AIM OF THE WORK

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The aim of the work is to evaluate the effect of two different preoperative doses of pregabalin on post operative pain and analgesic consumption in patients undergoing laparoscopic gynecological surgeries.

PATIENTS

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After approval of Ethical Committee of Faculty of Medicine and written informed consent from patients, the present study was carried out in Shatby Maternity University Hospitals on forty-five patients ASA physical status I and II, of female patients aged 30-60 years old, scheduled for elective laparoscopic gynecological surgeries under general anaesthesia.

The sample size was determined by the biostatistics department of the High Institute of Public Health using program G power.

Exclusion criteria

1. Impaired kidney or liver functions.
2. History of drug or alcohol abuse.
3. History of chronic pain or daily intake of analgesics.
4. Uncontrolled medical disease (diabetes mellitus and hypertension).
5. History of intake of non-steroidal anti-inflammatory drugs within 24 h before surgery.
6. Any procedure takes more than two hours will be excluded from the study.

Patients were randomly categorized into three equal groups by closed envelope method (fifteen each group):

Group I: Patients received pregabalin 75 mg orally, 1 h before induction of anaesthesia with sips of water.

Group II: Patients received pregabalin 150 mg orally, 1 h before induction of anaesthesia with sips of water.

Group III: Patients received a matching placebo (vitamin C) orally, 1 h before induction of anaesthesia with sips of water.

METHODS

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I. Preoperative evaluation

Evaluation of the patients was carried out through:

1. Proper history taking and clinical examination, to exclude cardiovascular, respiratory, neurological and metabolic diseases.
2. Routine laboratory investigations including:
   - Complete blood count (CBC).
   - Haemostatic profile study:
     - Bleeding time.
     - Clotting time.
     - Prothorombin time (PT).
     - Partial thromboplastin time (PTT).
     - Prothrombin activity.
   - Blood urea and blood creatinine.
   - Fasting blood glucose.
   - Liver enzymes (ALT, AST).
   - Urine analysis.
3. Electrocardiographic tracing; for patients above 40 years old.

II. Preoperative medication

Each patient received pregabalin 75 mg or 150 mg or a matching placebo. All the medications were provided by the hospital pharmacy, were identical, and were administered orally, in the ward 1 h before induction of anaesthesia with sips of water by a staff nurse who was not involved in the study.

- A 20 – gauge cannula was inserted by an anaesthesiologist in the ward.
- Each patient received intravenous midazolam 0.02 mg/kg in the ward by an anaesthesiologist and under his supervision 15 min before induction of anaesthesia.
- Each patient received intravenous fluids in the form of lactated Ringer's solution according to the 4-2-1 rule (ml/kg/hr), in the ward 10 min before transferee to operating theater.

III. Intra-operative anaesthetic technique:

Each patient was accompanied by the anaesthesiologist from the ward to the operating theater. After his entrance, the patient was attached to a multi-channel monitor (Trakmon kontron limited - Enland) to continuously display:

- ECG monitoring (lead II).
- Heart rate [HR] in (beats /min).
- Non-invasive arterial blood pressure monitoring: mean arterial blood pressure (MAP) in (mm Hg).
- Arterial oxygen saturation% (SpO_2%), using pulse oximeter.

Anaesthesia was standardized in both groups. Thus, all patients were induced starting with fentanyl 2 µg/kg. This was followed after 5 min by injection of xylocaine 1 mg/kg was followed after 1 min by propofol 2 mg/kg. Injection of cisatracurium 0.2 mg/kg

followed after the patient lost consciousness (with loss of the eye lash reflex and verbal contact). Maintenance of patent air way was ensured by jaw thrust. Maintenance of patient's oxygenation was pertained with a face mask and isoflurane 1.2% in 100% oxygen. This procedure lasted for 3-4 min to give sufficient time for the action of the muscle relaxant.

Orotracheal intubation was conducted by the same anaesthsiologist to all patients. After the insertion of endotracheal tube, each patient was put on IPPV with a tidal volume 6ml/kg, frequency 14 breath/min and with I:E ratio 1:2.

Anaesthesia was maintained with isoflurane 1%-1.5% in 100% oxygen along with a maintenance dose of cisatracurium 0.02 mg/kg every 30 min until the end of the operation.

At the end of surgery, residual neuromuscular paralysis was antagonized with neostigmine 0.05 mg/kg and atropine 0.01 mg/kg.

IV. Post-operative care

After satisfactory recovery according to the modified Aldrete score,[111] patients were extubated and were fast-tracked to the ward when their score became ≥9.

In the ward, patients received intra venous ketrolac with a dose not exceeding 30 mg / 6 hours only when their pain score became ≥4 as assessed by the visual analogue scale (VAS).

Measurements

The following parameters were measured:

A. Hemodynamic Parameters

- Heart rate (beats/minutes) using lead 11 electrocardiograms.
- Mean arterial blood pressure: (MABP) will be measured in mmHg.
- Arterial oxygen saturation ($Sp0_2$): using pulse oximeter if there was any changes.

These were monitored continuously and recorded at the following times:

- Before induction.
- After induction.
- Every 15 minutes intraoperative.
- After endotracheal extubation.
- Postoperative every 6 hours for 24 hour.

B. Postoperative pain

1. Assessment of pain both at rest (static) and during coughing (dynamic). It was assessed using visual analogue scale (VAS).[112] Patients were instructed the day before operation about how to use the (VAS). Pain was assessed on a linear scale (a 10 cm graded horizontal line):

I	Right hand margin	No pain	Score zero.
II	Left hand margin	Worst pain	Score10.

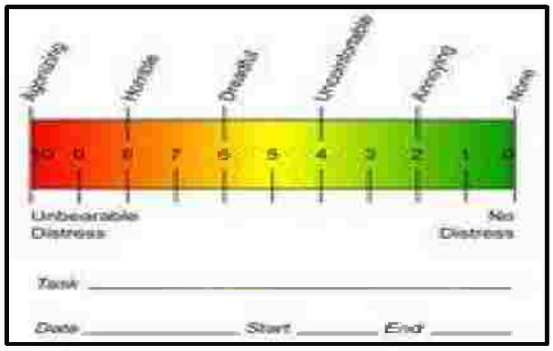

Figure (6): Visual analogue scale (VAS).

Assessment of pain will be done

1. On arrival of patient to the ward.
2. Then every 30 minutes in the first two hours.
3. Then every one hour till six hours
4. Then every 6 hours for the rest of 24 hours.
2. When postoperative pain is VAS 4, patients received intravenous ketrolac with dose not exceed 30 mg/ 6hour and the total administered dose in 24 hour and requirement time will be recorded.

C. Analgesic consumption

It was assessed as follows:

1. First dose required.
2. Total requirement in 24 hours.

D. Level of sedation

It was assessed with the Ramsay sedation score[113] as follows:

1. Patient is anxious and agitated or restless, or both.
2. Patient is cooperative, oriented, and tranquil.
3. Patients respond to commands only.
4. Patient exhibits brisk response to light glabellar tap or loud auditory stimulus.
5. Patient exhibits a sluggish response to light glabellar tap or loud auditory stimulus.
6. Patient exhibits no response.

Patients with a sedation scale of 4 was considered as sedated. Assessment of sedation will be done:

1. On arrival of patient to the ward.
2. Then every 6 h till the end of the study, that is, 24 h after operation.

E. Postoperative nausea and vomiting

The severity of PONV was graded on a four-point ordinal scale (0, no nausea or vomiting; 1, mild nausea; 2, moderate nausea; and 3, severe nausea with vomiting). Rescue antiemetic ondansetron 4 mg intravenouse was given to all patients with PONV of grade 2.

F. Postoperative side effects

Patients were observed for any side effects during the first 24 postoperative hours in the ward such as skin rash, tinnitus, itching or others.

Statistical analysis of the data[114]

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0.[115] Qualitative data were described using number and percent. Quantitative data were described using range (minimum and maximum), mean, standard deviation and median. Comparison between different groups regarding categorical variables was tested using Chi-square test. When more than 20% of the cells have expected count less than 5, correction for chi-square was conducted using Fisher's Exact test or Monte Carlo correction. The distributions of quantitative variables were tested for normality using Kolmogorov-Smirnov test, Shapiro-Wilk test and D'Agstino test, also Histogram and QQ plot were used for vision test. If it reveals normal data distribution, parametric tests was applied. If the data were abnormally distributed, non-parametric tests were used. For normally distributed data, comparison between the studied groups were analyzed using F-test (ANOVA) and Post Hoc test (Scheffe), comparison between different periods using ANOVA with repeated measures and Post Hoc test was assessed using Bonferroni adjusted. For abnormally distributed data or ordinal data, Kruskal Wallis test was used to compare between the studied groups and pair wise comparison was assessed using Mann-Whitney test. Significance test results are quoted as two-tailed probabilities. Significance of the obtained results was judged at the 5% level.

RESULTS

RESULTS

The present study was carried out in Alexandria Main University Hospitals on forty-five patients ASA physical status I and II, of female patients aged 30-60 years old, scheduled for elective laparoscopic gynecological surgeries under general anesthesia.

Patients were randomly categorized into three equal groups (fifteen):

Group I: Patients received pregabalin 75 mg orally, 1 h before induction of anaesthesia with sips of water.

Group II: Patients received pregabalin 150 mg orally, 1 h before induction of anaesthesia with sips of water.

Group III: Patients received a matching placebo orally, 1 h before induction of anaesthesia with sips of water.

A. Hemodynamic Parameter

Heart Rate (beats/minute) (Tables: 1, 2, 3, 4 and figure 7)

In group I

The mean heart rate immediately before induction was 86.0 ±13.4 (beat per minute) There was a significant decrease in the heart rate as after induction, at 15 minute and at 30 minute the mean was 78.1±8.0, 78.0 ± 9.5, and 79.8±7.9 respectively, No significant changes were detected in all other times of measurement.

