using mean and standard deviation for normally distributed data while abnormally distributed data was expressed using median, minimum and maximum.

For normally distributed data, comparison between two independent population were done using independent t-test while more than two population were analyzed F-test (ANOVA) to be used and Post Hoc test (Scheffe).

Significance test results are quoted as two-tailed probabilities. Significance of the obtained results was judged at the 5% level.

A- Mean value $(\bar{X}) = \frac{X}{n}$.

Where: X = the sum of all observations.
n = the number of observations.

B- The standard deviation S.D. $= \sqrt{\frac{\sum (X - \bar{X})^2}{n - 1}}$

Where: Σ (Xi – X)2 = the sum of squares of differences of observations from the mean.

C- Student (Unpaired-sample) "t" test:

It is used during comparison between the means of different sample groups. The "t" is calculated as follows:

$$\mathbf{t} = \frac{X_1 - X_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

Where

X_1 = Mean of first group.

X_2 = Mean of second group.

S_1 = Standard deviation of the first group.

S_2 = Standard deviation of the second group.

n_1 = Sample size of the first group.

n_2 = Sample size of the second group.

D- One way analysis of variance (ANOVA) was performed for comparison between more than two groups

Variance ratio F was computed by the formula.

$$F_{(r-1),(n-1)} = \frac{\text{Means quare between classes}}{\text{Mean square within classes}}$$

Where r = number of groups
n = total sample size

E- Chi-Square test

It tests the association between qualitative nominal variables, it is performed mainly on frequencies. It determines whether the observed frequencies differ significantly from expected frequencies.

$$\text{Computed } X^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Where E = expected frequency
O = observed frequency

$$E = \frac{\text{Raw total x Column total}}{\text{Grand total}}$$

RESULTS

RESULTS

The study was done in Alexandria Main University Hospitals on 60 patients scheduled for lower abdominal or lower limb surgeries under spinal anaesthsia. Subarachinoid block was successfully performed with no technical problems. Patients were divided into three groups (20 patients each)

Group B: Patients received 3ml (15mg) of 0.5% hyperbaric bupivacaine + 0.5ml of normal saline intrathecally.

Group F: Patients received 3ml (15mg) of 0.5% hyperbaric bupivacaine + 0.5ml (25 microgram) of preservative free fentanyl intrathecally.

Group D: Patients received 3ml (15mg) of 0.5% hyperbaric bupivacaine + 0.5ml (5 microgram) of diluted, preservative free dexmedetomidine intrathecally.

Age

In group B the age ranged from 19years to 49years, with mean age of 31.3years ±11.09years. In group F the age ranged from 22years to50years, with mean age of 35.55years ±9.59years. In group D the age ranged from 19years to50years, with mean age of 31.05 years ± 9.34years. There was no significant difference among the 3 groups. (P= 0.362).

Height

In group B the height ranged from 160cm to 180cm, with mean height 166cm ±6.20cm. In group F the height ranged from 160cm to 180cm, with mean height 166.5cm ±5.98cm. In group D the height ranged from 160cm to 180cm, with mean height 163.75cm ±5.59cm. There was no significant difference among the 3 groups in height. (P =0.365).

Gender

In group B females were 11 and males were 9. In group F females were 8 and males were 12. In group D females were 9 and males were 11. There was no significant difference among the 3 groups regarding gender. (P=0.321)

Duration of surgery

In group B the minimum duration of surgery was 80min, the maximum was 130min with mean duration of 101.75min ±15.75min. In group F the minimum duration of surgery was 75min, the maximum was 130min with mean duration of 110.75min ± 15.50min.In group D the minimum duration of surgery was 60min, the maximum was 165min with mean duration of 113.25min ± 24.40min. There was no significant difference among the durations of surgeries in the 3 groups (P=0.1025).

Table (III): Comparison among the studied groups regarding Age in years.

Number	Bupivacaine	Fentanyl	Dexmedetomidine
1	30	50	26
2	19	50	23
3	19	30	30
4	26	49	19
5	21	28	30
6	25	37	34
7	23	36	28
8	22	25	20
9	48	32	22
10	33	31	34
11	20	45	38
12	42	38	40
13	49	27	50
14	48	33	26
15	35	35	37
16	40	47	42
17	49	25	24
18	20	48	34
19	33	22	42
20	24	23	22
Min.	19.0	22.0	19.0
Max	49.0	50.0	50.0
Mean	31.3	35.55	31.05
S.D.	11.09	9.59	9.34
F	1.05		
p	0.362		

Min=minimum, Max=maximum, SD=standard deviation F value for ANOVA test, *P is significant at ≤0.05

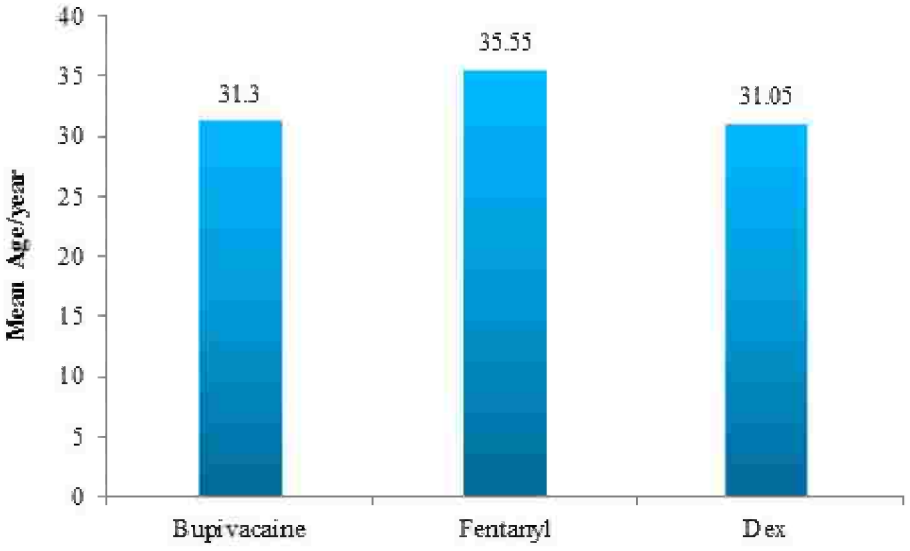


Figure (9): Comparison among the three studied groups regarding Age/year.

Table (IV): Comparison among the studied groups regarding Height in cm.

Number	Bupivacaine	Fentanyl	Dexmedetomidine
1	160	165	170
2	160	174	160
3	165	160	160
4	160	160	180
5	170	168	160
6	170	170	165
7	170	165	170
8	160	170	170
9	170	160	160
10	160	180	165
11	170	160	160
12	180	160	160
13	160	170	170
14	160	160	160
15	170	168	160
16	170	175	160
17	175	165	160
18	160	160	165
19	170	170	160
20	160	170	160
Min.	160.0	160.0	160.0
Max	180.0	180.0	180.0
Mean	166	166.5	163.75
S.D.	6.20	5.98	5.59
F	2.05		
p	0.365		

Min=minimum, Max=maximum, SD=standard deviation, F value for ANOVA test, *P is significant at ≤0.05

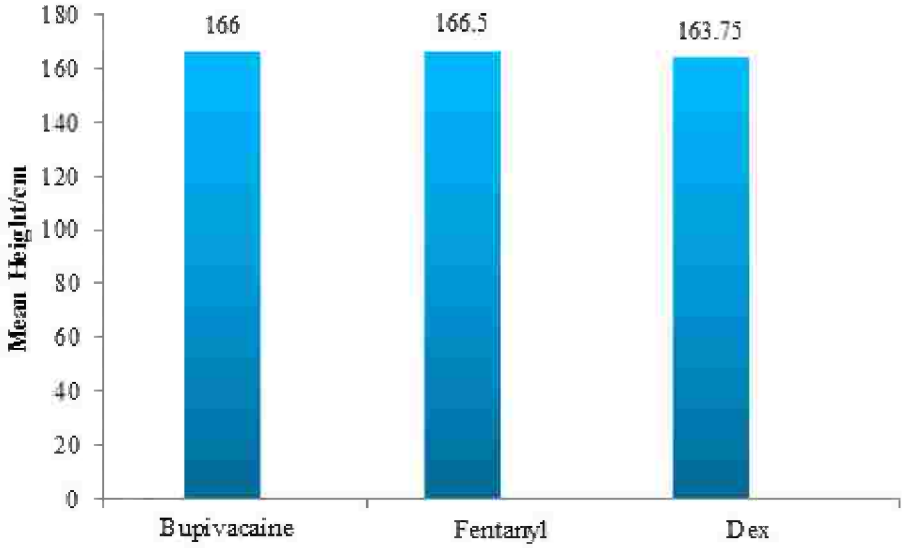


Figure (10): Comparison among the three studied groups regarding Height/cm.

Table (V): Comparison among the studied groups regarding Sex.

	Male		Female	
	Number	**Percent %**	**Number**	**Percent %**
Bupivacaine	**9**	**45**	**11**	**55**
Fentanyl	**12**	**60**	**8**	**40**
Dexmedetomidine	**11**	**55**	**9**	**45**
X2	**1.25**			
P	**0.321**			

X2 value for Chi square test, * P is significant at ≤0.05.

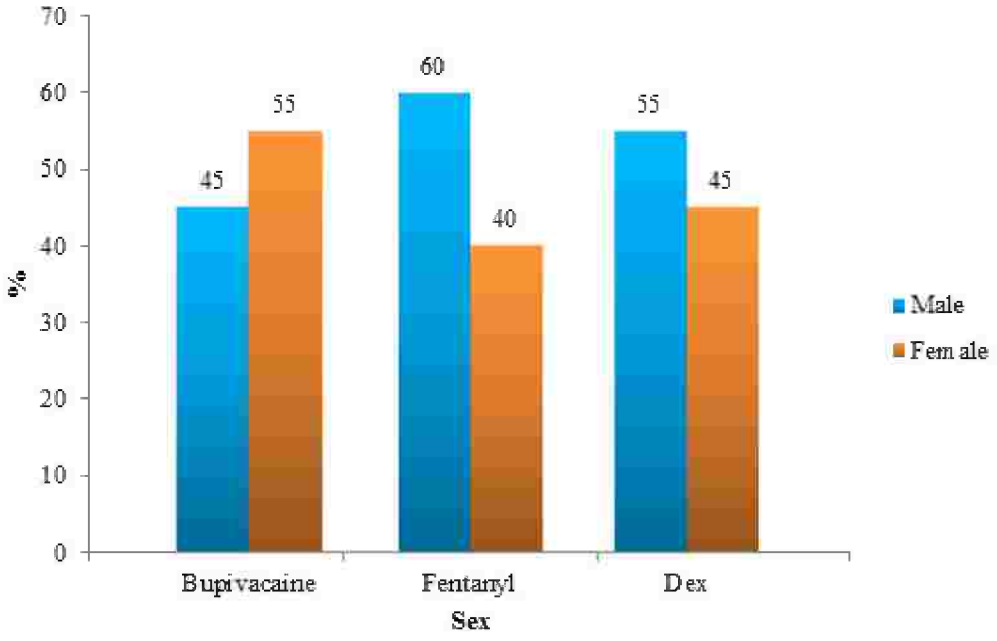


Figure (11): Comparison among the three studied groups regarding Sex.

Table (VI): Comparison among the studied groups regarding Duration of Operation/min.

Number	Bupivacaine	Fentanyl	Dexmedetomidine
1	90	115	130
2	100	75	120
3	85	120	120
4	85	75	120
5	80	105	60
6	95	95	90
7	105	125	90
8	120	100	105
9	120	120	90
10	110	115	85
11	125	120	90
12	130	110	120
13	110	115	120
14	100	120	165
15	85	125	150
16	120	130	120
17	110	125	120
18	80	120	135
19	95	105	130
20	90	100	105
Min.	80.0	75.0	60.0
Max	130.0	130.0	165.0
Mean	101.75	110.75	113.25
S.D.	15.75	15.50	24.40
F		2.650	
p		0.1025	

Min=minimum, Max=maximum, S.D.=standard deviation, F value for ANOVA test, *P is significant at ≤0.05

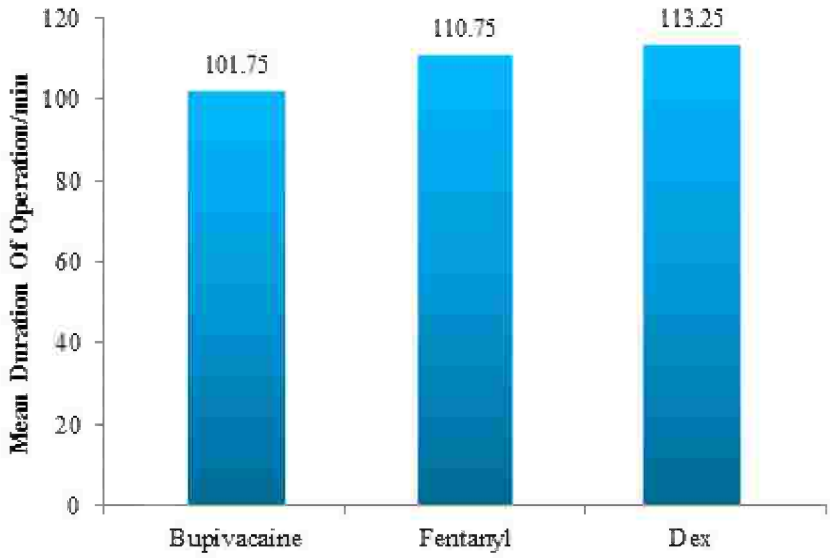


Figure (12): Comparison among the three studied groups regarding Duration Of Operation/min.

Heart rate

- **Group B**

Before intrathecal injection the mean heart rate was 75.90 ±14.09 beat/min. Then there was no significant decrease or increase in the heart rate in the rest of the studied times.