In group II

The mean heart rate immediately before induction was 83.7±5.9 (beat per minute) There was a significant decrease in the heart rate as after induction, at 15 minute, at 30 minute reaching a mean of 73.1±7.0, 74.6±3.6, and 79.0±3.8 respectively, while at 12 hours, at 18 hours, and at 24 hours heart rate rise again significantly reaching a mean of 73.1±7.0, 74.6±3.6, 79.0±3.8, 87.3±3.4, 87.4±2, and 88.1±4 respectively, No significant changes were detected in all other times of measurement.

In group III

The mean heart rate immediately before induction was 92.9±3.5 (beat per minute) there was a significant decrease in the heart rate as after induction reaching a mean of 88.8±4.6, There was a significant increase in the heart rate at 15 minute, at 30 minute, at 45 minute, at 60 minute, after ETT extubation, at 6 hours at 12 hours ,and at 18 hours reaching a mean of 88.8±4.6, 95.8±3.2, 99.9±5.6, 103.6±8.6, 112.3±8.7, 115.0±7.9, 114.0±8.3, 114.6±9.2, and 110.2±9.1 respectively, No significant changes were detected in all other times of measurement.

Comparison between three studied groups

Comparison between three studied groups according to heart rate showed significant difference before induction (0.017), after induction, at 15 minute, at 30 minute, at 45 minute, at 60 minute, at 75 minute, after ETT extubation, at 6 hours, 12 hours, and at 18 hours (<0.001) as group III showed higher readings than the other two groups.

Comparison between group I and group II according to heart rate it was statistically significantly lower after induction (0.0138), at 75 minute (0.020), and after ETT extubation (0.020) in group II.

Comparison between group I and group III according to heart rate it was statistically significantly higher after induction, at 15 minutes, at 30 minute, at 45 minutes, at 60 minute, at 75 minute, after ETT extubation, at 6 hours, at 12 hours, and at 18 hours(<0.001), in group III.

Comparison between group II and group III according to heart rate it was statistically significantly higher before induction(0.022), after induction, at 15 minute, at 30 minute, at 45 minute, at 60 minute, at 75 minute, after ETT extubation, at 6 hours, at 12 hours, and at 18 hours(<0.001), in group III.

Table (1): Changes in HR in group I.

Patient	Before induction	After induction	After						After ETT extubation	After extubation			
			15 min	30 min	45 min	60 min	75 min	90 min		6 hrs	12 hrs	18 hrs	24 hrs
1	70	68	75	80	85				88	90	87	92	95
2	70	68	63	82	80				90	91	80	88	90
3	78	70	68	70	79				89	87	86	90	100
4	100	80	81	85	90	86			87	82	90	85	88
5	70	75	70	73	80	81			90	84	84	82	87
6	70	66	65	68	77	70			100	90	88	90	92
7	110	85	89	90	89	88	90	91	115	86	92	95	110
8	80	81	75	77	82	78			90	92	80	77	75
9	100	85	87	89	86	85	89		89	79	89	85	78
10	105	89	87	89	88				90	90	85	88	82
11	90	82	85	84	86				79	92	82	77	84
12	89	90	86	84	82	85			93	89	88	92	77
13	90	70	68	66	70				89	91	75	80	83
14	82	80	91	85	88	87	86		92	86	89	82	97
15	86	83	80	75	74	83			91	90	96	89	91
Min.	70.0	66.0	63.0	66.0	70.0	70.0	86.0	91.0	79.0	79.0	75.0	77.0	75.0
Max.	110.0	90.0	91.0	90.0	90.0	88.0	90.0	91.0	115.0	92.0	96.0	95.0	110.0
Mean	86.0	78.1	78.0	79.8	82.4	82.6	88.3	91.0	91.5	87.9	86.1	86.1	88.6
SD.	13.4	8.0	9.5	7.9	5.8	5.6	2.1	-	7.8	3.9	5.3	5.6	9.4
Median	86.0	80.0	80.0	82.0	82.0	85.0	89.0	91.0	90.0	90.0	87.0	88.0	88.0
p		0.005*	0.005*	0.037*	0.258	0.196	0.327	-	0.143	0.629	0.984	0.971	0.553

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between before induction with each other period
*: Statistically significant at $p \leq 0.05$

Table (2): Changes in HR in group II.

Patient	Before induction	After induction	After						After ETT extubation	After extubation			
			15 min	30 min	45 min	60 min	75 min	90 min		6 hrs	12 hrs	18 hrs	24 hrs
1	70	65	76	76	80	83	85		87	90	88	87	90
2	78	70	72	75	79	79	80		79	85	89	86	88
3	80	72	70	78	76	80			79	87	90	87	91
4	85	77	73	87	78	79			82	84	87	89	93
5	90	71	70	78	87	85	86		85	92	95	90	98
6	88	80	77	76	75	79	80		86	86	87	88	89
7	89	76	76	74	79				89	88	89	90	89
8	87	75	78	79	80	78			90	91	87	89	88
9	82	79	79	76	89	77			78	84	82	85	86
10	89	70	73	80	84	80	82	81	86	86	86	89	85
11	90	88	80	86	86	87			83	89	88	86	87
12	85	80	79	83	85	87	89	88	86	90	88	89	87
13	78	67	70	79	87	89	86		83	86	89	87	86
14	77	65	71	78	79				87	82	80	86	84
15	87	62	75	80	82	85			84	80	85	83	81
Min.	70.0	62.0	70.0	74.0	75.0	77.0	80.0	81.0	78.0	80.0	80.0	83.0	81.0
Max.	90.0	88.0	80.0	87.0	89.0	89.0	89.0	88.0	90.0	92.0	95.0	90.0	98.0
Mean	83.7	73.1	74.6	79.0	81.7	82.2	84.0	84.5	84.3	86.7	87.3	87.4	88.1
SD.	5.9	7.0	3.6	3.8	4.3	4.0	3.4	4.9	3.6	3.4	3.4	2.0	4.0
Median	85.0	72.0	75.0	78.0	80.0	80.0	85.0	84.5	85.0	86.0	88.0	87.0	88.0
p		<0.001*	<0.001*	0.009*	0.286	0.427	0.669	0.728	0.714	0.089	0.037*	0.021*	0.023*

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between before induction with each other period
*: Statistically significant at $p \leq 0.05$

Table (3): Changes in HR in group III.

Patient	Before induction	After induction	After						After ETT extubation	After extubation			
			15 min	30 min	45 min	60 min	75 min	90 min		6 hrs	12 hrs	18 hrs	24 hrs
1	89	80	93	99	110	120			115	110	105	118	120
2	90	78	95	98	100	118			112	115	125	120	128
3	92	88	92	98	96				110	120	111	104	120
4	100	89	96	99	91	106	119	128	130	120	115	123	116
5	96	90	98	110	117	127			112	124	127	122	120
6	93	90	95	99	109	112			120	124	130	110	115
7	89	87	92	90	105				109	112	123	116	119
8	90	92	98	105	119				135	120	112	98	110
9	92	90	98	107					110	97	100	94	99
10	95	90	93	98	100	104			110	112	117	119	116
11	98	95	99	94	91				112	114	117	100	112
12	95	92	90	95	98				110	100	102	109	108
13	95	92	99	98	100	102			109	108	107	108	107
14	91	93	99	100	108	109			112	124	120	107	108
15	88	86	100	109	107				119	110	108	105	104
Min.	88.0	78.0	90.0	90.0	91.0	102.0	119.0	128.0	109.0	97.0	100.0	94.0	99.0
Max.	100.0	95.0	100.0	110.0	119.0	127.0	119.0	128.0	135.0	124.0	130.0	123.0	128.0
Mean	92.9	88.8	95.8	99.9	103.6	112.3	119.0	128.0	115.0	114.0	114.6	110.2	113.46
SD.	3.5	4.6	3.2	5.6	8.6	8.7	-	-	7.9	8.3	9.2	9.1	231.0
Median	92.0	90.0	96.0	99.0	102.5	110.5	119.0	128.0	112.0	114.0	115.0	109.0	116.0
p		0.002*	0.028*	0.002*	0.003*	0.002*	-	-	<0.001*	<0.001*	<0.001*	<0.001*	0.199

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between before induction with each other period

*: Statistically significant at $p \leq 0.05$

Table (4): Comparison between the studied groups according to HR.

	Before induction	After induction	After						After ETT extubation	After extubation			
			15 min	30 min	45 min	60 min	75 min	90 min		6 hrs	12 hrs	18 hrs	24 hrs
Group I													
Min.	70.0	66.0	63.0	66.0	70.0	70.0	86.0	91.0	79.0	79.0	75.0	77.0	75.0
Max.	110.0	90.0	91.0	90.0	90.0	88.0	90.0	91.0	115.0	92.0	96.0	95.0	110.0
Mean	86.0	78.1	78.0	79.8	82.4	82.6	88.3	91.0	91.5	87.9	86.1	86.1	88.6
SD.	13.4	8.0	9.5	7.9	5.8	5.6	2.1	-	7.8	3.9	5.3	5.6	9.4
Median	86.0	80.0	80.0	82.0	82.0	85.0	89.0	91.0	90.0	90.0	87.0	88.0	88.0
Group II													
Min.	70.0	62.0	70.0	74.0	75.0	77.0	80.0	81.0	78.0	80.0	80.0	83.0	81.0
Max.	90.0	88.0	80.0	87.0	89.0	89.0	89.0	88.0	90.0	92.0	95.0	90.0	98.0
Mean	83.7	73.1	74.6	79.0	81.7	82.2	84.0	84.5	84.3	86.7	87.3	87.4	88.1
SD.	5.9	7.0	3.6	3.8	4.3	4.0	3.4	4.9	3.6	3.4	3.4	2.0	4.0
Median	85.0	72.0	75.0	78.0	80.0	80.0	85.0	84.5	85.0	86.0	88.0	87.0	88.0
Group III													
Min.	88.0	78.0	90.0	90.0	91.0	102.0	119.0	128.0	109.0	97.0	100.0	94.0	99.0
Max.	100.0	95.0	100.0	110.0	119.0	127.0	119.0	128.0	135.0	124.0	130.0	123.0	128.0
Mean	92.9	88.8	95.8	99.9	103.6	112.3	119.0	128.0	115.0	114.0	114.6	110.2	113.46
SD.	3.5	4.6	3.2	5.6	8.6	8.7	-	-	7.9	8.3	9.2	9.1	7.55
Median	92.0	90.0	96.0	99.0	102.5	110.5	119.0	128.0	112.0	114.0	115.0	109.0	115.0
p	0.017*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	0.136	<0.001*	<0.001*	<0.001*	<0.001*	0.144
p_1	0.765	0.138*	0.324	0.935	0.961	0.988	0.020*	-	0.020*	0.829	0.866	0.859	1.000
p_2	0.109	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	-	<0.001*	<0.001*	<0.001*	<0.001*	0.231
p_3	0.022*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	-	<0.001*	<0.001*	<0.001*	<0.001*	0.228

p: p value for F test (ANOVA) for comparing between the different studied group
p_1: p value for Post Hoc test (Scheffe) for comparing between group I and group II
p_2: p value for Post Hoc test (Scheffe) for comparing between group I and group III
p_3: p value for Post Hoc test (Scheffe) for comparing between group II and group III
*: Statistically significant at $p \leq 0.05$

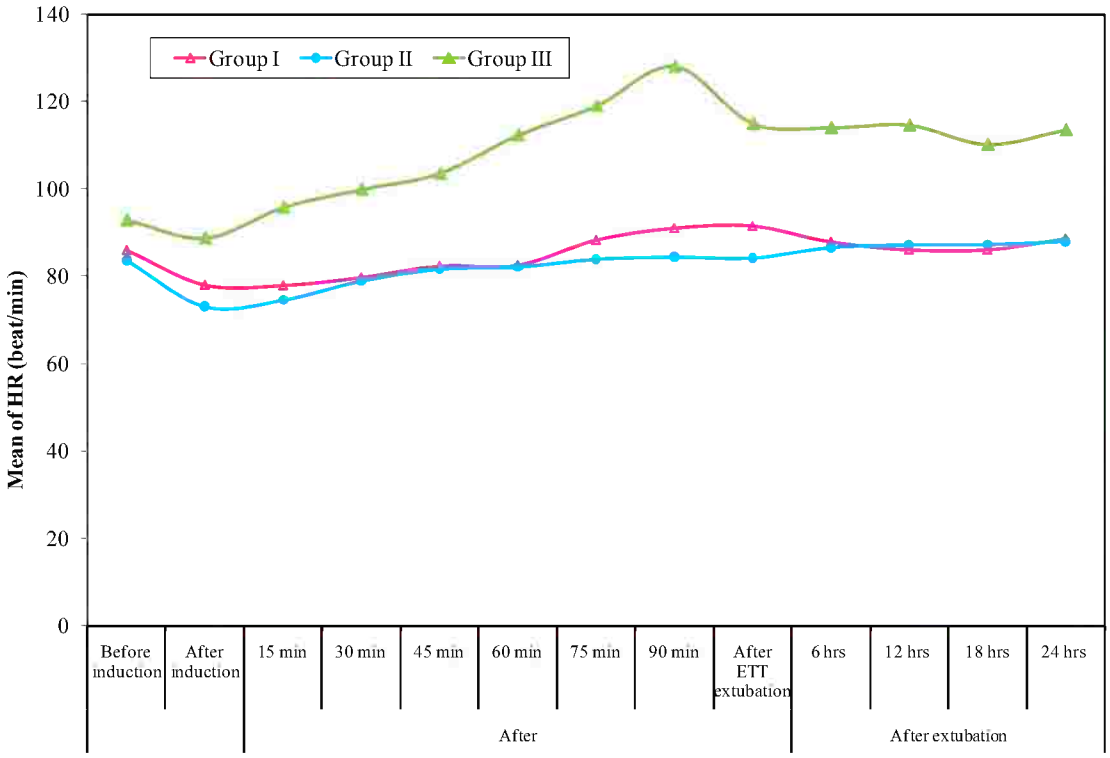

Figure (7): Etween the studied groups according to HR.

Mean arterial blood pressure (mmHg) (Table 5,6,7,8 and Figure 8)

In group I

The mean of mean arterial blood pressure was 95.2±10.1 before induction, there was a significant decrease in mean arterial blood pressure as after induction, at 15 minute, at 30 minute, and at 60 minute the mean was 85.1±7.6, 87.9±5.6±89.6±5.6, and 91.9±6.4 respectively, No significant changes were detected in all other time of measurement.

In group II

The mean of mean arterial blood pressure was 94.0±8.2 before induction, there was a significant decrease in mean arterial blood pressure as after induction, at 15 minute, at 30 minute, at 45 minute, at 60 minute, at 75 minute, after ETT extubation, at 6 hours, at 12 hours, at 18 hours, and at 24 hours the mean was 84.5±5.6, 87.4±5.1, 88.0±5.4, 88.1±4.6, 87.4±4.7, 89.1±3.6, 91.4±5.7, 90.8±5.9, 90.6±6.2, 90.3±5.8, and 90.6±6.0 No significant changes were detected in all other time of measurement.

In group III

The mean of mean arterial blood pressure was100.5±4.5 before induction, then after induction mean arterial blood pressure decreased significantly reaching a mean of 89.6±3.4, while the mean arterial blood pressure rise again significantly at 30 minute, at 45 minute, at 75 minute, after ETT extubation, at 6 hours, at 12 hours, at 18 hours, and at 24 hours reaching a mean of 108.8±9.1, 111.3±8.2, 113.5±5.4, 119.7±3.9, 118.7±2.2, 116.3±5.8, 119.5±5.4, and 118.0±7.1, No significant changes were detected in all other time of measurement.

In comparison between the three studied groups

In comparison between the three studied groups according to mean arterial blood pressure there were statistically significant changes in these measurements after induction (0.038), at 15 minute, at 30 minute, at 45 minute, at 75 minute, at 90 minute, after ETT extubation at 6 hours, at 12 hours, at 18 hours, and at 24 hours (<0.001) as group III showed higher readings than other two groups.

In comparison between group I and group II there was not any significant changes in mean arterial blood pressure.

In comparison between group I and group III according to mean arterial blood pressure it was statistically significantly higher in these measurements at 15 minute (<0.001), at 30 minute(<0.001), at 45 minute(<0.001), at 60 minute(<0.001), at 75 minute(<0.001), at 90 minute(0.003), after ETT extubation(0.001), at 6 hours(<0.001), at 12 hours(<0.001), at 18 hours(<0.001), and at 24 hours(<0.001) in group III.

In comparison between group II and group III according to mean arterial blood pressure it was statistically significantly higher in these measurements at 15 minute(<0.001), at 30 minute(<0.001), at 45 minute(<0.001), at 60 minute(<0.001), at 75 minute(<0.001), at 90 minute(0.001), after ETT extubation(<0.001), at 6 hours(<0.001), at 12 hours(<0.001), at 18 hours(<0.001), and at 24 hours(<0.001) in group III.

Table (5): Changes in MABP in group I.

Patient	Before induction	After induction	After						After ETT extubation	After extubation			
			15 min	30 min	45 min	60 min	75 min	90 min		6 hrs	12 hrs	18 hrs	24 hrs
1	87	70	80	87	95				92	90	89	92	93
2	95	89	90	87	90	92			97	90	94	92	98
3	110	98	97	98	99	100	97		100	102	98	100	100
4	102	90	89	90	92	90			90	96	93	91	95
5	98	88	89	90	92	93	95	93	92	94	98	100	94
6	106	94	95	98	93	95			100	102	99	93	96
7	85	80	79	80	78	81	81		89	86	87	88	86
8	115	90	89	91	92				95	100	110	98	100
9	90	85	88	92	94	96			98	93	92	94	93
10	85	77	80	83	85	82	80		87	89	90	83	91
11	89	82	85	82	87	88	89	90	92	90	88	93	95
12	98	88	95	92	98	100			103	104	100	110	109
13	100	90	92	98	95	98			106	105	106	115	120
14	80	75	84	87	85				90	85	87	89	90
15	88	80	87	89	90	88			90	92	88	89	90
Min.	80.0	70.0	79.0	80.0	78.0	81.0	80.0	90.0	87.0	85.0	87.0	83.0	86.0
Max.	115.0	98.0	97.0	98.0	99.0	100.0	97.0	93.0	106.0	105.0	110.0	115.0	120.0
Mean	95.2	85.1	87.9	89.6	91.0	91.9	88.4	91.5	94.7	94.5	94.6	95.1	96.7
SD.	10.1	7.6	5.6	5.6	5.5	6.4	7.8	2.1	5.7	6.6	7.1	8.4	8.4
Median	95.0	88.0	89.0	90.0	92.0	92.5	89.0	91.5	92.0	93.0	93.0	93.0	95.0
p		<0.001*	0.001*	0.011*	0.062	0.041*	0.082	0.626	0.834	0.676	0.678	0.978	0.551

p_1: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between before induction with each other period
*: Statistically significant at $p \leq 0.05$

Table (6): Changes in MABP in group II.