- **Group F**

Before intrathecal injection the mean heart rate was 77.95 ±15.12 beat/min. Then there was no significant decrease or increase in the heart rate in the rest of the studied times.

- **Group D**

Before intrathecal injection the mean heart rate was 79.85 ±14.22 beat/min. then it decreased significantly at 45min 69.55 ±14.38 (P=0.014), at 60min 68.80 ±10.31 (P=0.004), at75min 69.80 ± 8.58 (P=0.005) and at 90min 70.55 ± 9.10 (P=0.009), while there was no other significant decrease or increase in heart rate during the rest of the studied times.

Comparison among the groups regarding the heart rate

At 45min mean heart rate in group D was significantly lower than in group F where it was in group D 69.55beat/min ± 14.38 and in group F it was 77.55beat/min ± 14.66 (P=0.045), also, at 60min it was significantly lower in group D 68.80 ± 10.31 than in group F 76.70 ± 14.44 (P=0.027) again at 90min it was significantly lower in group D 70.55 ± 9.10 than in group F 77.05 ± 14.30 (P=0.047). there was no other significant difference in the change of mean heart rate between group D and F in the rest of the studied times. Regarding comparison between group F and B, mean heart rate was significantly lower in group B than in group F at 30min in group B 68.85 ± 13.05 and in group F 76.95 ± 15.30 (P=0.040), also, at 45min it was significantly lower in group B 70.20 ±12.46 than in group F 77.55 ±14.66 (P=0.048), there was no other significant difference between group F and B in the rest of the studied times.

Table (VII): Heart Rate in Bupivacaine Group (beat/min)

Number	Heart Rate (beat/min)																			
	BS	AS	15m	30m	45m	60m	75m	90m	EOS	1st h	2nd h	3rd h	4th h	5th h	6th h	8th h	10th h	14th h	18th h	22nd h
1	99	105	90	91	89	92	95	94	92	94	93	95	93	91	91	91	95	99	98	98
2	55	60	49	54	56	58	60	61	60	61	59	58	60	62	62	60	60	61	61	62
3	68	74	70	66	68	65	67	70	66	65	69	70	71	72	72	71	70	70	73	72
4	91	90	87	92	94	92	90	88	92	92	100	102	104	100	100	98	96	98	98	100
5	60	65	59	62	61	60	59	60	60	60	60	62	58	59	60	62	62	60	60	58
6	84	70	49	60	76	76	76	78	78	90	88	86	90	92	84	88	88	86	88	88
7	58	59	48	55	56	57	57	57	56	60	61	60	58	59	60	62	62	60	61	62
8	77	84	92	74	74	75	74	72	74	75	76	80	78	76	78	78	79	80	84	82
9	90	94	82	84	80	81	80	81	82	84	86	88	88	89	90	90	92	94	95	96
10	88	82	72	73	72	74	75	75	76	78	78	80	79	80	82	84	84	84	84	84
11	64	60	52	56	54	56	58	60	60	61	60	62	62	64	68	64	64	62	62	60
12	68	56	48	52	58	59	61	61	62	62	66	66	64	68	69	70	72	71	70	70
13	70	78	68	69	68	66	68	70	71	72	70	68	68	66	68	70	71	70	70	70
14	98	106	92	90	92	93	93	94	96	96	98	100	98	97	96	97	98	100	100	100
15	56	60	49	60	59	58	58	60	61	62	60	60	61	62	63	61	62	62	61	60
16	68	62	91	58	58	60	60	64	64	65	66	68	68	69	70	69	68	69	70	70
17	72	68	64	63	65	64	63	64	66	67	69	70	70	74	72	71	72	74	74	76
18	76	67	90	62	68	69	70	71	72	70	71	73	74	75	76	76	74	76	75	76
19	92	85	84	83	84	85	84	84	85	86	88	86	90	92	94	90	94	96	94	94
20	84	74	72	73	72	74	74	75	76	79	77	75	78	77	79	80	82	81	80	80
Min	55	56	48	52	54	56	57	57	56	60	59	58	58	59	60	60	60	60	60	58
Max	99	106	92	92	94	93	95	94	96	96	100	102	104	100	100	98	98	100	100	100
Mean	75.90	74.95	70.40	68.85	70.20	70.70	71.10	71.95	72.45	73.95	74.75	75.45	75.60	76.20	76.70	76.60	77.25	77.65	77.90	77.90
SD	14.09	15.20	17.20	13.05	12.46	12.52	12.23	11.56	12.05	12.56	13.28	13.61	14.08	13.15	12.45	12.46	12.97	14.03	13.94	14.33
P		0.419	0.138	0.054	0.092	0.112	0.129	0.169	0.205	0.323	0.396	0.459	0.473	0.472	0.425	0.434	0.377	0.348	0.327	0.329

BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery, m=minute, h=hour, Min=minimum, Max=maximum, SD=standard deviation. *P is significant at ≤0.05

Table (VIII): Heart Rate in Fentanyl Group (beat/min).

Num	Heart Rate (beat/min)																			
	BS	AS	15m	30m	45m	60m	75m	90m	EOS	1st h	2nd h	3rd h	4th h	5th h	6th h	8th h	10th h	14th h	18th h	22nd h
1	106	104	94	95	94	96	98	99	96	94	95	97	97	98	96	97	98	103	98	100
2	76	81	78	74	73	70	70	75	74	73	76	77	78	76	76	73	73	76	78	76
3	80	81	77	74	74	73	72	74	75	77	78	80	74	73	72	74	78	80	74	76
4	82	73	48	87	84	75	75	75	75	78	80	79	81	80	80	78	79	76	82	82
5	93	96	93	90	91	89	88	90	92	93	94	92	93	91	90	92	94	92	93	94
6	60	64	50	55	58	58	56	57	60	61	63	64	66	64	65	61	64	66	64	65
7	76	81	78	74	73	68	69	70	75	68	74	73	77	73	74	76	75	76	76	76
8	78	83	74	71	70	74	72	74	76	76	78	78	76	80	82	80	78	77	76	78
9	110	118	113	105	108	110	100	103	104	106	111	110	108	106	115	110	108	106	108	110
10	56	60	54	49	52	54	56	57	57	57	59	58	60	56	56	58	59	60	59	60
11	66	78	73	72	74	68	66	66	69	70	71	72	72	70	69	66	65	64	66	68
12	85	94	90	86	88	90	90	91	89	88	86	88	93	92	94	91	90	88	86	86
13	78	88	84	82	85	86	83	86	85	85	86	87	80	78	77	78	78	76	80	84
14	74	68	48	66	70	69	66	68	70	73	76	75	74	68	70	73	75	76	73	70
15	90	104	100	90	89	88	89	94	92	90	94	98	100	97	96	97	95	100	99	98
16	52	57	45	52	60	62	59	59	59	60	61	59	58	66	64	62	60	61	61	61
17	76	83	84	84	82	80	77	75	76	78	80	83	84	81	78	79	76	79	82	82
18	89	96	94	93	94	90	91	92	94	95	90	92	99	94	92	95	93	95	94	93
19	62	60	63	58	54	57	57	58	55	60	61	59	59	59	62	61	60	62	62	62
20	70	83	80	82	78	77	77	78	80	81	82	83	82	80	79	80	78	80	82	83
Min	52	57	45	49	52	54	56	57	55	57	59	58	58	56	56	58	59	60	59	60
Max	110	118	113	105	108	110	100	103	104	106	111	110	108	106	115	110	108	106	108	110
Mean	77.95	82.60	76.00	76.95	77.55	76.70	75.55	77.05	77.65	78.15	79.75	80.20	80.55	79.10	79.35	79.05	78.80	79.65	79.65	80.20
SD	15.12	16.29	19.33	15.30	14.66	14.44	13.78	14.30	13.90	13.48	13.30	13.96	14.28	13.70	14.34	14.21	13.81	13.88	13.72	13.89
P		0.178	0.362	0.418	0.466	0.395	0.301	0.424	0.474	0.483	0.346	0.314	0.290	0.401	0.383	0.407	0.427	0.357	0.356	0.313

Num=number, BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery, m=minute, h=hour, Min=minimum, Max=maximum, SD=standard deviation. *P is significant at ≤0.05

Table (IX): Heart Rate in Dexmedetomidine Group (beat/min).

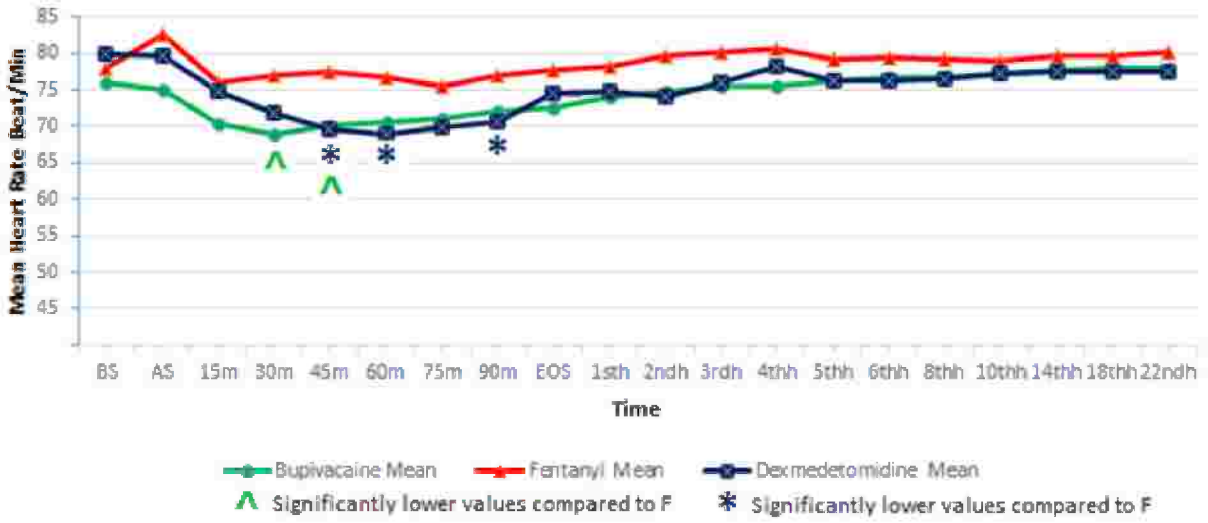
Num	Heart Rate (beat/min)																			
	BS	AS	15m	30m	45m	60m	75m	90m	EOS	1st h	2nd h	3rd h	4th h	5th h	6th h	8th h	10th h	14th h	18th h	22nd h
1	89	87	70	70	75	73	75	75	88	73	75	75	74	75	74	75	73	74	75	74
2	57	58	60	54	54	60	62	60	60	60	66	68	66	65	65	64	64	63	64	63
3	88	85	82	81	70	70	73	75	77	77	75	78	80	80	82	81	82	85	86	88
4	100	100	130	104	106	90	75	73	92	90	92	90	92	92	94	90	92	92	92	90
5	96	102	80	73	73	71	70	70	71	70	70	96	106	83	70	76	76	78	76	78
6	76	76	74	68	55	49	57	60	64	64	66	68	68	68	70	72	72	74	76	76
7	65	65	46	53	58	62	63	62	66	65	65	67	66	66	64	66	67	65	66	66
8	70	83	68	61	50	64	64	63	70	64	64	61	73	74	78	74	74	78	74	76
9	90	89	84	77	73	73	74	73	77	80	82	80	78	81	83	82	84	82	80	80
10	80	71	82	100	86	74	74	82	89	74	72	80	80	74	78	76	80	84	82	84
11	82	71	80	72	74	70	76	74	83	95	82	81	88	86	82	88	86	84	86	86
12	64	60	50	54	52	52	56	60	62	60	66	64	60	60	62	64	62	64	66	62
13	68	63	53	48	58	60	62	60	61	62	62	64	68	68	66	62	68	66	67	66
14	98	99	88	86	82	74	82	84	82	82	84	80	86	88	90	87	84	88	90	90
15	76	78	71	68	70	71	70	73	70	68	74	78	76	75	77	73	75	78	77	76
16	106	104	90	89	85	85	88	90	92	95	93	90	91	95	95	95	93	90	92	90
17	63	58	49	55	55	58	60	62	63	61	63	66	68	61	60	63	63	62	62	63
18	74	80	73	68	70	72	70	71	74	74	76	76	78	72	74	76	78	76	74	74
19	90	95	96	92	83	82	80	81	81	85	84	88	90	90	92	93	95	94	90	93
20	65	70	67	63	62	66	65	63	66	95	69	70	74	72	70	74	76	72	73	74
Min	57	58	46	48	50	49	56	60	60	60	62	61	60	60	60	62	62	62	62	62
Max	106	104	130	104	106	90	88	90	92	95	93	96	106	95	95	95	95	94	92	93
Mean	79.85	79.70	74.65	71.80	69.55	68.80	69.80	70.55	74.40	74.70	74.00	76.00	78.10	76.25	76.30	76.55	77.20	77.45	77.40	77.45
SD	14.22	15.17	19.33	16.10	14.38	10.31	8.58	9.10	10.70	12.22	9.46	9.94	11.33	10.31	10.76	10.14	9.85	9.97	9.62	10.02
P		0.487	0.169	0.051	0.014*	0.004*	0.005*	0.009*	0.089	0.113	0.067	0.164	0.335	0.182	0.189	0.202	0.249	0.270	0.264	0.270

Num=number, BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery, m=minute, h=hour, Min=minimum, Max=maximum, SD=standard deviation. *P is significant at ≤0.05

Table (X): Comparison among the studied groups regarding heart rate (beat/min).

	Heart Rate (beat/min)																			
	BS	**AS**	**15m**	**30m**	**45m**	**60m**	**75m**	**90m**	**EOS**	**1st h**	**2nd h**	**3rd h**	**4th h**	**5th h**	**6th h**	**8th h**	**10th h**	**14th h**	**18th h**	**22nd h**
Bupivacaine																				
Min	55	56	48	52	54	56	57	57	56	60	59	58	58	59	60	60	60	60	60	58
Max	99	106	92	92	94	93	95	94	96	96	100	102	104	100	100	98	98	100	100	100
Mean	75.90	74.95	70.40	68.85	70.20	70.70	71.10	71.95	72.45	73.95	74.75	75.45	75.60	76.20	76.70	76.60	77.25	77.65	77.90	77.90
SD	14.09	15.20	17.20	13.05	12.46	12.52	12.23	11.56	12.05	12.56	13.28	13.61	14.08	13.15	12.45	12.46	12.97	14.03	13.94	14.33
P		0.419	0.138	0.054	0.092	0.112	0.129	0.169	0.205	0.323	0.396	0.459	0.473	0.472	0.425	0.434	0.377	0.348	0.327	0.329
Fentanyl																				
Min	52	57	45	49	52	54	56	57	55	57	59	58	58	56	56	58	59	60	59	60
Max	110	118	113	105	108	110	100	103	104	106	111	110	108	106	115	110	108	106	108	110
Mean	77.95	82.60	76.00	76.95	77.55	76.70	75.55	77.05	77.65	78.15	79.75	80.20	80.55	79.10	79.35	79.05	78.80	79.65	79.65	80.20
SD	15.12	16.29	19.33	15.30	14.66	14.44	13.78	14.30	13.90	13.48	13.30	13.96	14.28	13.70	14.34	14.21	13.81	13.88	13.72	13.89
P		0.178	0.362	0.418	0.466	0.395	0.301	0.424	0.474	0.483	0.346	0.314	0.290	0.401	0.383	0.407	0.427	0.357	0.356	0.313
Dexmedetomidine																				
Min	57	58	46	48	50	49	56	60	60	60	62	61	60	60	60	62	62	62	62	62
Max	106	104	130	104	106	90	88	90	92	95	93	96	106	95	95	95	95	94	92	93
Mean	79.85	79.70	74.65	71.80	69.55	68.80	69.80	70.55	74.40	74.70	74.00	76.00	78.10	76.25	76.30	76.55	77.20	77.45	77.40	77.45
SD	14.22	15.17	19.33	16.10	14.38	10.31	8.58	9.10	10.70	12.22	9.46	9.94	11.33	10.31	10.76	10.14	9.85	9.97	9.62	10.02
P		0.487	0.169	0.051	0.014*	0.004*	0.005*	0.009*	0.089	0.113	0.067	0.164	0.335	0.182	0.189	0.202	0.249	0.270	0.264	0.270
P1	0.342	0.282	0.413	0.153	0.045*	0.027*	0.061	0.047*	0.206	0.201	0.062	0.140	0.276	0.231	0.226	0.263	0.338	0.284	0.276	0.239
P2	0.192	0.164	0.234	0.264	0.440	0.302	0.350	0.336	0.296	0.425	0.419	0.442	0.270	0.495	0.457	0.494	0.495	0.479	0.448	0.454
P3	0.330	0.066	0.170	0.040*	0.048*	0.084	0.143	0.111	0.107	0.157	0.121	0.141	0.138	0.249	0.268	0.283	0.358	0.327	0.346	0.305

BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery. m=minute, h=hour, Min=minimum, Max=maximum, SD=standard deviation. P1 is the statistical significance between group D and F, P2 is the statistical significance between group D and B, P3 is the statistical significance between group F and B. *P is significant at ≤0.05



BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery, m=minute, h=hour

Figure (13): Comparison among the studied groups regarding heart rate (in beat/min).

Mean arterial blood pressure

- **Group B**

Before intrathecal injection the mean arterial blood pressure was 83.58 ± 9.20mmHg.Then it significantly decreased at the following times, at after intrathecal injection to 72.70 ± 10.17mmHg(P=0.001), at 15min 67.03 ± 11.15mmHg(P=0.000), at 30min 69.45 ± 8.01 mmHg(P=0.000), at45min 72.18 ± 8.77mmHg(P=0.000), at 60min 75.52± 8.09 mmHg(P=0.003) at 75min 76.52 ± 7.00 mmHg(P=0.005), at 90min 76.70 ± 7.81 mmHg(P=0.007), at end of surgery 77.60 ± 7.65 mmHg(P=0.016) and at first hour after surgery 77.77 ± 7.62 mmHg(P=0.018). Then changes were statistically insignificant at the rest of the studied times.

- **Group F**

Before intrathecal injection the mean arterial blood pressure was 87.58 ± 8.68mmHg. Then it significantly decreased at the following times, at after intrathecal injection to 82.17 ±10.54 mmHg(P=0.042), at 15min to 73.20 ± 11.98mmHg(P=0.000), at 30min 71.43 ± 11.52 mmHg(P=0.000), at45min 75.10 ± 8.56 mmHg(0.000), at 60min 77.10 ± 7.32 mmHg(P=0.000) at 75min 78.13 ± 7.17 mmHg(P=0.000), at 90min 80.32 ± 7.38 mmHg(P=0.004), at end of surgery 80.97 ± 6.66 mmHg(0.005), at first hour after surgery 80.45 ± 8.43 mmHg(0.006) and at second hour after surgery 83.13 ± 6.65mmHg(P=0.038). Then changes were statistically insignificant at the rest of the studied times.

- **Group D**

Before intrathecal injection the mean arterial blood pressure was 86.80 ± 7.56mmHg. Then it significantly decreased at the following times, at after intrathecal injection to 81.00 ±9.91mmHg(P=0.022), at 15min 73.93 ± 13.64mmHg(P=0.000), at 30min 71.55 ± 11.18 mmHg(P=0.000), at45min 69.68 ± 9.20 mmHg(P=0.000), at 60min 72.83 ± 10.78 mmHg(P=0.000), at 75min 76.23 ± 9.19 mmHg(P=0.000), at 90min 78.35 ± 8.85 mmHg(P=0.001), at end of surgery 79.85 ± 8.78 mmHg(P=0.005) and at first hour after surgery 79.48 ± 9.96 mmHg(P=0.006). Then changes were statistically insignificant, at the rest of the studied times.

Comparison among the groups regarding mean arterial blood pressure

Mean arterial blood pressure was significantly lower in group D than in group F at 45min, in group D it was 69.68 ± 9.20 mmHg and in group F it was 75.10 ± 8.56 mmHg (P= 0.031), while there was no other significant difference between the two groups in the studied times.

There was significant decrease in MABP in group B than D at after the intrathecal block it was 72.70 ± 10.17mmHg in group B and 81.00 ± 9.91mmHg in group D (P=0.006) also, at 15min it was significantly lower in group B than in D 67.03 ± 11.15 mmHg and 73.93 ± 13.64mmHg, respectively (P=0.044).

Comparing between group F and B, MABP was significantly lower in group B than in F at after the intrathecal block in group B was72.70 ±10.17mmHg and in group F was 82.17 ± 10.54mmHg (P=0.003). Also, at 15min it was significantly lower in group B 67.03 ± 11.15mmHg than in group F 73.20 ± 11.98mmHg (P=0.050).

Table (XI): Mean arterial blood pressure (MABP) in Bupivacaine Group (in mmHg).

Num	MABP (in mmHg)																		
	BS	AS	15m	30m	45m	60m	75m	90m	EOS	1st h	2nd h	3rd h	4th h	5th h	6th h	8th h	10th h	14th h	18th h	22nd h
1	99	87	81	76	83	85	84	85	85	85	87	89	90	90	90	90	93	93	93	93
2	90	82	75	76	75	80	80	80	80	80	91	92	70	80	92	92	92	85	85	87
3	81	73	53	63	65	75	75	79	71	78	78	75	77	77	79	82	83	83	85	90
4	94	93	93	83	80	80	84	83	86	87	87	87	92	86	86	86	90	91	90	91
5	93	77	73	77	83	83	83	83	87	87	90	94	95	93	93	93	95	95	93	94
6	73	62	57	63	66	67	67	67	73	73	71	73	70	73	73	73	73	73	73	73
7	102	93	92	91	91	93	90	90	90	92	90	92	92	93	93	93	90	93	93	93
8	73	67	64	67	67	72	73	73	73	73	73	73	72	73	72	73	73	73	73	83
9	84	57	63	67	67	71	74	73	67	67	70	73	77	80	80	80	81	81	81	81
10	80	70	60	67	67	72	73	73	73	73	73	73	85	73	72	73	73	73	73	73
11	81	73	63	57	57	63	74	65	65	73	73	77	81	81	83	83	81	81	81	81
12	77	68	65	65	73	78	77	77	77	73	77	77	77	80	76	77	80	77	77	77
13	91	70	60	70	81	84	86	93	91	90	88	90	93	93	93	91	90	90	90	92
14	73	78	65	65	66	67	71	69	77	67	77	77	77	67	67	77	77	77	77	77
15	73	69	60	65	65	63	63	67	70	70	73	76	76	77	73	75	77	77	75	77
16	75	64	63	65	66	73	73	73	75	73	73	73	73	70	76	75	75	73	77	77
17	93	75	73	73	83	83	83	83	87	87	90	94	95	93	93	93	95	95	93	94
18	80	60	53	63	65	67	67	69	73	75	75	75	75	77	77	76	80	80	80	80
19	82	67	67	71	71	76	77	77	77	79	79	79	80	80	81	81	81	81	81	82
20	77	68	60	65	73	78	77	77	77	73	77	77	77	80	76	77	80	77	77	77
Min	73	57	53	57	57	63	63	65	65	67	70	73	70	67	67	73	73	73	73	73
Max	102	93	93	91	91	93	90	93	91	92	91	94	95	93	93	93	95	95	93	94
Mean	83.58	72.70	67.03	69.45	72.18	75.52	76.52	76.70	77.60	77.77	79.68	80.73	81.05	80.83	81.30	82.07	83.02	82.47	82.35	83.55
SD	9.20	10.17	11.15	8.01	8.77	8.09	7.00	7.81	7.65	7.62	7.38	7.92	8.61	8.13	8.59	7.56	7.51	7.84	7.48	7.51
P		0.001	0.000	0.000	0.000	0.003	0.005	0.007	0.016	0.018	0.074	0.150	0.187	0.162	0.211	0.286	0.416	0.341	0.322	0.495

Num=number, BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery, m=minute, h=hour, Min=minimum, Max=maximum, SD=standard deviation. *P is significant at ≤0.05

Table (XII): Mean arterial blood pressure (MABP) in Fentanyl Group (in mmHg).

Num	MABP (in mmHg)																			
	BS	AS	15m	30m	45m	60m	75m	90m	EOS	1st h	2nd h	3rd h	4th h	5th h	6th h	8th h	10th h	14th h	18th h	22nd h
1	99	93	92	91	91	93	90	90	90	92	90	92	92	93	93	93	90	93	93	93
2	97	96	63	59	65	64	65	74	74	67	71	79	77	77	80	80	93	97	93	93
3	102	89	82	77	83	83	83	79	79	87	90	94	95	93	93	100	102	102	100	101
4	89	78	60	63	69	74	73	85	73	85	85	85	87	87	89	90	87	85	89	81
5	77	68	65	65	73	78	77	77	73	73	77	77	77	80	76	77	80	77	77	77
6	81	73	63	53	63	73	75	74	79	71	78	78	75	77	77	79	82	80	83	80
7	91	89	80	80	84	83	86	93	91	90	88	90	91	93	93	91	90	90	90	92
8	94	93	93	83	80	80	84	83	86	87	87	87	88	86	86	86	90	81	90	91
9	81	73	63	53	63	73	75	74	77	71	78	78	75	77	77	79	82	83	83	85
10	93	93	86	83	83	83	83	83	87	87	90	94	95	93	93	100	102	102	93	93
11	97	95	88	87	87	89	89	92	89	92	95	95	97	97	93	95	97	97	97	97
12	89	77	81	81	73	73	81	76	83	81	87	89	100	87	89	87	86	86	80	80
13	93	93	86	83	81	75	75	79	83	83	87	87	83	83	83	83	83	87	87	87
14	73	67	60	67	67	72	73	73	73	73	73	73	72	73	72	73	73	73	73	73
15	86	85	70	71	77	77	80	80	80	83	84	85	85	87	87	83	83	87	80	80
16	73	69	60	65	65	63	63	67	70	70	73	76	76	77	73	75	77	77	75	77
17	89	78	60	63	74	73	73	85	85	85	85	85	87	87	89	90	87	85	89	81
18	81	73	66	60	66	73	75	75	79	71	78	78	75	77	77	79	82	83	83	85
19	77	68	65	65	73	78	77	77	77	73	77	77	77	80	76	77	80	77	77	77
20	90	89	80	80	84	83	86	93	91	90	88	90	91	93	93	91	90	90	90	92
Min	73	67	60	53	63	63	63	67	70	67	71	73	72	73	72	73	73	73	73	73
Max	102	96	93	91	91	93	90	93	91	92	95	95	100	97	93	100	102	102	100	101
Mean	87.58	82.17	73.20	71.43	75.10	77.10	78.13	80.32	80.97	80.45	83.13	84.38	84.55	84.73	84.48	85.53	86.75	86.57	86.20	85.67
SD	8.68	10.54	11.98	11.52	8.56	7.32	7.17	7.38	6.66	8.43	6.65	6.87	8.81	7.29	7.82	8.11	7.57	8.30	7.62	7.88
P		0.042*	0.000*	0.000*	0.000*	0.000*	0.000*	0.004*	0.005*	0.006*	0.038*	0.102	0.140	0.134	0.121	0.223	0.374	0.354	0.298	0.235

Num=number,BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery. m=minute, h=hour, Min=minimum, Max=maximum, SD=standard deviation. *P is significant at ≤0.05

Table (XIII): Mean arterial blood pressure (MABP) in Dexmedetomidine Group (in mmHg).