Patient	Before induction	After induction	After						After ETT extubation	After extubation			
			15 min	30 min	45 min	60 min	75 min	90 min		6 hrs	12 hrs	18 hrs	24 hrs
1	90	83	86	87	90	88			90	88	87	89	90
2	88	80	86	85	88	90	88		90	88	87	88	90
3	92	82	86	88	87	85	88	87	88	89	90	88	87
4	96	90	88	89	88	83	85	88	90	92	93	94	92
5	98	88	87	86	87	88			95	92	94	92	90
6	96	88	86	85	89	88	89		93	92	90	93	94
7	87	80	87	85	84	83	84		88	89	90	88	86
8	100	85	90	94	93	92	90		93	92	94	91	93
9	110	90	96	97	94	93	95		100	102	99	98	99
10	104	92	94	95	93	92	94		98	99	97	96	98
11	102	88	90	92	93	91			99	98	99	100	99
12	90	86	88	89	87	88	89		90	88	89	88	90
13	95	87	92	91	90	92			95	92	93	91	92
14	80	76	79	80	79	78			82	80	78	79	80
15	82	72	76	77	79	80			80	81	79	80	79
Min.	80.0	72.0	76.0	77.0	79.0	78.0	84.0	87.0	80.0	80.0	78.0	79.0	79.0
Max.	110.0	92.0	96.0	97.0	94.0	93.0	95.0	88.0	100.0	102.0	99.0	100.0	99.0
Mean	94.0	84.5	87.4	88.0	88.1	87.4	89.1	87.5	91.4	90.8	90.6	90.3	90.6
SD.	8.2	5.6	5.1	5.4	4.6	4.7	3.6	0.7	5.7	5.9	6.2	5.8	6.0
Median	95.0	86.0	87.0	88.0	88.0	88.0	89.0	87.5	90.0	92.0	90.0	91.0	90.0
p		<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	0.004*	0.144	0.013*	0.001*	0.001*	0.002*	0.002*

p_1: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between before induction with each other period
*: Statistically significant at $p \leq 0.05$

Table (7): Changes in MABP in group III.

Patient	Before induction	After induction	After						After ETT extubation	After extubation			
			15 min	30 min	45 min	60 min	75 min	90 min		6 hrs	12 hrs	18 hrs	24 hrs
1	96	90	98	106	108	105	115		120	115	105	110	104
2	94	88	96	102	106	109			115	118	109	120	115
3	96	87	105	100	118	105	109	116	120	118	128	125	122
4	97	91	100	112	100	113	109	108	120	115	110	119	120
5	100	90	98	93	95	100			110	119	118	113	119
6	105	85	96	99	110	107			117	119	117	130	120
7	110	95	108	105	102	100	106	109	119	118	110	117	118
8	107	90	98	119	109	105	106		118	120	119	120	129
9	104	98	108	120	122	118	120		125	120	118	119	120
10	100	89	110	128	123	119	118	116	120	119	118	117	112
11	98	90	99	110	115	112	116		120	118	116	119	120
12	97	88	102	108	112	115			123	120	115	118	120
13	99	90	105	116	119	118	120		126	120	119	118	106
14	103	88	101	105	113	115	112		123	124	122	130	115
15	102	85	100	109	118	120	118		120	118	120	117	130
Min.	94.0	85.0	96.0	93.0	95.0	100.0	106.0	108.0	110.0	115.0	105.0	110.0	104.0
Max.	110.0	98.0	110.0	128.0	123.0	120	120.0	116.0	126.0	124.0	128.0	130.0	130.0
Mean	100.5	89.6	101.6	108.8	111.3	110.73	113.5	112.3	119.7	118.7	116.3	119.5	118.0
SD.	4.5	3.4	4.5	9.1	8.2	6.8	5.4	4.3	3.9	2.2	5.8	5.4	7.1
Median	100.0	90.0	100.0	108.0	112.0	112.0	115.0	112.5	120.0	119.0	118.0	119.0	120.0
p		<0.001*	0.472	0.005*	0.001*	0.271	<0.001*	0.086	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

p_1: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between before induction with each other period
*: Statistically significant at $p \leq 0.05$

Table (8): Comparison between the studied groups according to MABP.

	Before induction	After induction	After						After ETT extubation	After extubation			
			15 min	30 min	45 min	60 min	75 min	90 min		6 hrs	12 hrs	18 hrs	24 hrs
Group I													
Min.	80.0	70.0	79.0	80.0	78.0	81.0	80.0	90.0	87.0	85.0	87.0	83.0	86.0
Max.	115.0	98.0	97.0	98.0	99.0	100.0	97.0	93.0	106.0	105.0	110.0	115.0	120.0
Mean	95.2	85.1	87.9	89.6	91.0	91.9	88.4	91.5	94.7	94.5	94.6	95.1	96.7
SD.	10.1	7.6	5.6	5.6	5.5	6.4	7.8	2.1	5.7	6.6	7.1	8.4	8.4
Median	95.0	88.0	89.0	90.0	92.0	92.5	89.0	91.5	92.0	93.0	93.0	93.0	95.0
Group II													
Min.	80.0	72.0	76.0	77.0	79.0	78.0	84.0	87.0	80.0	80.0	78.0	79.0	79.0
Max.	110.0	92.0	96.0	97.0	94.0	93.0	95.0	88.0	100.0	102.0	99.0	100.0	99.0
Mean	94.0	84.5	87.4	88.0	88.1	87.4	89.1	87.5	91.4	90.8	90.6	90.3	90.6
SD.	8.2	5.6	5.1	5.4	4.6	4.7	3.6	0.7	5.7	5.9	6.2	5.8	6.0
Median	95.0	86.0	87.0	88.0	88.0	88.0	89.0	87.5	90.0	92.0	90.0	91.0	90.0
Group III													
Min.	94.0	85.0	96.0	93.0	95.0	100.0	106.0	108.0	110.0	115.0	105.0	110.0	104.0
Max.	110.0	98.0	110.0	128.0	123.0	120.0	120.0	116.0	126.0	124.0	128.0	130.0	130.0
Mean	100.5	89.6	101.6	108.8	111.3	110.73	113.5	112.3	119.7	118.7	116.3	119.5	118.0
SD.	4.5	3.4	4.5	9.1	8.2	6.80	5.4	4.3	3.9	2.2	5.8	5.4	7.1
Median	100.0	90.0	100.0	108.0	112.0	112.0	115.0	112.5	120.0	119.0	118.0	119.0	120.0
p	0.069	0.038*	<0.001*	<0.001*	<0.001*	0.224	<0.001*	0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
p_1	0.919	0.961	0.960	0.820	0.450	0.997	0.972	0.562	0.222	0.165	0.241	0.156	0.083
p_2	0.199	0.113	<0.001*	<0.001*	<0.001*	0.373	<0.001*	0.003*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
p_3	0.093	0.063	<0.001*	<0.001*	<0.001*	0.295	<0.001*	0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

p: p value for F test (ANOVA) for comparing between the different studied group
p_1: p value for Post Hoc test (Scheffe) for comparing between group I and group II
p_2: p value for Post Hoc test (Scheffe) for comparing between group I and group III
p_3: p value for Post Hoc test (Scheffe) for comparing between group II and group III
*: Statistically significant at $p \leq 0.05$

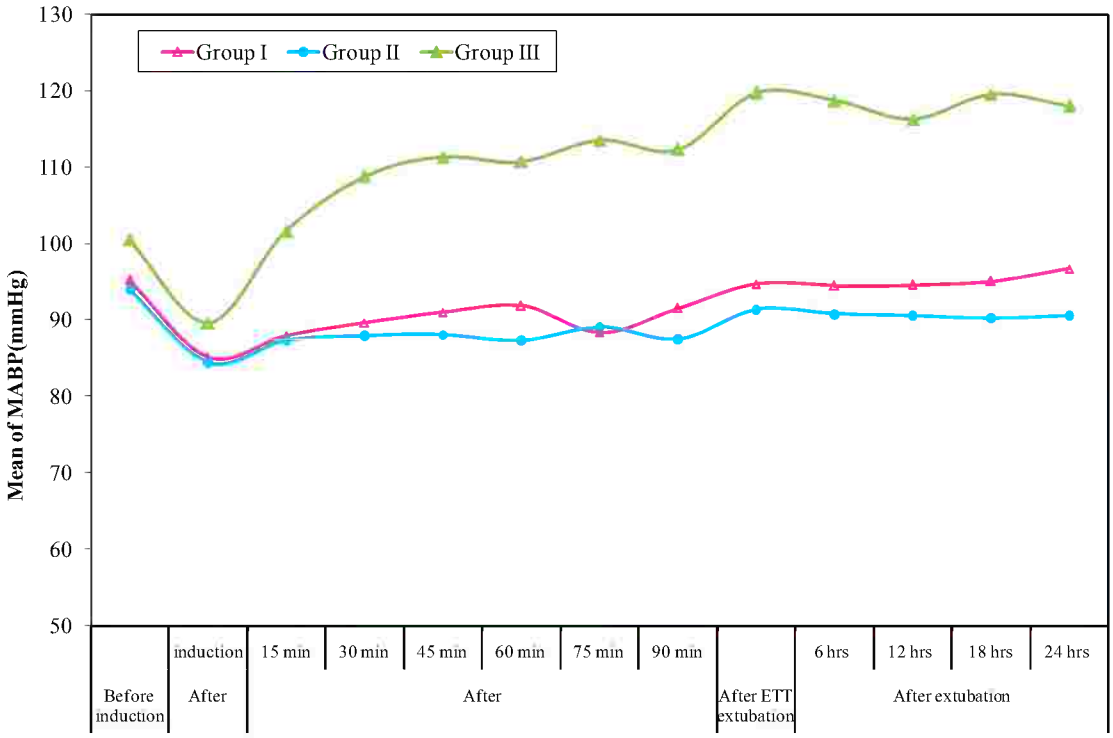

Figure (8): Comparison between the studied groups according to MABP.