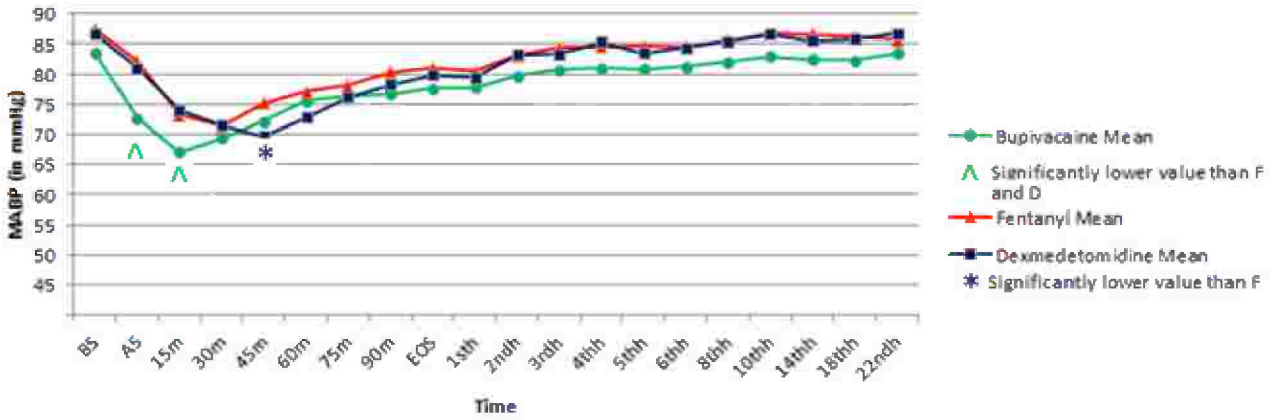
Num	MABP (in mmHg)																		
	BS	AS	15m	30m	45m	60m	75m	90m	EOS	1st h	2nd h	3rd h	4th h	5th h	6th h	8th h	10th h	14th h	18th h	22nd h
1	88	74	89	104	87	100	98	99	103	100	103	99	100	98	103	99	99	99	103	99
2	73	78	65	65	66	67	71	69	77	67	77	77	77	67	67	77	77	77	77	77
3	81	73	65	63	56	53	63	63	65	67	71	73	73	77	77	77	77	77	77	77
4	83	84	63	63	87	71	81	85	71	75	81	81	84	77	83	83	81	81	83	83
5	97	97	81	73	60	68	70	75	78	73	97	93	95	95	97	93	93	92	92	97
6	87	71	71	71	65	60	78	79	79	87	87	88	87	85	87	87	86	88	87	87
7	77	68	65	65	73	78	77	77	77	73	77	77	77	80	76	77	80	77	77	77
8	93	81	78	71	66	85	85	82	82	85	73	79	87	83	83	87	104	87	87	87
9	89	77	81	81	73	73	81	83	83	81	87	89	100	87	89	87	86	86	87	87
10	91	91	84	73	70	67	73	83	83	100	93	91	90	88	90	91	93	93	91	90
11	92	92	102	80	74	73	60	74	84	73	80	74	84	73	80	80	81	81	84	87
12	81	73	60	53	56	63	74	65	65	73	73	77	81	81	83	83	81	81	81	81
13	89	78	60	63	69	74	73	85	85	85	85	85	87	87	89	90	87	85	89	89
14	75	69	60	65	65	63	63	67	70	70	73	77	77	79	73	76	79	79	76	79
15	91	89	68	68	78	89	88	90	90	92	92	90	90	92	91	90	90	90	92	91
16	81	73	63	63	63	73	75	75	79	71	78	78	75	77	77	79	82	83	83	85
17	80	68	53	62	66	71	71	73	76	73	76	78	77	80	77	80	80	79	80	80
18	100	93	90	80	80	81	84	84	86	82	89	87	87	89	90	93	93	92	91	97
19	94	93	93	83	80	80	84	83	86	87	87	87	88	86	86	86	90	91	90	91
20	93	93	86	83	60	65	73	76	77	77	87	87	91	90	90	93	95	93	90	93
Min	73	68	53	53	56	53	60	63	65	67	71	73	73	67	67	76	77	77	76	77
Max	100	97	102	104	87	100	98	99	103	100	103	99	100	98	103	99	104	99	103	99
Mean	86.80	81.00	73.93	71.55	69.68	72.83	76.23	78.35	79.85	79.48	83.28	83.38	85.28	83.50	84.45	85.45	86.58	85.52	85.88	86.70
SD	7.56	9.91	13.64	11.18	9.20	10.78	9.19	8.85	8.78	9.96	8.75	7.20	7.90	7.73	8.70	6.75	7.83	6.62	6.86	6.99
P		0.022*	0.000*	0.000*	0.000*	0.000*	0.000*	0.001*	0.005*	0.006*	0.091	0.076	0.269	0.090	0.184	0.277	0.465	0.286	0.345	0.483

BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery, m=minute, h=hour, Min=minimum, Max=maximum, SD=standard deviation. *P is significant at ≤0.05

Table (XIV): Comparison among the studied groups regarding mean arterial blood pressure (MABP) (in mmHg).

	MABP (in mmHg)																			
	BS	**AS**	**15m**	**30m**	**45m**	**60m**	**75m**	**90m**	**EOS**	**1st h**	**2nd h**	**3rd h**	**4th h**	**5th h**	**6th h**	**8th h**	**10th h**	**14th h**	**18th h**	**22nd h**
Bupivacaine																				
Min	73	57	53	57	57	63	63	65	65	67	70	73	70	67	67	73	73	73	73	73
Max	102	93	93	91	91	93	90	93	91	92	91	94	95	93	93	93	95	95	93	94
Mean	83.58	72.70	67.03	69.45	72.18	75.52	76.52	76.70	77.60	77.77	79.68	80.73	81.05	80.83	81.30	82.07	83.02	82.47	82.35	83.55
SD	9.20	10.17	11.15	8.01	8.77	8.09	7.00	7.81	7.65	7.62	7.38	7.92	8.61	8.13	8.59	7.56	7.51	7.84	7.48	7.51
P		0.001*	0.000*	0.000*	0.000*	0.003*	0.005*	0.007*	0.016*	0.018*	0.074	0.150	0.187	0.162	0.211	0.286	0.416	0.341	0.322	0.495
Fentanyl																				
Min	73	67	60	53	63	63	63	67	70	67	71	73	72	73	72	73	73	73	73	73
Max	102	96	93	91	91	93	90	93	91	92	95	95	100	97	93	100	102	102	100	101
Mean	87.58	82.17	73.20	71.43	75.10	77.10	78.13	80.32	80.97	80.45	83.13	84.38	84.55	84.73	84.48	85.53	86.75	86.57	86.20	85.67
SD	8.68	10.54	11.98	11.52	8.56	7.32	7.17	7.38	6.66	8.43	6.65	6.87	8.81	7.29	7.82	8.11	7.57	8.30	7.62	7.88
P		0.042*	0.000*	0.000*	0.000*	0.000*	0.000*	0.004*	0.005*	0.006*	0.038*	0.102	0.140	0.134	0.121	0.223	0.374	0.354	0.298	0.235
Dexmedetomidine																				
Min	73	68	53	53	56	53	60	63	65	67	71	73	73	67	67	76	77	77	76	77
Max	100	97	102	104	87	100	98	99	103	100	103	99	100	98	103	99	104	99	103	99
Mean	86.80	81.00	73.93	71.55	69.68	72.83	76.23	78.35	79.85	79.48	83.28	83.38	85.28	83.50	84.45	85.45	86.58	85.52	85.88	86.70
SD	7.56	9.91	13.64	11.18	9.20	10.78	9.19	8.85	8.78	9.96	8.75	7.20	7.90	7.73	8.70	6.75	7.83	6.62	6.86	6.99
P		0.022*	0.000*	0.000*	0.000*	0.000*	0.000*	0.001*	0.005*	0.006*	0.091	0.076	0.269	0.090	0.184	0.277	0.465	0.286	0.345	0.483
P1	0.381	0.360	0.429	0.487	0.031*	0.076	0.235	0.225	0.327	0.371	0.476	0.328	0.392	0.303	0.495	0.486	0.473	0.330	0.445	0.332
P2	0.117	0.006*	0.044*	0.249	0.192	0.189	0.457	0.268	0.197	0.272	0.084	0.138	0.057	0.147	0.128	0.072	0.075	0.096	0.064	0.089
P3	0.083	0.003*	0.050*	0.266	0.147	0.260	0.238	0.070	0.073	0.149	0.064	0.064	0.106	0.059	0.114	0.085	0.063	0.058	0.058	0.195

BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery, m=minute, h=hour, Min=minimum, Max=maximum, SD=standard deviation. P1 is the statistical significance between group D and F, P2 is the statistical significance between group D and B, P3 is the statistical significance between group F and B. *P is significant at ≤0.05



BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery, m=minute, h=hour

Figure (14): Comparison among the studied groups regarding mean arterial blood pressure MABP (in mmHg).

Arterial oxygen saturation (SPO2)

- **Group B**

The mean arterial oxygen saturation before intrathecal injection was 99.00 ± 0.92%. There was not any significant change in SpO2% throughout the times of measurement intra or postoperatively.

- **Group F**

The mean arterial oxygen saturation before intrathecal injection was 99.30 ± 0.92%. There was not any significant change in SpO2% throughout the times of measurement intra or postoperatively.

- **Group D**

The mean arterial oxygen saturation before intrathecal injection was 99.45 ± 0.83%. There was not any significant change in SpO2% throughout the times of measurement intra or postoperatively.

Comparison among the groups regarding the arterial oxygen saturation

There was no significant changes in the mean arterial oxygen saturation among the three groups all through the times of the study intra and postoperatively.

Table (XV): Arterial oxygen saturation in Bupivacaine Group (in %).

Number	Arterial oxygen saturation (in %)																			
	BS	AS	15m	30m	45m	60m	75m	90m	EOS	1st h	2nd h	3rd h	4th h	5th h	6th h	8th h	10th h	14th h	18th h	22nd h
1	100	100	99	99	100	99	98	100	99	100	98	99	100	99	98	98	100	98	100	100
2	98	99	98	99	98	99	100	99	99	98	100	100	98	99	99	100	100	98	98	99
3	99	98	99	99	99	98	98	99	100	98	100	98	100	99	98	100	98	99	98	98
4	100	100	98	99	98	100	99	100	99	99	99	99	98	100	99	99	98	100	100	100
5	98	98	100	99	99	100	100	98	100	98	99	98	99	99	100	99	99	100	100	99
6	99	100	99	98	99	99	99	100	99	100	100	99	100	98	98	99	98	99	99	99
7	98	99	100	98	99	99	99	98	99	100	98	100	100	98	98	100	99	98	100	99
8	100	99	98	100	99	98	99	100	100	99	98	100	99	99	98	99	99	98	100	100
9	98	99	99	100	98	100	99	100	100	99	99	98	99	100	99	100	98	98	98	98
10	100	98	100	100	99	99	100	98	100	99	99	98	100	98	99	100	100	98	99	99
11	98	99	99	98	99	98	98	100	99	100	99	99	99	99	99	100	98	99	100	100
12	100	98	98	98	99	100	98	98	100	99	98	98	98	100	99	99	100	98	100	98
13	98	99	100	98	98	98	99	98	100	100	98	98	100	98	99	100	98	98	100	98
14	98	100	98	99	98	99	98	98	98	100	100	99	99	100	99	99	98	98	99	99
15	100	98	99	100	100	99	99	98	98	99	99	100	100	99	100	99	100	100	98	100
16	99	99	100	98	99	98	100	98	99	98	98	100	99	98	100	99	99	99	98	100
17	98	100	99	99	99	99	98	100	99	100	99	99	100	100	99	99	99	99	98	100
18	99	100	100	100	100	100	99	100	98	98	99	99	98	99	100	98	99	99	99	98
19	100	100	98	98	99	98	100	100	100	99	100	100	100	98	99	98	99	98	100	98
20	100	99	99	100	100	99	98	99	100	98	100	98	98	98	98	99	99	100	100	100
Min	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
Max	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Mean	99.00	99.10	99.00	98.95	98.95	98.95	98.90	99.05	99.30	99.05	99.00	98.95	99.20	98.90	98.90	99.20	98.90	98.70	99.20	99.10
SD	0.92	0.79	0.79	0.83	0.69	0.76	0.79	0.94	0.73	0.83	0.79	0.83	0.83	0.79	0.72	0.70	0.79	0.80	0.89	0.85
P		0.357	0.500	0.429	0.423	0.426	0.357	0.433	0.130	0.429	0.500	0.429	0.238	0.357	0.352	0.221	0.357	0.139	0.245	0.361

BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery, m=minute, h=hour, Min=minimum, Max=maximum, SD=standard deviation.*P is significant at ≤0.05

Table (XVI): Arterial oxygen saturation in Fentanyl Group (in %).

Num	Arterial oxygen saturation (in %)																			
	BS	AS	15m	30m	45m	60m	75m	90m	EOS	1st h	2nd h	3rd h	4th h	5th h	6th h	8th h	10th h	14th h	18th h	22nd h
1	99	98	99	100	100	98	99	98	99	100	100	98	99	99	99	99	100	100	99	100
2	100	98	99	99	99	98	99	98	100	99	100	99	100	99	100	100	98	100	98	100
3	100	98	98	99	99	99	98	98	98	98	100	100	100	100	100	99	98	98	99	100
4	98	100	98	100	98	98	100	99	100	99	99	100	98	98	100	98	100	98	100	99
5	100	98	100	98	98	99	99	100	100	98	99	98	99	98	99	98	98	98	100	100
6	100	100	99	99	100	99	99	99	98	99	98	98	100	100	98	98	98	98	98	99
7	98	100	99	100	98	98	99	99	99	100	100	99	99	100	98	99	99	98	100	100
8	100	99	99	100	98	98	100	99	98	100	98	99	99	100	100	100	98	98	98	100
9	99	99	99	98	99	100	98	99	100	100	98	99	98	98	99	98	100	100	98	99
10	100	100	100	100	100	98	98	99	99	98	100	99	99	98	98	98	98	100	100	98
11	98	99	99	100	98	100	100	98	100	99	100	100	99	99	99	99	99	98	100	99
12	100	100	99	100	100	99	99	99	100	98	98	98	98	100	100	100	100	100	100	98
13	100	99	100	100	100	98	100	99	100	99	100	98	98	99	98	98	100	99	99	98
14	100	100	99	99	98	100	100	98	99	100	99	99	98	99	100	99	99	98	98	100
15	98	100	100	99	98	99	98	100	98	98	98	100	98	99	98	100	98	100	100	99
16	100	98	100	99	99	100	99	99	99	99	99	98	100	98	98	99	99	99	98	98
17	98	99	99	98	100	99	99	98	98	99	99	99	98	100	98	98	98	100	100	99
18	100	99	100	99	98	99	98	99	100	100	100	100	98	98	99	100	100	98	99	100
19	98	98	98	99	99	98	98	98	100	98	99	99	100	98	98	98	98	99	99	99
20	100	98	98	100	98	100	100	98	99	100	100	99	100	98	100	99	99	100	98	100
Min	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
Max	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Mean	99.30	99.00	99.10	99.30	98.85	98.85	99.00	98.70	99.20	99.05	99.20	98.95	98.80	98.90	98.95	98.85	98.85	98.95	99.05	99.25
SD	0.92	0.86	0.72	0.73	0.88	0.81	0.79	0.66	0.83	0.83	0.83	0.76	0.98	0.85	0.89	0.81	0.88	0.94	0.89	0.79
P		0.147	0.225	0.500	0.061	0.055	0.139	0.012	0.361	0.186	0.361	0.099	0.062	0.081	0.115	0.055	0.061	0.122	0.194	0.427

Num=number, BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery, m=minute, h=hour, Min=minimum, Max=maximum, SD=standard deviation.*P is significant at ≤0.05

Table (XVII): Arterial oxygen saturation in Dexmedetomidine Group (in %).

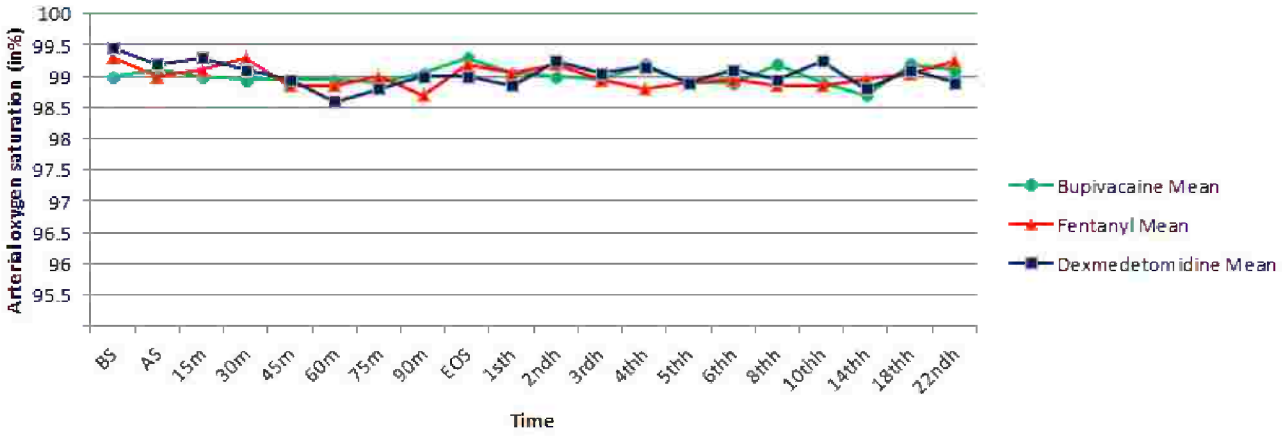
Num	Arterial oxygen saturation (in %)																			
	BS	AS	15m	30m	45m	60m	75m	90m	EOS	1st h	2nd h	3rd h	4th h	5th h	6th h	8th h	10th h	14th h	18th h	22nd h
1	100	99	100	99	99	98	99	98	99	99	100	98	98	98	100	100	99	99	100	99
2	100	99	98	100	98	99	98	99	100	98	100	100	100	98	100	99	99	98	98	98
3	100	100	100	99	100	98	98	98	100	100	98	100	98	99	99	99	98	98	100	99
4	100	100	100	100	99	100	98	98	98	99	99	100	98	100	99	99	100	98	100	99
5	99	100	99	100	98	98	100	100	98	100	100	99	99	98	99	99	100	99	98	100
6	100	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
7	98	100	100	98	98	98	99	100	100	99	100	98	99	100	98	99	99	100	98	98
8	100	98	99	99	98	99	100	100	100	100	99	100	100	100	100	99	100	100	98	98
9	98	99	100	99	100	98	99	99	98	98	100	100	100	99	100	98	99	100	99	100
10	99	98	99	99	100	100	99	98	99	98	98	98	99	100	100	99	100	99	100	98
11	100	99	99	100	99	99	98	99	100	99	100	99	99	100	100	99	98	98	99	99
12	98	99	99	100	99	98	99	98	99	100	99	99	99	98	98	100	99	99	100	99
13	100	100	98	99	98	100	98	98	98	99	100	100	99	98	98	98	100	99	99	99
14	99	98	100	98	100	99	100	99	98	98	100	98	100	98	98	100	98	99	99	98
15	100	98	98	100	100	98	98	100	98	98	100	99	100	99	100	100	100	99	99	100
16	100	100	100	99	99	100	98	99	100	99	100	99	99	98	98	98	99	98	99	100
17	100	100	100	98	99	98	98	98	100	99	98	100	99	98	98	99	99	98	100	99
18	100	98	99	100	99	98	99	100	99	99	98	99	100	98	98	98	100	100	98	99
19	98	100	99	98	100	98	99	100	99	99	98	99	100	99	99	98	99	98	100	98
20	100	100	100	98	99	98	100	100	98	98	100	98	99	100	100	99	99	99	99	99
Min	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
Max	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Mean	99.45	99.20	99.30	99.10	98.95	98.60	98.80	99.00	99.00	98.85	99.25	99.05	99.15	98.90	99.10	98.95	99.25	98.80	99.10	98.90
SD	0.83	0.83	0.73	0.79	0.97	0.99	0.95	0.97	0.99	0.89	0.89	0.89	0.88	0.98	0.97	0.79	0.79	0.99	0.97	0.79
P		0.173	0.273	0.089	0.066	0.057	0.059	0.058	0.059	0.062	0.236	0.067	0.118	0.111	0.105	0.107	0.209	0.061	0.089	0.063

Num=number, BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery, m=minute, h=hour, Min=minimum, Max=maximum, SD=standard deviation. *P is significant at ≤0.05

Table (XVIII): Comparison among the studied groups regarding arterial oxygen saturation (in %).

	Arterial oxygen saturation (in %)																			
	BS	**AS**	**15m**	**30m**	**45m**	**60m**	**75m**	**90m**	**EOS**	**1st h**	**2nd h**	**3rd h**	**4th h**	**5th h**	**6th h**	**8th h**	**10th h**	**14th h**	**18th h**	**22nd h**
B																				
Min	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
Max	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Mean	99.00	99.10	99.00	98.95	98.95	98.95	98.90	99.05	99.30	99.05	99.00	98.95	99.20	98.90	98.90	99.20	98.90	98.70	99.20	99.10
SD	0.92	0.79	0.79	0.83	0.69	0.76	0.79	0.94	0.73	0.83	0.79	0.83	0.83	0.79	0.72	0.70	0.79	0.80	0.89	0.85
P		0.357	0.500	0.429	0.423	0.426	0.357	0.433	0.130	0.429	0.500	0.429	0.238	0.357	0.352	0.221	0.357	0.139	0.245	0.361
F																				
Min	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
Max	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Mean	99.30	99.00	99.10	99.30	98.85	98.85	99.00	98.70	99.20	99.05	99.20	98.95	98.80	98.90	98.95	98.85	98.85	98.95	99.05	99.25
SD	0.92	0.86	0.72	0.73	0.88	0.81	0.79	0.66	0.83	0.83	0.83	0.76	0.83	0.85	0.89	0.81	0.88	0.94	0.89	0.79
P		0.147	0.225	0.500	0.061	0.055	0.139	0.012	0.361	0.186	0.361	0.099	0.062	0.081	0.115	0.055	0.061	0.122	0.194	0.427
D																				
Min	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
Max	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Mean	99.45	99.20	99.30	99.10	98.95	98.60	98.80	99.00	99.00	98.85	99.25	99.05	99.15	98.90	99.10	98.95	99.25	98.80	99.10	98.90
SD	0.83	0.83	0.73	0.79	0.76	0.82	0.77	0.86	0.86	0.75	0.91	0.83	0.75	0.91	0.91	0.69	0.72	0.77	0.79	0.72
P		0.173	0.273	0.089	0.066	0.057	0.059	0.058	0.059	0.062	0.236	0.067	0.118	0.111	0.105	0.107	0.209	0.061	0.089	0.063
P1	0.296	0.230	0.194	0.206	0.351	0.170	0.212	0.111	0.230	0.213	0.429	0.346	0.085	0.500	0.301	0.338	0.061	0.292	0.426	0.075
P2	0.056	0.349	0.111	0.280	0.500	0.085	0.343	0.431	0.121	0.213	0.180	0.352	0.421	0.500	0.223	0.130	0.075	0.345	0.355	0.214
P3	0.155	0.352	0.339	0.082	0.345	0.345	0.346	0.091	0.345	0.500	0.221	0.500	0.069	0.500	0.423	0.076	0.425	0.186	0.299	0.283

B = Bupivacaine, F= Fentanyl, D= Dexmedetomidine, BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery, m=minute, h=hour, Min=minimum, Max=maximum, SD=standard deviation. P1 is the statistical significance between group D and F, P2 is the statistical significance between group D and B, P3 is the statistical significance between group F and B. *P is significant at ≤0.05.



BS=before spinal anaesthesia, AS=after spinal anaesthesia, EOS=end of surgery, m=minute, h=hour

Figure (15): Comparison among the studied groups regarding arterial oxygen saturation (in %).

Sensory assessment

1. Highest sensory level

- **Group B**

The highest sensory level was T6 with 25% of the patients reached this level, 10% reached T7, 25% reached T8 and 40% reached T10.

- **Group F**

The highest sensory level was T4 with 10% of the patients reached this level, 10% reached T5, 30% reached T6, 30% reached T7 and 20% reached T8.

- **Group D**

The highest sensory level was T4 with 35% of the patients reached this level, 10% reached T5, 25% reached T6 and 30% reached T7.

Comparison among the groups regarding the highest sensory level

Regarding T4 as the highest sensory level reached among the three groups, it was reached by 35% of patients in group D, 10% in group F and was not reached in group B.

2. Onset of sensory block

- **Group B**

The mean time to reach highest sensory level was 5.36 ± 0.45min.

- **Group F**

The mean time to reach highest sensory level was 4.88 ± 0.42min.

- **Group D**

The mean time to reach highest sensory level was 4.32 ± 0.28min.

Comparison among the groups regarding the sensory onset

The onset was significantly faster in group D than groups F and B (P=0.000) also, it was significantly faster in group F than B (P=0.001).

3. Duration of sensory block

- **Group B**

The mean duration of sensory block was 151.50 ± 16.55min

- **Group F**

The mean duration of sensory block was 182.75 ± 13.91min

- **Group D**

The mean duration of sensory block was 327.75 ± 29.36min

Comparison among the groups regarding the sensory duration

Group D significantly had longer duration than group F and B (P=0.000) also, group F had significantly longer duration than group B (P=0.000).

Table (XIX): Onset and duration of sensory block in Bupivacaine group (in min).

	Onset and duration of sensory block (in min).	
Number	**Onset/min**	**Duration/min**
1	5	120
2	5	155
3	6	160
4	5	175
5	5	145
6	6	150
7	5	165
8	5	135
9	5	170
10	6	180
11	5	140
12	5	125
13	6	165
14	5	170
15	5	145
16	5	155
17	5	150
18	6	150
19	5	130
20	6	145
Min	5	120
Max	6	180
Mean	5.36	151.50
SD	0.45	16.55

Min=minimum, Max=maximum, SD=standard deviation.

Table (XX): Onset and duration of sensory block in Fentanyl group (in min).

Number	Onset and duration of sensory block (in min)	
	Onset/min	Duration/min
1	5	180
2	5	195
3	5	175
4	4	210
5	5	190
6	5	165
7	5	200
8	6	190
9	5	185
10	5	175
11	5	180
12	5	150
13	4	185
14	5	180
15	5	170
16	5	200
17	5	195
18	5	170
19	5	175
20	4	185
Min	4	150
Max	6	210
Mean	4.88	182.75
SD	0.42	13.91

Min=minimum, Max=maximum, SD=standard deviation.

Table (XXI): Onset and duration of sensory block in Dexmedetomidine group (in min).

Number	Onset and duration of sensory block (in min)	
	Onset/min	Duration/min
1	4	320
2	5	360
3	5	270
4	4	350
5	5	325
6	4	295
7	4	300
8	4	360
9	4	300
10	4	340
11	4	335
12	4	300
13	5	365
14	4	285
15	5	315
16	4	370
17	5	320
18	4	360
19	4	350
20	4	335
Min	4	270
Max	5	370
Mean	4.32	327.75
SD	0.28	29.36

Min=minimum, Max=maximum, SD=standard deviation.