Oxygen saturation

There was no change in oxygen saturation in the patients in the three groups along the duration of the study.

B. Postoperative pain

Assessment of pain at rest (static) according to visual analogue scale (VAS) (Table 9,10,11,12 and figure 9)

I. Assessment of pain at rest (static) according to visual analogue scale (VAS) in group I.

On arrival to ward (zero point) the pain intensity according to VAS score was mild ranged from 1 to 3 with mean of 1.9±0.5 then pain intensity increased gradually reaching its maximum after 14 hours as it ranged from 2 to 7 with mean of 3.9±1.6.

II. Assessment of pain at rest (static) according to visual analogue scale (VAS) in group II.

On arrival to the ward (zero line) the pain intensity according to VAS was minimal ranged from 0.0 to 2.0 with mean of 1.1±0.7then pain intensity increased gradually to reach its maximum after 7 hours as it ranged from 2 to 5 with mean of 3.1±1.0 then it decreased again in later measurement.

III. Assessment of pain at rest (static) according to visual analogue scale (VAS) in group III.

On arrival to the ward (zero line) the pain intensity according to VAS ranged from 3 to 6 with mean of 4.2±1.0 the decreased gradually to reach it minimum after 30 minutes as it ranged from 2 to 4 with mean of 2.7±0.7 then it increased gradually to range from 2 to 7 with mean of 4±1.3after 7 hours then increased slightly to reach it maximum after 20 hours as it ranged from 3 to 7 with mean of 4.7±1.3.

IV. Comparison between the studied groups according to assessment of pain at rest (static) according to visual analogue scale (VAS)

Comparison between three studied groups

There was a significant change in these readings arrival to ward (<0.001), after 30 minutes (<0.001), after 60 minutes (<0.001), after 90 minutes (<0.001), after 120 minutes(<0.001), after 3 hours(0.002), after 4 hours(<0.001), after 6 hours(0.009), after 14 hours(0.014), and after 20 hours(<0.001) as group III showed higher readings than other two groups.

Comparison between group I and group II

It was statistically significantly higher in two readings arrival to ward (0.002) and after 30 minutes (0.0128) in group I.

Comparison between group I and group III

It was statistically significantly higher in these readings arrival to ward(<0.001), after 30 minutes(<0.001), after 60 minutes(<0.001), after 90 minutes(<0.001), after 120 minutes(0.001), after 4 hours(<0.001), after 5 hours(<0.001), after 6 hours(0.091), and after 20 hours(0.006) in group III.

Comparison between group II and group III

It was statistically significantly higher in these readings arrival to ward(<0.001), after 30 minutes(<0.001), after 60 minutes(<0.001), after 90 minutes(<0.001), after 120 minutes(<0.001), after 3 hours(<0.001), after 4 hours(<0.001), after 5 hours(<0.001), after 7 hours(0.003), and after 20 hours(0.005) in group III.

Table (9): In VAS Changes "static" in group I.

Patient	Arrival to ward	After											
		30 min	60 min	90 min	120 min	3 hrs	4 hrs	5 hrs	6 hrs	7 hrs	8 hrs	14 hrs	20 hrs
1	2	2	2	2	2	2	2	2	2	4	2	3	2
2	2	2	1	2	2	2	2	2	2	2	4	3	2
3	1	2	1	2	1	2	2	2	3	3	6	3	2
4	2	2	2	2	2	2	2	2	4	3	2	2	2
5	2	1	1	2	1	2	2	2	2	2	5	2	3
6	2	1	2	1	3	2	2	1	2	2	5	3	2
7	2	2	2	2	1	2	1	2	1	3	4	3	3
8	2	2	1	2	3	2	3	5	3	2	3	4	2
9	2	2	2	2	1	4	2	3	2	3	3	6	2
10	2	2	1	2	2	2	4	3	3	3	2	5	1
11	1	1	1	2	2	2	1	2	2	7	3	3	4
12	3	2	2	5	3	3	2	1	2	2	2	7	2
13	2	2	1	2	2	3	2	3	2	5	2	3	7
14	1	2	3	2	3	3	3	3	3	5	3	6	6
15	2	2	1	1	2	2	2	3	3	4	3	5	6
Min.	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	2.0	2.0	1.0
Max.	3.0	2.0	3.0	5.0	3.0	4.0	4.0	5.0	4.0	7.0	6.0	7.0	7.0
Mean	1.9	1.8	1.5	2.1	2.0	2.3	2.1	2.4	2.4	3.3	3.3	3.9	3.1
SD.	0.5	0.4	0.6	0.9	0.8	0.6	0.7	1.0	0.7	1.4	1.3	1.6	1.8
Median	2.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	3.0	2.0

Table (10): Changes in VAS "static" in group II.

Patient	Arrival to ward	After											
		30 min	60 min	90 min	120 min	3 hrs	4 hrs	5 hrs	6 hrs	7 hrs	8 hrs	14 hrs	20 hrs
1	2	2	2	1	2	1	2	2	2	4	3	2	2
2	1	1	1	1	2	2	3	3	2	3	4	2	1
3	1	2	1	2	3	2	2	2	3	4	2	2	2
4	0	1	1	1	2	2	2	2	2	3	3	5	2
5	1	1	1	1	1	2	2	1	2	4	2	2	2
6	1	1	2	1	2	2	2	3	3	3	3	4	3
7	2	2	2	2	2	2	2	4	2	2	3	2	2
8	0	1	2	1	2	2	2	2	4	2	2	2	3
9	1	1	2	3	2	3	2	4	2	3	3	2	3
10	0	1	1	2	2	2	2	3	3	5	2	2	3
11	1	2	2	2	2	2	3	3	2	2	4	4	2
12	2	2	2	2	2	2	3	3	2	4	3	3	3
13	2	2	2	3	3	1	1	4	2	2	3	3	1
14	1	2	3	4	2	2	2	2	2	4	3	4	2
15	1	2	3	2	3	2	3	4	2	2	2	5	3
Min.	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	1.0
Max.	2.0	2.0	3.0	4.0	3.0	3.0	3.0	4.0	4.0	5.0	4.0	5.0	3.0
Mean	1.1	1.5	1.8	1.9	2.1	1.9	2.2	2.8	2.3	3.1	2.8	2.9	2.3
SD.	0.7	0.5	0.7	0.9	0.5	0.5	0.6	0.9	0.6	1.0	0.7	1.2	0.7
Median	1.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0	3.0	3.0	2.0	2.0

Table (11): Changes in VAS "static" in group III.

Patient	Arrival to ward	After											
		30 min	60 min	90 min	120 min	3 hrs	4 hrs	5 hrs	6 hrs	7 hrs	8 hrs	14 hrs	20 hrs
1	3	3	3	3	4	3	3	3	2	3	5	3	6
2	4	3	3	3	3	2	3	3	4	3	3	5	3
3	5	2	3	3	3	3	3	3	3	3	4	2	3
4	3	4	3	3	3	3	3	3	2	3	6	3	4
5	4	2	2	2	2	2	2	3	3	7	2	3	5
6	3	3	2	3	4	3	3	3	3	3	3	7	4
7	4	2	3	3	3	2	3	2	3	5	3	6	7
8	5	2	3	3	3	3	3	3	3	4	3	5	4
9	4	3	3	3	3	2	3	2	3	5	2	6	5
10	6	2	3	3	3	3	3	3	3	2	3	5	4
11	5	3	3	3	3	3	3	3	3	4	3	4	6
12	4	2	3	3	3	3	3	3	3	5	3	4	3
13	3	4	3	3	3	3	3	3	3	5	3	6	6
14	6	3	3	3	3	2	3	3	3	5	3	5	4
15	4	3	2	3	2	3	3	3	3	3	6	3	6
Min.	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0
Max.	6.0	4.0	3.0	3.0	4.0	3.0	3.0	3.0	4.0	7.0	6.0	7.0	7.0
Mean	4.2	2.7	2.8	2.9	3.0	2.7	2.9	2.9	2.9	4.0	3.5	4.5	4.7
SD.	1.0	0.7	0.4	0.3	0.5	0.5	0.3	0.4	0.5	1.3	1.2	1.5	1.3
Median	4.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	5.0	4.0

Table (12): Comparison between the studied groups according to VAS "static".