Table (XXII): Comparison among the studied groups regarding the onset and duration of the sensory block (in min).

	Sensory	
	Onset/min	**Duration/min**
Bupivacaine		
Min	5	120
Max	6	180
Mean	5.36	151.50
SD	0.45	16.55
P	0.000*	0.000*
Fentanyl		
Min	4	150
Max	6	210
Mean	4.88	182.75
SD	0.42	13.91
P	0.000*	0.000*
Dexmedetomidine		
Min	4	270
Max	5	370
Mean	4.32	327.75
SD	0.28	29.36
P	0.000*	0.000*
P1	0.000*	0.000*
P2	0.000*	0.000*
P3	0.001*	0.000*

Min=minimum, Max=maximum, SD=standard deviation, P1 is the statistical significance between group D and F, P2 is the statistical significance between group D and B, P3 is the statistical significance between group F and B. *P is significant at ≤0.05

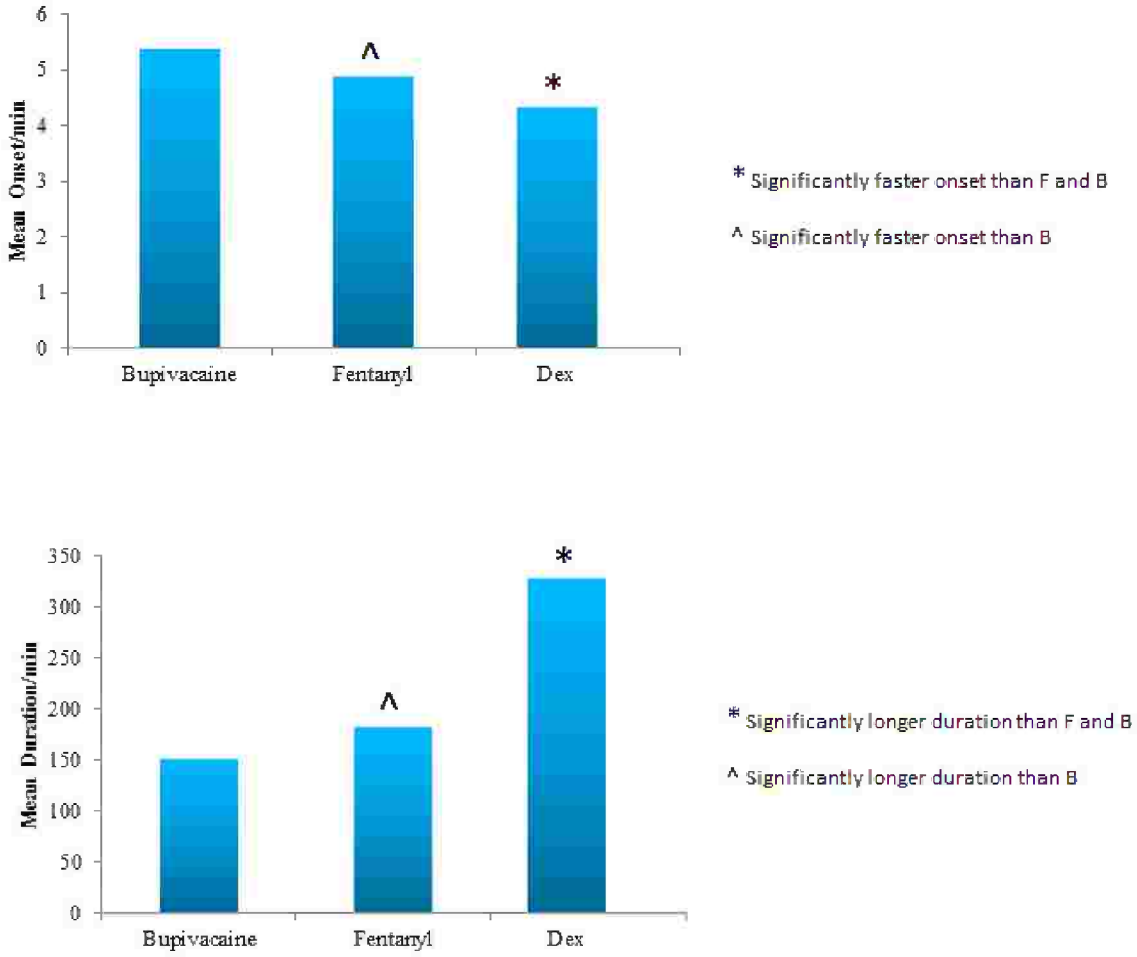


Figure (16): Comparison among the studied groups regarding the onset and duration of sensory block (in min).

Postoperative pain assessment

1- Visual Analogue Score VAS

- **Group B**

4 patients had VAS greater than or equal 4 at the fourth hour post-operatively, 10 at the sixth hour, 4 at the tenth hour, 5 at the fourteenth hour and 7 at the eighteenth hour.

- **Group F**

1 patient had VAS greater than or equal 4 at the fourth hour post-operatively, 2 at the sixth hour, 6 at the tenth hour, 3 at the fourteenth hour, 1 at the eighteenth hour and 1 at the twenty-second hour.

- **Group D**

1 patient had VAS greater than or equal 4 at the sixth hour post-operatively, 1 at the tenth hour, 2 at the fourteenth hour and 1 at the eighteenth hour.

Comparison among the groups regarding the VAS

There was no statistical difference among the three groups regarding the VAS.

2- Time to first analgesia request

- **Group B**

50% of the patients needed rescue analgesia after 360min, 20% after 240min, 20% after 600min and 10% only needed no rescue analgesia. The mean time for the first analgesia request was 386.66min (taking the total being 18, total who needed rescue analgesia).

- **Group F**

50% of the patients had no need for rescue analgesia, 25% needed it after 600min, 15% after 840min and 10% after 360min. The mean time for the first analgesia request was 624min (taking the total being 10, total who needed rescue analgesia)

- **Group D**

75% of the patients had no need for rescue analgesia, 15% needed it after 840min, 5% after 600min and 5% after 360min. The mean time for the first analgesia request was 696min (taking the total being 5, total who needed rescue analgesia)

Comparison among the groups regarding the time to first analgesia request

The time to first analgesia request was significantly longer in group D in comparison to group F (P=0.013) and B (P=0.002). It was significantly longer in group F in comparison to group B (P=0.015). There was no need for rescue analgesia in 75% of patients in group D, 50% in group F and in 10% in group B. The total number of patients who needed rescue analgesia was less in group D (5) in comparison to group F (10) and B (18) and it was less in group F than B.

Table (XXIII): Visual analogue scale (VAS) in Bupivacaine Group.

Num	VAS								
	1st h	2nd h	4th h	6th h	8th h	10th h	14th h	18th h	22nd h
1	0	2	3	5	3	3	3	3	3
2	0	0	3	5	3	3	3	3	3
3	0	0	2	2	3	6	5	3	3
4	0	0	0	2	3	3	3	3	3
5	0	1	6	1	3	3	5	3	3
6	0	0	2	5	2	3	3	4	3
7	0	0	2	5	2	3	3	4	3
8	0	0	3	6	3	3	3	5	3
9	0	0	2	5	3	3	3	4	3
10	0	0	1	2	3	6	3	3	3
11	0	0	3	5	3	3	3	4	3
12	0	1	5	1	3	3	5	3	3
13	0	2	5	1	3	3	4	3	3
14	0	0	0	2	3	3	3	3	3
15	0	0	3	5	3	3	3	4	3
16	0	0	2	2	3	6	3	3	3
17	0	0	3	5	3	3	3	4	3
18	0	0	1	2	3	5	3	3	3
19	0	0	5	1	3	3	4	3	3
20	0	0	2	5	3	3	3	3	3
Min	**0**	**0**	**0**	**1**	**2**	**3**	**3**	**3**	**3**
Max	**0**	**2**	**6**	**6**	**3**	**6**	**5**	**5**	**3**
Mean	**0.00**	**0.30**	**2.65**	**3.35**	**2.90**	**3.55**	**3.40**	**3.40**	**3.00**
SD	**0.00**	**0.66**	**1.63**	**1.84**	**0.31**	**1.15**	**0.75**	**0.60**	**0.00**
P		**0.0001***	**0.0001***	**0.0001***	**0.0001***	**0.0001***	**0.0001***	**0.0001***	**0.0001***

Num=number, h=hour, Min=minimum, Max=maximum, SD=standard deviation, *P is significant at ≤0.05

Table (XXIV): Visual analogue scale (VAS) in Fentanyl Group.

Num	VAS								
	1st h	**2nd h**	**4th h**	**6th h**	**8th h**	**10th h**	**14th h**	**18th h**	**22nd h**
1	0	0	2	2	3	3	3	3	3
2	0	0	0	2	2	2	3	3	3
3	0	0	2	3	3	5	3	3	3
4	0	0	2	3	3	4	6	3	3
5	0	0	0	2	2	3	3	3	3
6	0	2	4	5	1	3	3	4	3
7	0	0	0	2	2	3	3	3	3
8	0	0	0	2	2	2	3	3	3
9	0	0	0	2	3	3	5	3	3
10	0	0	2	3	3	5	3	3	3
11	0	0	0	2	2	2	3	3	3
12	0	0	3	5	1	3	3	3	4
13	0	0	0	2	2	2	3	3	3
14	0	0	2	2	3	3	5	3	2
15	0	0	2	2	2	5	2	2	3
16	0	0	0	0	2	2	2	3	3
17	0	0	0	2	2	2	3	3	3
18	0	0	2	2	3	5	1	3	2
19	0	0	0	2	2	2	3	3	3
20	0	0	2	2	3	5	3	2	3
Min	**0**	**0**	**0**	**0**	**1**	**2**	**1**	**2**	**2**
Max	**0**	**2**	**4**	**5**	**3**	**5**	**6**	**4**	**4**
Mean	**0.00**	**0.10**	**1.15**	**2.35**	**2.30**	**3.20**	**3.15**	**2.95**	**2.95**
SD	**0.00**	**0.45**	**1.27**	**1.09**	**0.66**	**1.20**	**1.09**	**0.39**	**0.39**
P		**0.001***	**0.0001***	**0.0001***	**0.0001***	**0.0001***	**0.0001***	**0.0001***	**0.0001***

Num=number, h=hour, Min=minimum, Max=maximum, SD=standard deviation, *P is significant at ≤0.05

Table (XXV): Visual analogue scale (VAS) in Dexmedetomidine Group.

Num	VAS								
	1st h	2nd h	4th h	6th h	8th h	10th h	14th h	18th h	22nd h
1	0	0	0	0	0	2	2	3	3
2	0	0	0	0	2	2	2	3	3
3	0	0	3	5	2	3	3	4	1
4	0	0	0	2	2	3	3	3	3
5	0	0	0	0	2	2	3	3	3
6	0	0	0	2	3	3	5	2	2
7	0	0	2	2	2	2	3	3	3
8	0	0	0	0	2	2	2	3	3
9	0	0	0	0	2	3	5	2	3
10	0	0	0	0	0	2	3	3	2
11	0	0	0	2	2	2	3	3	3
12	0	0	0	2	2	2	3	3	3
13	0	0	0	2	2	2	2	3	3
14	0	0	2	2	3	5	2	2	3
15	0	0	0	2	2	2	3	3	3
16	0	0	0	0	2	2	2	3	3
17	0	0	2	2	2	3	5	3	2
18	0	0	0	0	2	2	3	3	3
19	0	0	0	0	2	2	3	3	3
20	0	0	0	0	0	2	2	3	3
Min	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**2**	**1**
Max	**0**	**0**	**3**	**5**	**3**	**5**	**5**	**4**	**3**
Mean	**0.00**	**0.00**	**0.45**	**1.15**	**1.80**	**2.40**	**2.95**	**2.90**	**2.75**
SD	**0.00**	**0.00**	**0.94**	**1.35**	**0.83**	**0.75**	**1.00**	**0.45**	**0.55**
P			**0.020***	**0.000***	**0.000***	**0.000***	**0.000***	**0.000***	**0.000***

Num=number, h=hour, Min=minimum, Max=maximum, SD=standard deviation, *P is significant at ≤0.05

Table (XXVI): Visual analogue scale (VAS) in different studied groups.

	VAS								
	1st h	2nd h	4th h	6th h	8th h	10th h	14th h	18th h	22nd h
Bupivacaine									
Min	0	0	0	1	2	3	3	3	3
Max	0	2	6	6	3	6	5	5	3
Mean	0.00	0.30	2.65	3.35	2.90	3.55	3.40	3.40	3.00
SD	0.00	0.66	1.63	1.84	0.31	1.15	0.75	0.60	0.00
Fentanyl									
Min	0	0	0	0	1	2	1	2	2
Max	0	2	4	5	3	5	6	4	4
Mean	0.00	0.10	1.15	2.35	2.30	3.20	3.15	2.95	2.95
SD	0.00	0.45	1.27	1.09	0.66	1.20	1.09	0.39	0.39
Dexmedetomidine									
Min	0	0	0	0	0	2	2	2	1
Max	0	0	3	5	3	5	5	4	3
Mean	0.00	0.00	0.45	1.15	1.80	2.40	2.95	2.90	2.75
SD	0.00	0.00	0.94	1.35	0.83	0.75	1.00	0.45	0.55
P	1.0	0.98	0.689	0.098	0.65	0.25	0.336	0.254	0.36

h=hour, Min=minimum, Max=maximum, SD=standard deviation, *P is significant at ≤0.05

Table (XXVII): Comparison among the studied groups regarding time to first request for analgesia (in min).