	Arrival to ward	After											
		30 min	60 min	90 min	120 min	3 hrs	4 hrs	5 hrs	6 hrs	7 hrs	8 hrs	14 hrs	20 hrs
Group I													
Min.	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	2.0	2.0	1.0
Max.	3.0	2.0	3.0	5.0	3.0	4.0	4.0	5.0	4.0	7.0	6.0	7.0	7.0
Mean	1.9	1.8	1.5	2.1	2.0	2.3	2.1	2.4	2.4	3.3	3.3	3.9	3.1
SD.	0.5	0.4	0.6	0.9	0.8	0.6	0.7	1.0	0.7	1.4	1.3	1.6	1.8
Median	2.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	3.0	2.0
Group II													
Min.	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	1.0
Max.	2.0	2.0	3.0	4.0	3.0	3.0	3.0	4.0	4.0	5.0	4.0	5.0	3.0
Mean	1.1	1.5	1.8	1.9	2.1	1.9	2.2	2.8	2.3	3.1	2.8	2.9	2.3
SD.	0.7	0.5	0.7	0.9	0.5	0.5	0.6	0.9	0.6	1.0	0.7	1.2	0.7
Median	1.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0	3.0	3.0	2.0	2.0
Group III													
Min.	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0
Max.	6.0	4.0	3.0	3.0	4.0	3.0	3.0	3.0	4.0	7.0	6.0	7.0	7.0
Mean	4.2	2.7	2.8	2.9	3.0	2.7	2.9	2.9	2.9	4.0	3.5	4.5	4.7
SD.	1.0	0.7	0.4	0.3	0.5	0.5	0.3	0.4	0.5	1.3	1.2	1.5	1.3
Median	4.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	5.0	4.0
p	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	0.002*	<0.001*	0.113	0.009*	0.143	0.353	0.014*	<0.001*
p_1	0.002*	0.0128*	0.261	0.434	0.603	0.057	0.601	0.196	0.679	0.931	0.426	0.065	0.459
p_2	<0.001*	<0.001*	<0.001*	<0.001*	0.001*	0.058	<0.001*	0.022*	0.019*	0.116	0.566	0.247	0.006*
p_3	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	0.001*	<0.001*	0.813	0.003*	0.068	0.133	0.005*

p: p value for Kruskal Wallis test for comparing between the different studied groups
p_1: p value for Mann Whitney test for comparing between group I and group II
p_2: p value for Mann Whitney test for comparing between group I and group III
p_3: p value for Mann Whitney test for comparing between group II and group III
*: Statistically significant at $p \leq 0.05$

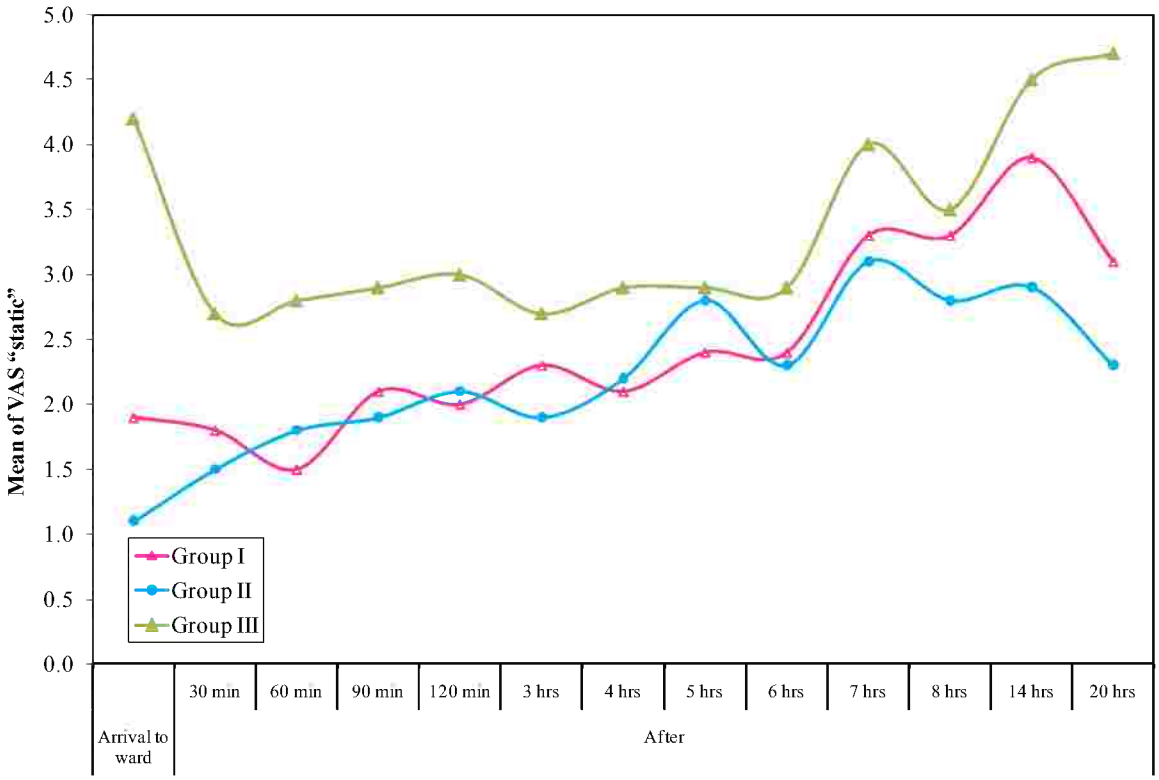

Figure (9): Comparison between the studied groups according to VAS "static".

Assessment of pain at rest (dynamic) according to visual analogue scale (VAS) (Table 13,14,15,16 and Figure 10)

I. Assessment of pain at rest (dynamic) according to visual analogue scale (VAS) in group I.

On arrival to the ward (zero line) the pain intensity according to VAS was mild ranged from 1 to 3 with mean of 2.1±0.5 then the pain intensity increased gradually to reach it maximum after 20 hours as it ranged from 2 to 7 with mean of 4.0±1.6.

II. Assessment of pain at rest (dynamic) according to visual analogue scale (VAS) in group II.

On arrival to the ward (zero line) the pain intensity according to VAS was minimal as it ranged from 1 to 2 with mean of 1.5±0.5 then the pain intensity increased gradually to reach its maximum after 7 hours as it ranged from 2 to 5 with mean of 3.1±1.0 then it decreased in later measurement.

III. Assessment of pain at rest (dynamic) according to visual analogue scale (VAS) in group III.

On arrival to the ward (zero line) the pain intensity according to VAS ranged from 3 to 6 with mean of 4.5±1.2 then it decreased to reach it minimum after 60 minutes as it ranged from 2 to 3 with mean of 2.9±0.3 then it increased gradually to reach its maximum after 20 hours as it ranged from 3 to 7 with mean of 4.9±1.4.

IV. Comparison between the studied groups according to assessment of pain at rest (dynamic) according to visual analogue scale (VAS)

Comparison between three studied groups

There were statistically significantly differences in these readings arrival to ward (<0.001), after 30 minutes(<0.001), after 60 minutes(<0.001), after 90 minutes(<0.001), after 120 minutes(0.002), after 3 hours(<0.001), after 4 hours(0.002), after 6 hours(0.008), after 14 hours(0.018), and after 20 hours(0.001) as group III showed higher readings than other two groups.

Comparison between group I and group II

It was statistically significantly higher in these readings arrival to ward (0.004), after 30 minutes (0.015), after 3 hours (0.046), and after 20 hours (0.041) in group I.

Comparison between group I and group III

It was statistically significantly higher in these readings arrival to ward (<0.001), after 30 minutes(0.001), after 60 minutes(0.001), after 90 minutes(<0.001), after 120 minutes(0.028), after 3 hours(0.011), after 4 hours(0.009), after 5 hours(0.049), and after 6 hours(0.015) in group III.

Comparison between group II and group III

It was statistically significantly higher in these readings arrival to ward(<0.001), after 30 minutes(<0.001), after 60 minutes(<0.001), after 90 minutes(<0.001), after 120 minutes(<0.001), after 3 hours(<0.001), after 4 hours(<0.001), after 6 hours(0.003), after 7 hours(0.047), after 14 hours(0.007), and after 20 hours(<0.001) in group III.

Table (13): Changes in VAS "dynamic" in group I.

Patient	Arrival to ward	After											
		30 min	60 min	90 min	120 min	3 hrs	4 hrs	5 hrs	6 hrs	7 hrs	8 hrs	14 hrs	20 hrs
1	2	3	2	2	3	2	3	2	2	4	2	3	4
2	2	2	2	2	2	3	2	3	2	2	4	3	5
3	2	3	3	2	4	2	2	2	3	3	6	3	2
4	2	2	2	2	2	2	3	2	4	3	2	2	3
5	3	2	2	2	3	2	2	2	2	3	5	2	4
6	2	2	2	1	3	2	2	1	2	2	5	3	3
7	2	2	2	2	1	2	3	2	1	3	4	3	5
8	2	2	2	2	3	2	3	6	3	2	3	4	2
9	2	2	2	2	2	4	2	3	3	3	3	6	2
10	2	2	2	2	2	2	4	3	3	3	2	5	4
11	1	2	3	2	2	2	1	2	2	7	3	3	5
12	3	2	2	5	3	3	2	1	2	2	2	7	2
13	2	2	3	2	2	3	2	3	2	6	2	3	7
14	2	2	3	2	3	3	3	3	3	5	3	6	6
15	2	2	3	2	2	2	2	3	3	4	3	5	6
Min.	1.0	2.0	2.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Max.	3.0	3.0	3.0	5.0	4.0	4.0	4.0	6.0	4.0	7.0	6.0	7.0	7.0
Mean	2.1	2.1	2.3	2.1	2.5	2.4	2.4	2.5	2.5	3.5	3.3	3.9	4.0
SD.	0.5	0.4	0.5	0.8	0.7	0.6	0.7	1.2	0.7	1.5	1.3	1.6	1.6
Median	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	3.0	4.0

Table (14): Changes in VAS "dynamic" in group II.

Patient	Arrival to ward	After											
		30 min	60 min	90 min	120 min	3 hrs	4 hrs	5 hrs	6 hrs	7 hrs	8 hrs	14 hrs	20 hrs
1	2	2	2	2	2	1	2	2	2	4	3	2	3
2	1	2	2	1	2	2	3	3	2	3	4	2	3
3	1	2	1	2	3	2	2	2	3	4	2	2	2
4	1	1	2	2	2	2	2	2	3	3	3	5	2
5	1	2	1	1	2	2	2	3	2	4	2	2	3
6	2	1	2	1	2	2	2	3	3	3	3	4	3
7	2	2	2	2	2	2	2	4	2	2	3	2	2
8	1	1	2	2	2	2	2	2	4	2	2	2	3
9	1	1	2	3	2	3	2	4	2	3	3	2	3
10	1	2	1	2	2	2	2	3	3	5	2	2	4
11	1	2	3	2	2	2	3	3	2	2	4	4	2
12	2	2	2	2	2	2	3	3	2	4	3	3	3
13	2	2	2	3	3	2	2	4	2	2	3	3	3
14	2	2	3	4	2	2	2	2	2	4	3	4	2
15	2	2	3	2	3	2	3	4	2	2	2	6	4
Min.	1.0	1.0	1.0	1.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Max.	2.0	2.0	3.0	4.0	3.0	3.0	3.0	4.0	4.0	5.0	4.0	6.0	4.0
Mean	1.5	1.7	2.0	2.1	2.2	2.0	2.3	2.9	2.4	3.1	2.8	3.0	2.8
SD.	0.5	0.5	0.7	0.8	0.4	0.4	0.5	0.8	0.6	1.0	0.7	1.3	0.7
Median	1.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0	3.0	3.0	2.0	3.0

Table (15): Changes in VAS "dynamic" in group III.

Patient	Arrival to ward	After											
		30 min	60 min	90 min	120 min	3 hrs	4 hrs	5 hrs	6 hrs	7 hrs	8 hrs	14 hrs	20 hrs
1	3	3	3	3	5	3	3	3	3	3	7	3	6
2	6	3	3	3	3	3	3	3	5	3	3	6	3
3	5	3	3	3	3	3	3	3	3	3	6	2	3
4	3	6	3	3	3	3	3	3	2	3	6	3	4
5	4	2	3	2	2	2	2	3	3	7	2	3	6
6	3	3	2	3	4	3	3	3	3	3	3	7	4
7	4	3	3	3	3	2	3	2	3	5	3	6	7
8	5	2	3	3	3	3	3	3	3	7	3	5	6
9	6	3	3	3	3	3	3	2	3	5	2	6	5
10	6	2	3	3	3	3	3	3	3	2	3	5	4
11	5	3	3	3	3	3	3	3	3	4	3	4	6
12	4	2	3	3	3	3	3	3	3	5	3	4	3
13	3	4	3	3	3	3	3	3	3	7	3	6	7
14	6	3	3	3	3	3	3	3	3	5	3	5	4
15	5	3	3	3	2	3	3	3	3	3	6	3	6
Min.	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0
Max.	6.0	6.0	3.0	3.0	5.0	3.0	3.0	3.0	5.0	7.0	7.0	7.0	7.0
Mean	4.5	3.0	2.9	2.9	3.1	2.9	2.9	2.9	3.1	4.3	3.7	4.5	4.9
SD.	1.2	1.0	0.3	0.3	0.7	0.4	0.3	0.4	0.6	1.7	1.6	1.5	1.4
Median	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	5.0	5.0

Table (16): Comparison between the studied groups according to VAS "dynamic".

	Arrival to ward	After											
		30 min	60 min	90 min	120 min	3 hrs	4 hrs	5 hrs	6 hrs	7 hrs	8 hrs	14 hrs	20 hrs
Group I													
Min.	1.0	2.0	2.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Max.	3.0	3.0	3.0	5.0	4.0	4.0	4.0	6.0	4.0	7.0	6.0	7.0	7.0
Mean	2.1	2.1	2.3	2.1	2.5	2.4	2.4	2.5	2.5	3.5	3.3	3.9	4.0
SD.	0.5	0.4	0.5	0.8	0.7	0.6	0.7	1.2	0.7	1.5	1.3	1.6	1.6
Median	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	3.0	4.0
Group II													
Min.	1.0	1.0	1.0	1.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Max.	2.0	2.0	3.0	4.0	3.0	3.0	3.0	4.0	4.0	5.0	4.0	6.0	4.0
Mean	1.5	1.7	2.0	2.1	2.2	2.0	2.3	2.9	2.4	3.1	2.8	3.0	2.8
SD.	0.5	0.5	0.7	0.8	0.4	0.4	0.5	0.8	0.6	1.0	0.7	1.3	0.7
Median	1.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0	3.0	3.0	2.0	3.0
Group III													
Min.	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0
Max.	6.0	6.0	3.0	3.0	5.0	3.0	3.0	3.0	5.0	7.0	7.0	7.0	7.0
Mean	4.5	3.0	2.9	2.9	3.1	2.9	2.9	2.9	3.1	4.3	3.7	4.5	4.9
SD.	1.2	1.0	0.3	0.3	0.7	0.4	0.3	0.4	0.6	1.7	1.6	1.5	1.4
Median	5.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	5.0	5.0
p	<0.001*	<0.001*	<0.001*	<0.001*	0.002*	<0.001*	0.002*	0.132	0.008*	0.114	0.301	0.018*	0.001*
p_1	0.004*	0.015*	0.144	0.936	0.212	0.046*	0.574	0.128	0.673	0.763	0.426	0.078	0.041*
p_2	<0.001*	0.001*	0.001*	<0.001*	0.028*	0.011*	0.009*	0.049*	0.015*	0.120	0.414	0.214	0.118
p_3	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	0.865	0.003*	0.047*	0.121	0.007*	<0.001*

p: p value for Kruskal Wallis test for comparing between the different studied groups
p_1: p value for Mann Whitney test for comparing between group I and group II
p_2: p value for Mann Whitney test for comparing between group I and group III
p_3: p value for Mann Whitney test for comparing between group II and group III
*: Statistically significant at $p \leq 0.05$

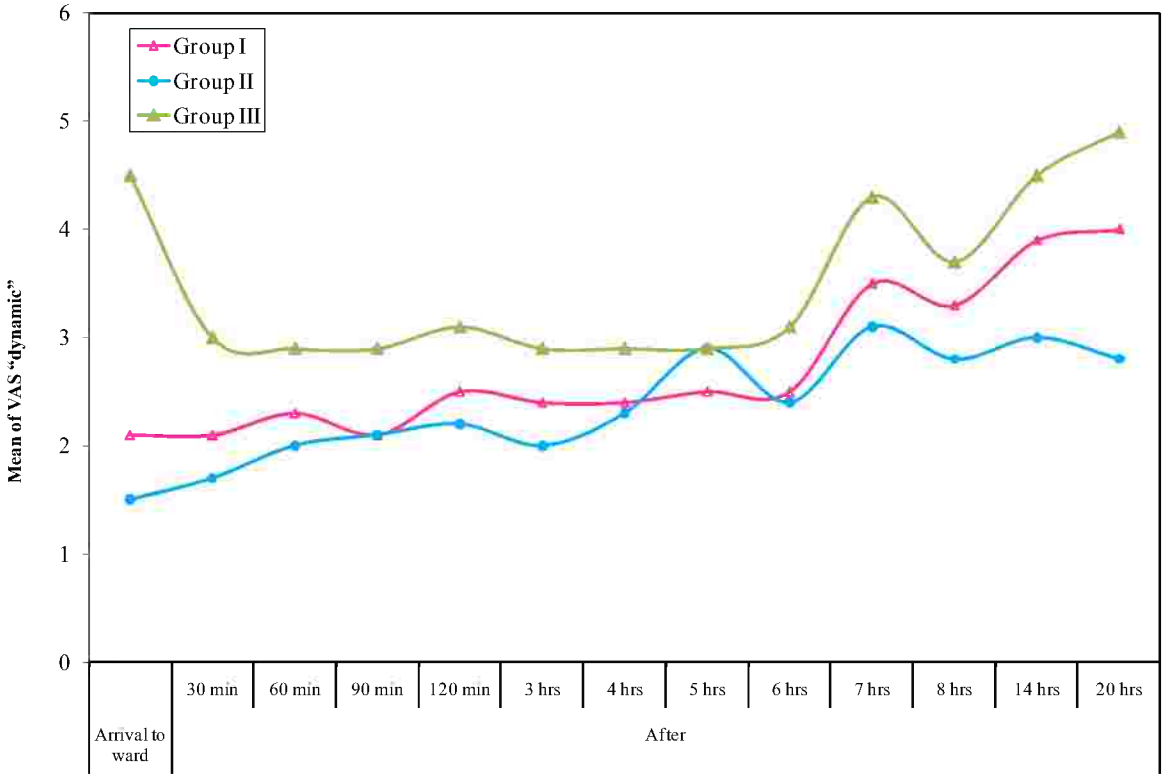

Figure (10): Comparison between the studied groups according to VAS "dynamic".

C. Analgesic consumption

1. Time of first dose f analgesia (Table 17, Figure 11)

- **In group I** the time of first dose of analgesia ranged from 1.50 hours to 8.0 hours with mean of 5.90±2.25.
- **In group II** the time of first dose of analgesia ranged from 1.50 hours to 14.0 hours with mean of 7.37±3.22.
- **In group III** the time of first dose of analgesia ranged from 0.0 hours to 2.0 hours with mean of 0.33±0.7.
- **In comparison between three studied groups** according to the time of first dose of analgesia showed significant change (<0.001) as group III needed earlier analgesia than two other groups.
- **In comparison between group I and group II** according to the time of first dose of analgesia showed no significant changes (0.231).
- **In comparison between group I and group III** according to the time of first dose of analgesia showed statistically significant difference as group III needed earlier analgesia (<0.001).
- **In comparison between group II and group III** according to the time of first dose of analgesia showed statistically significant difference as group III needed earlier analgesia (<0.001).

Table (17): Comparison between the studied groups according to analgesic consumption.