	Time to first request for Analgesia (in min)		
	Bupivacaine	**Fentanyl**	**Dexmedetomidine**
1	360	No need	No need
2	360	No need	No need
3	600	600	360
4	No need	840	No need
5	240	No need	No need
6	360	360	840
7	360	No need	No need
8	360	No need	No need
9	360	840	840
10	600	600	No need
11	360	No need	No need
12	240	360	No need
13	240	No need	No need
14	No need	840	600
15	360	600	No need
16	600	No need	No need
17	360	No need	840
18	600	600	No need
19	240	No need	No need
20	360	600	No need
240	4.00 (20.00%)	0.00 (0.00%)	0.00 (0.00%)
360	10.00 (50.00%)	2.00 (10.00%)	1.00 (5.00%)
600	4.00 (20.00%)	5.00 (25.00%)	1.00 (5.00%)
840	0.00 (0.00%)	3.00 (15.00%)	3.00 (15.00%)
No need	2.00 (10.00%)	10.00 (50.00%)	15.00 (75.00%)
P1			
P2		P1=0.013*	P2=0.002*
P3			P3=0.015*

P1 is the statistical significance between group D and F, P2 is the statistical significance between group D and B, P3 is the statistical significance between group F and B. *P is significant at ≤0.05

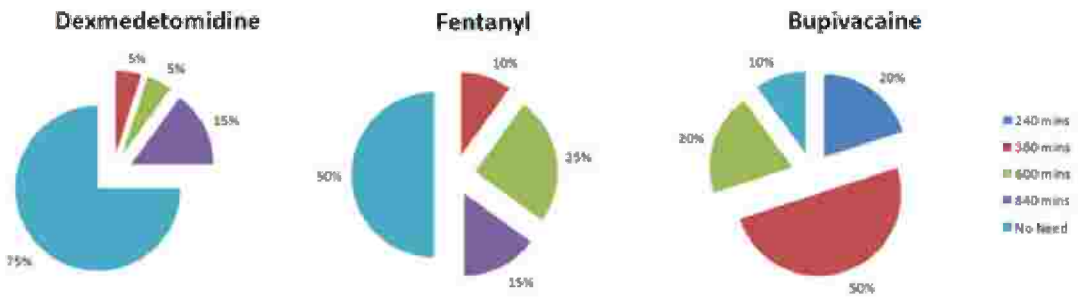


Figure (17): Comparison among the studied groups regarding time to first request for analgesia.

3- Total dose of Diclofenac sodium

- **Group B**

  The mean value of total Diclofenac sodium needed was 135mg ± 46.17mg.

- **Group F**

  The mean value of total Diclofenac sodium needed was 63.75mg ± 70.00mg.

- **Group D**

  The mean value of total Diclofenac sodium needed was 26.25mg ± 50.31mg.

Comparison among the groups regarding total dose of Diclofenac sodium

The total dose of Diclofenac sodium was significantly less in group D in comparison to group F and B (P=0.030, 0.000 respectively). Also, it was significantly less in group F than in group B (P=0.000).

4- Total dose of Pethidine

- **Group B**

  The mean value of total Pethidine needed was 12.5mg ± 17.21mg.

- **Group F**

  The mean value of total Pethidine needed was 3.75mg ± 9.16mg.

- **Group D**

  The mean value of total Pethidine needed was 0mg.

Comparison among the groups regarding the total Pethidine needed

Group D did not need any doses of Pethidine. While the total dose of Pethidine required in group F was significantly less than in group B (P=0.026).

Table (XXVIII): Comparison among the studied groups regarding Total dose of Diclofenac Na (in mg/24hr).

	Total dose of Diclofenac Na (in mg/24hr)		
	Bupivacaine	**Fentanyl**	**Dexmedetomidine**
1	150	0	0
2	150	0	0
3	150	150	150
4	0	75	0
5	150	0	0
6	150	150	75
7	150	0	0
8	150	0	0
9	150	75	75
10	150	150	0
11	150	0	0
12	150	150	0
13	150	0	0
14	0	75	150
15	150	150	0
16	150	0	0
17	150	0	75
18	150	150	0
19	150	0	0
20	150	150	0
Min	0	0	0
Max	150	150	150
Mean	135.00	63.75	26.25
SD	46.17	70.00	50.31
P1		P1=0.030*	P2=0.000*
P2 and P3			P3=0.000*

Min=minimum, Max=maximum, SD=standard deviation, P1 is the statistical significance between group D and F, P2 is the statistical significance between group D and B, P3 is the statistical significance between group F and B. *P is significant at ≤0.05

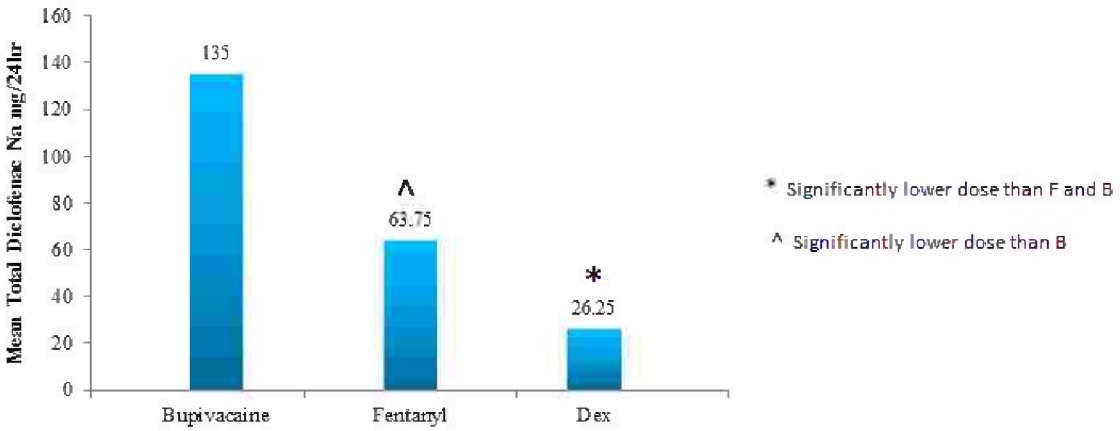


Figure (18): Comparison among the studied groups regarding Total Diclofenac Na mg/24hr.

Table (XXIX): Comparison among the studied groups regarding Total dose of Pethidine (in mg/24hr).

	Total dose of Pethidine (in mg/24hr)		
	Bupivacaine	**Fentanyl**	**Dexmedetomidine**
1	25	0	0
2	25	0	0
3	25	0	0
4	0	0	0
5	50	0	0
6	0	25	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	25	0	0
12	50	25	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	25	0	0
18	0	25	0
19	25	0	0
20	0	0	0
Min	0	0	0
Max	50	25	0
Mean	12.50	3.75	0.00
SD	17.21	9.16	0.00
P1		P1=0.037*	P2=0.001*
P2 and P3			P3=0.026*

Min=minimum, Max=maximum, SD=standard deviation, P1 is the statistical significance between group D and F, P2 is the statistical significance between group D and B, P3 is the statistical significance between group F and B. *P is significant at ≤0.05

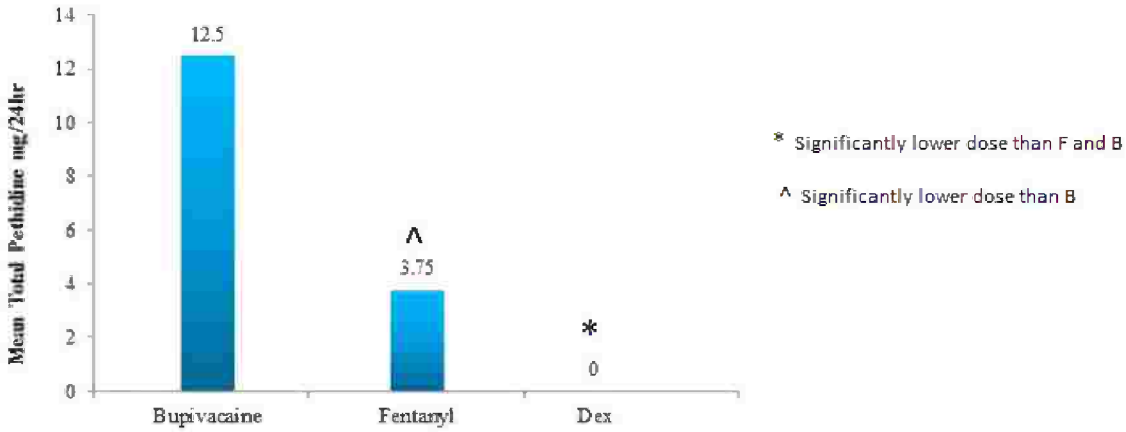


Figure (19): Comparison among the studied groups regarding Total Pethidine mg/24hr.

Motor assessment

1- Onset of motor block

- **Group B**

  The mean onset of motor block was 4.12 ±0.49 min.

- **Group F**

  The mean onset of motor block was 3.80 ± 0.41min.

- **Group D**

  The mean onset of motor block was 3.41 ± 0.36min.

Comparison among the three groups regarding the onset of motor block

The onset in group D was significantly faster than in groups F and B (P= 0.001, 0.000 respectively) also, it was significantly faster in group F than in group B (P=0.016).

2- Duration of motor block

- **Group B**

  The mean duration of motor block was 107.75 ± 12.08min.

- **Group F**

  The mean duration of motor block was 148.25 ± 12.49min.

- **Group D**

  The mean duration of motor block was 251.85 ± 39.72min.

Comparison among the three groups regarding the duration of the motor block

The motor block was significantly longer in group D than in groups F and B (P=0.000) also, it was longer in group F than in group B (P=0.000).

Table (XXX): Onset and duration of motor block in Bupivacaine group (in min).

Bupivacaine	Onset and duration of motor block (in min)	
	Onset/min	Duration/min
1	4	95
2	5	120
3	5	110
4	4	120
5	4	100
6	4	110
7	4	115
8	4	95
9	4	130
10	5	125
11	4	100
12	4	95
13	3	120
14	3	110
15	3	90
16	4	95
17	4	120
18	4	95
19	4	110
20	5	100
Min	3	90
Max	5	130
Mean	4.12	107.75
SD	0.49	12.08

Min=minimum, Max=maximum, SD=standard deviation.

Table (XXXI): Onset and duration of motor block in Fentanyl group (in min).

Fentanyl	Onset and duration of motor block (in min)	
	Onset/min	Duration/min
1	4	150
2	4	160
3	4	155
4	3	170
5	4	165
6	4	135
7	4	165
8	4	145
9	3	150
10	4	135
11	3	140
12	4	120
13	3	140
14	4	150
15	4	145
16	4	160
17	4	155
18	4	135
19	4	140
20	4	150
Min	3	120
Max	4	170
Mean	3.80	148.25
SD	0.41	12.49

Min=minimum, Max=maximum, SD=standard deviation.

Table (XXXII): Onset and duration of motor block in Dexmedetomidine group (in min).

Dexmedetomidine	Onset and duration of motor block (in min)	
	Onset/min	Duration/min
1	3	260
2	3	285
3	3	210
4	3	300
5	4	257
6	3	195
7	3	225
8	3	265
9	3	180
10	3	255
11	3	245
12	3	285
13	3	310
14	3	190
15	3	210
16	3	270
17	4	235
18	4	300
19	2	300
20	3	260
Min	2	180
Max	4	310
Mean	3.41	251.85
SD	0.36	39.72

Min=minimum, Max=maximum, SD=standard deviation.

Table (XXXIII): Comparison of the onset and duration of motor block among the studied groups (in min).

	onset and duration of motor block (in min)	
	Onset/min	**Duration/min**
Bupivacaine		
Min	3	90
Max	5	130
Mean	4.12	107.75
SD	0.49	12.08
Fentanyl		
Min	3	120
Max	4	170
Mean	3.80	148.25
SD	0.41	12.49
Dexmedetomidine		
Min	2	180
Max	4	310
Mean	3.41	251.85
SD	0.36	39.72
P1	0.001*	0.000*
P2	0.000*	0.000*
P3	0.016*	0.000*

Min=minimum, Max=maximum, SD=standard deviation, P1 is the statistical significance between group D and F, P2 is the statistical significance between group D and B, P3 is the statistical significance between group F and B. *P is significant at ≤0.05

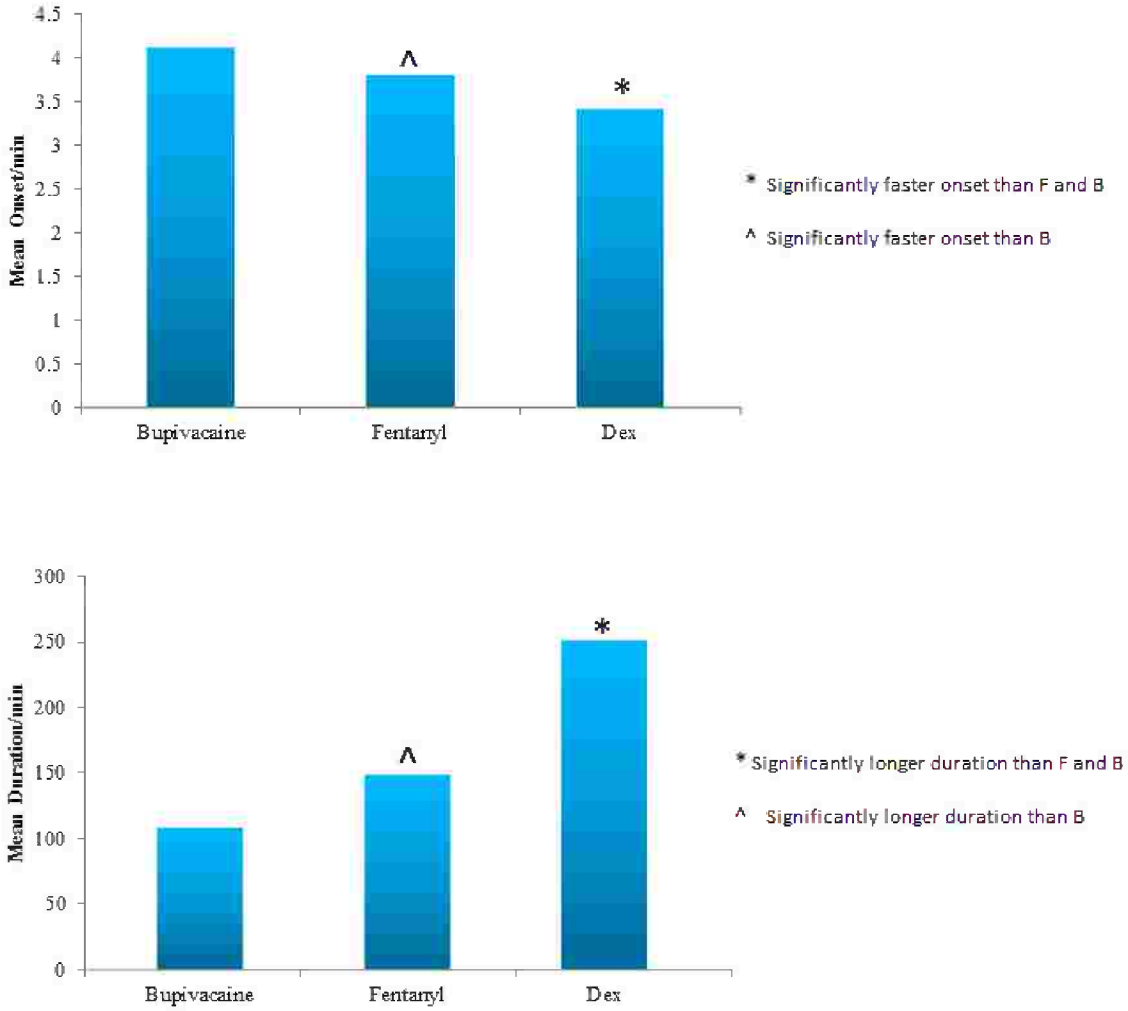


Figure (20): Onset and duration of motor block among the studied groups.

Side effects

1- Hypotension

- **Group B**

35% (7patients) of the patients developed hypotension during the study. Mean total dose of ephedrine used 3.90mg ±6.32mg.

- **Group F**

30% (6patients) of patients developed hypotension during the study. Mean total dose of ephedrine used 3.60mg ±5.89mg.

- **Group D**

40% (8patients) of the patients developed hypotension during the study. Mean total dose of ephedrine used 3.30mg ±4.66mg.

Comparison among the groups regarding hypotension and ephedrine dose

There was no significant change among the three groups regarding hypotension (P=0.352), also regarding the total ephedrine dose there was no significant difference among the three groups (P=0.462).

2- Bradycardia

- **Group B**

25% (5patients) of the patients developed bradycardia. Mean total dose of atropine required was 0.15mg ±0.27mg.

- **Group F**

20% (4patients) of the patients developed bradycardia. Mean total dose of atropine required was 0.15mg ±0.27mg.

- **Group D**

20% (4patients) of the patients developed bradycardia. Mean total dose of atropine required was 0.18mg ±0.28mg.

Comparison among the groups regarding bradycardia and atropine doses

There was no significant change among the three groups regarding bradycardia (P=0.685), also, regarding the total atropine dose there was no significant change in the three groups (P=0.352).

3- Nausea

- **Group B**

30% (6patients) of the patient suffered from nausea during the study.

- **Group F**

25% (5patients) of the patient suffered from nausea during the study.

- **Group D**

20% (4patients) of the patient suffered from nausea during the study.

Comparison among the groups regarding nausea

No significant difference was observed among the three groups (P=0.712).

4- Vomiting

- **Group B**

10% (2patients) of the patient suffered from vomiting during the study

- **Group F**

10% (2patients) of the patient suffered from vomiting during the study

- **Group D**

5% (1patients) of the patient suffered from vomiting during the study.

Comparison among the groups regarding vomiting

There was no significant difference among the three groups (P=0.682)

5- Shivering

- **Group B**

10% (2patients) of the patient suffered from shivering during the study.

- **Group F**

5% (1patient) of the patient suffered from shivering during the study.

- **Group D**

0% (0patients) of the patient suffered from shivering during the study.

Comparison among the groups regarding shivering

There was no significant difference among the three groups (P=0.55).

6- Pruritus

- **Group B**

0% (0patients) of the patient suffered from pruritus during the study.

- **Group F**

10% (2patients) of the patient suffered from pruritus during the study.

- **Group D**

0% (0patients) of the patient suffered from pruritus during the study.

Comparison among the groups regarding pruritus

There was no significant difference among the three groups (P=0.71)

7- Respiratory depression

No patients suffered from any respiratory depression during the study.

8- Sedation

All the patients got "Ramsy Sedation Score" of 2 in the three groups during the whole study except for one patient in group D had a score of 3 in the first hour, in other words all the patients were Awake.

Table (XXXIV): Different side effects among the studied groups.

	Bupivacaine		Fentanyl		Dexmedetomidine		p
	No.	%	No.	%	No.	%	
Hypotension	7	35	6	30	8	40	0.352
Bradycardia	5	25	4	20	4	20	0.685
Nausea	6	30	5	25	4	20	0.712
Vomiting	2	10	2	10	1	5	0.682
Shivering	2	10	1	5	0	0	0.55
Pruritus	0	0	2	10	0	0	0.71
Respiratory depression	0	0	0	0	0	0	-

No.=number, %=percent, Sedation all patients were Awake. *P is significant at ≤0.05

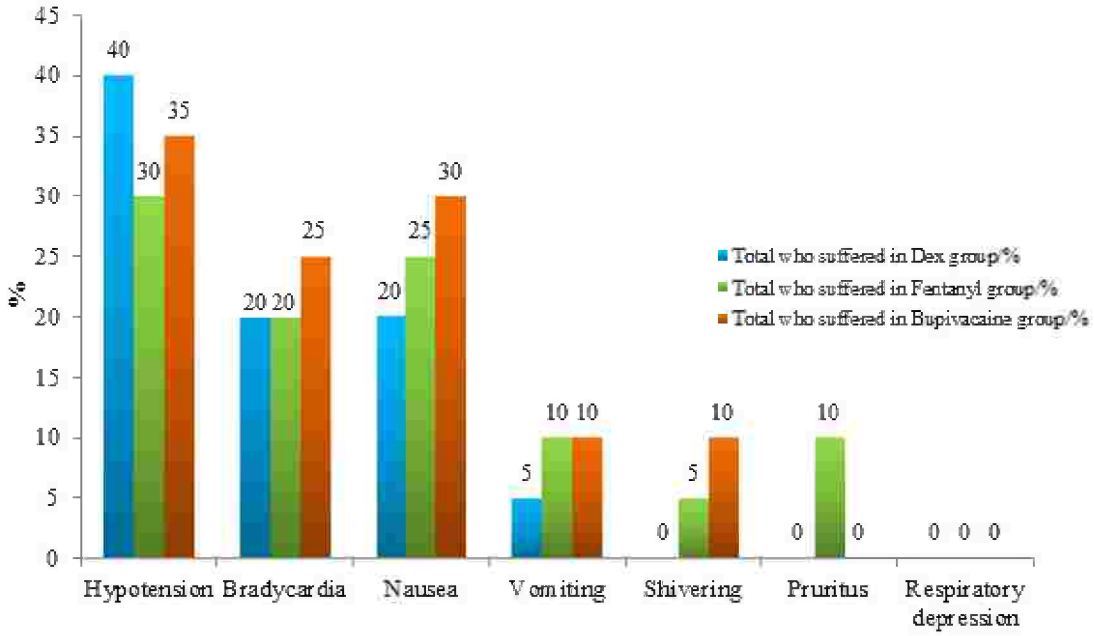


Figure (21): Different side effects among the studied groups.

Table (XXXV): Total ephedrine dose among the studied groups (in mg/24hr).

	Total dose of Ephedrine (in mg/24hr)		
	Bupivacaine	**Fentanyl**	**Dexmedetomidine**
1	0	0	0
2	0	9	0
3	15	0	6
4	0	9	0
5	0	0	6
6	15	15	12
7	0	0	0
8	0	0	0
9	15	15	0
10	9	0	0
11	0	0	6
12	0	0	15
13	15	0	6
14	0	15	0
15	0	0	0
16	0	0	0
17	0	9	6
18	9	0	0
19	0	0	0
20	0	0	9
Min	0	0	0
Max	15	15	15
Mean	3.90	3.60	3.30
SD	6.32	5.89	4.66
F	1.22		
P	0.462		

Min=minimum, Max=maximum, SD=standard deviation, F value for ANOVA test, *P is significant at ≤0.05

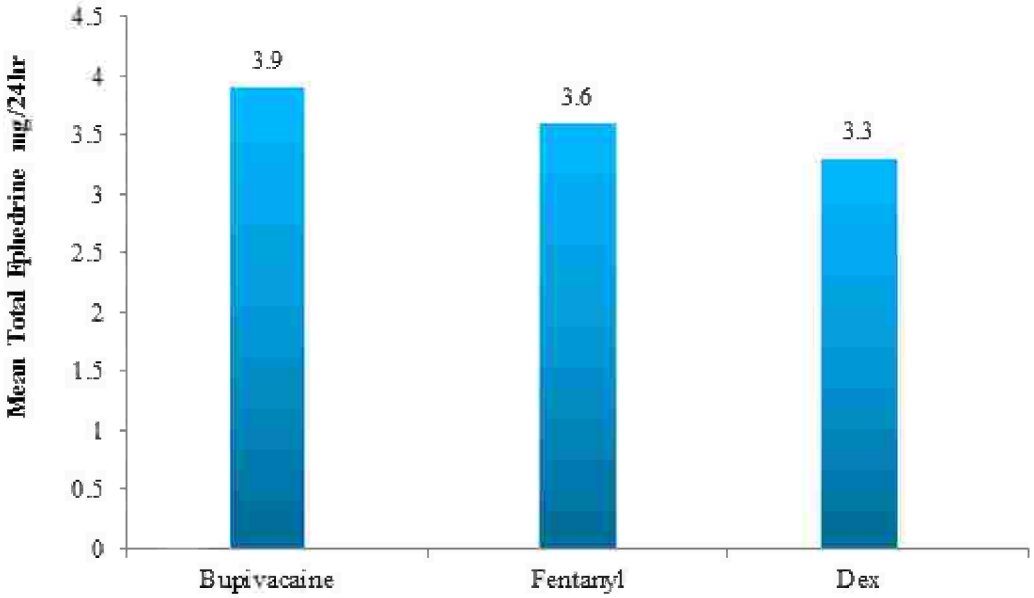


Figure (22): Total ephedrine dose among the studied groups. (in mg/24hr)

Table (XXXVI): Total atropine dose among the studied groups (in mg/24hr).

	Total Atropine dose (in mg/24hr)		
	Bupivacaine	**Fentanyl**	**Dexmedetomidine**
1	0	0	0
2	0.6	0	0
3	0	0	0
4	0	0.6	0
5	0	0	0
6	0.6	0.6	0.6
7	0.6	0	0.6
8	0	0	0.6
9	0	0	0
10	0	0.6	0
11	0	0	0
12	0.6	0	0.6
13	0	0	0.6
14	0	0.6	0
15	0.6	0	0
16	0	0.6	0
17	0	0	0.6
18	0	0	0
19	0	0	0
20	0	0	0
Min	0	0	0
Max	1	1	1
Mean	0.15	0.15	0.18
SD	0.27	0.27	0.28
F	2.11		
P	0.352		

Min=minimum, Max=maximum, SD=standard deviation, F value for ANOVA test, *P is significant at ≤0.05

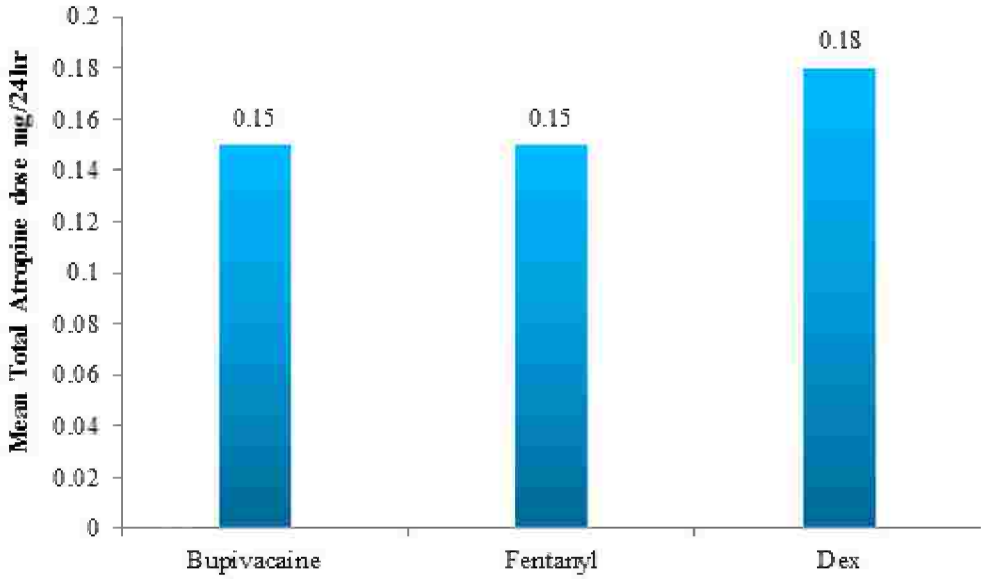


Figure (24): Total atropine dose among the studied groups (in mg/24hr).