	1st dose		
	Group I	**Group II**	**Group III**
1	7 hrs	7 hrs	120 min.
2	8 hrs	8 hrs	0
3	120 min.	7 hrs	0
4	6 hrs	14 hrs	0
5	8 hrs	7 hrs	30 min.
6	8 hrs	14 hrs	0
7	8 hrs	5 hrs	120 min.
8	5 hrs	6 hrs	0
9	3 hrs	5 hrs	0
10	4 hrs	7 hrs	0
11	7 hrs	8 hrs	0
12	90 min.	7 hrs	0
13	7 hrs	5 hrs	30 min.
14	7 hrs	90 min.	0
15	7 hrs	9 hrs	0
Min.	1.50	1.50	0.0
Max.	8.0	14.0	2.0
Mean	5.90	7.37	0.33
SD.	2.25	3.22	0.70
Median	7.0	7.0	0.0
p	<0.001*		
p_1	0.231		
p_2	<0.001*		
p_3	<0.001*		

p: p value for F test (ANOVA) for comparing between the different studied group
p_1: p value for Post Hoc test (Scheffe) for comparing between group I and group II
p_2: p value for Post Hoc test (Scheffe) for comparing between group I and group III
p_3: p value for Post Hoc test (Scheffe) for comparing between group II and group III
*: Statistically significant at $p \leq 0.05$

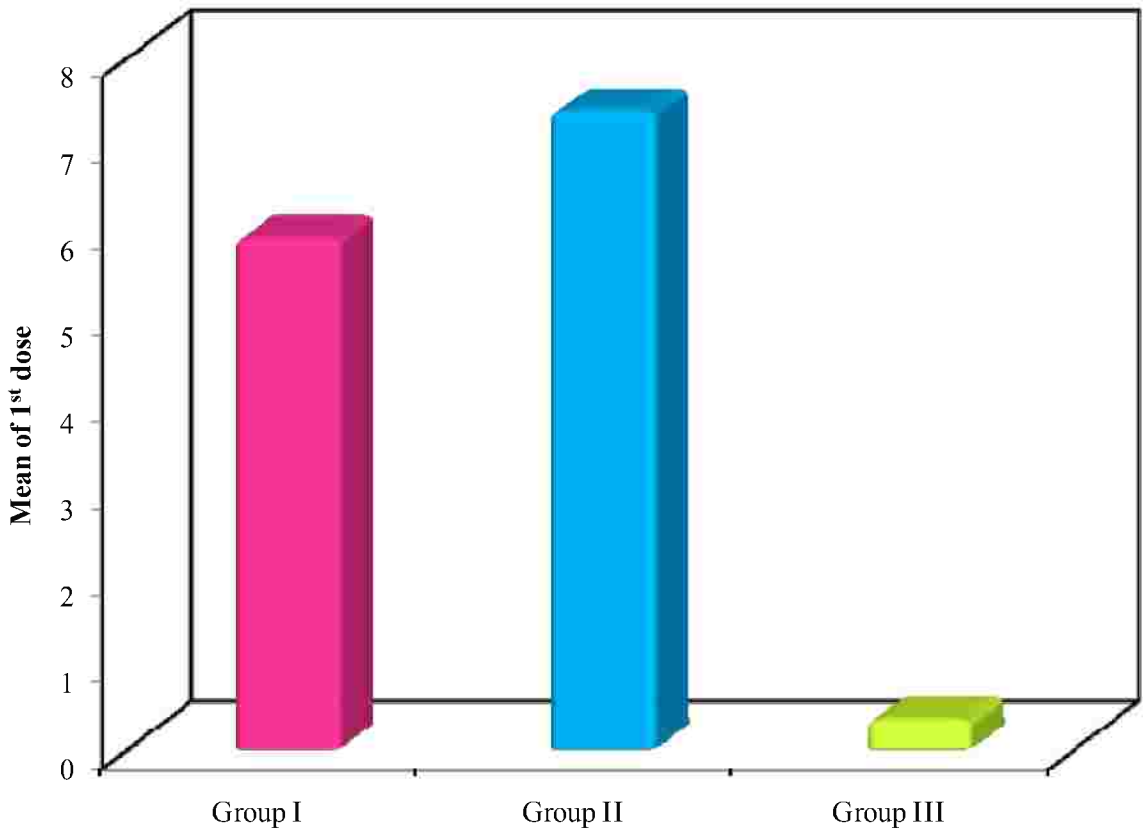

Figure (11): Comparison between the studied groups according to analgesic consumption.

2. Total analgesic consumption in milligrams (Table 18, Figure 12)

- **In group I** total analgesic consumption ranged from 30.0 mg to 90.0 mg with mean of 62.0±17.8 mg.
- **In group II** total analgesic consumption ranged from 30.0 mg to 90.0 mg with mean of 40.0±21.7 mg.
- **In group III** total analgesic consumption ranged from 60.0 mg to 120.0 mg with mean of 100.0±18.5 mg.
- **In comparison between the three studied groups** according to total analgesic consumption showed significant change as group III needed more analgesia than two other groups (<0.001).
- **In comparison between group I and group II** according to total analgesic consumption it was statistically significantly more in group I(0.013).
- **In comparison between group I and group III** according to total analgesic consumption it was statistically significantly more in group III(<0.001).
- **In comparison between group II and group III** according to total analgesic consumption it was statistically significantly more in group III(<0.001).

Table (18): Comparison between the studied groups according to analgesic consumption.

	Total dose		
	Group I	**Group II**	**Group III**
1	60 mg	30 mg	90 mg
2	60 mg	30 mg	90 mg
3	60 mg	30 mg	60 mg
4	30 mg	30 mg	90 mg
5	60 mg	30 mg	90 mg
6	30 mg	30 mg	90 mg
7	60mg	30 mg	120 mg
8	60 mg	30 mg	120 mg
9	60 mg	30 mg	120 mg
10	90 mg	30 mg	90 mg
11	60 mg	60 mg	120 mg
12	60 mg	30 mg	90 mg
13	60 mg	30 mg	120 mg
14	90 mg	90 mg	120 mg
15	90 mg	90 mg	90 mg
Min.	30.0	30.0	60.0
Max.	90.0	90.0	120.0
Mean	62.0	40.0	100.0
SD.	17.8	21.7	18.5
Median	60.0	30.0	90.0
p	<0.001*		
p_1	0.013*		
p_2	<0.001*		
p_3	<0.001*		

p: p value for F test (ANOVA) for comparing between the different studied group
p_1: p value for Post Hoc test (Scheffe) for comparing between group I and group II
p_2: p value for Post Hoc test (Scheffe) for comparing between group I and group III
p_3: p value for Post Hoc test (Scheffe) for comparing between group II and group III
*: Statistically significant at $p \leq 0.05$

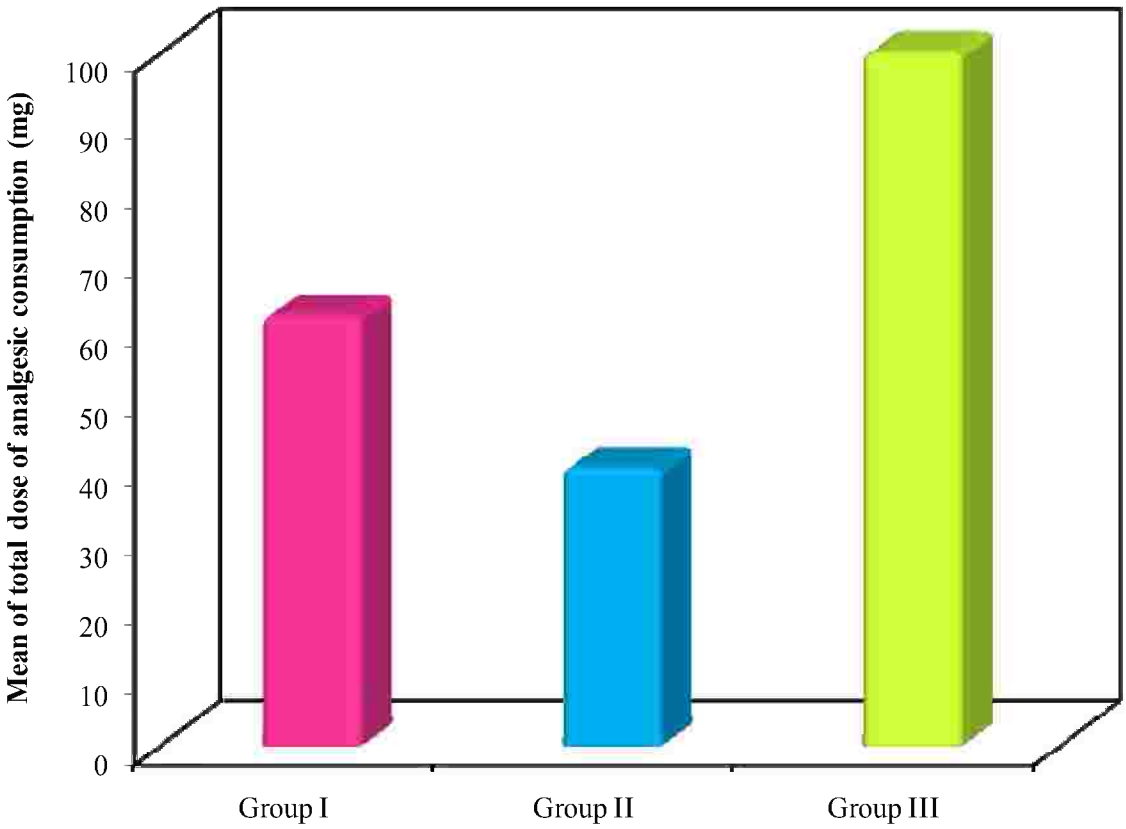

Figure (12): Comparison between the studied groups according to analgesic consumption**.**

D. Level of sedation (Table 19,20,21,22 and Figure 13)

- **Comparison between three studied groups** according to Ramsay sedation score there was a significant change only on arrival to ward (p=0.047) as group III showed less post operative sedation according to Ramsay sedation score .
- **Comparison between group I and group II** according to Ramsay sedation score there was not any significant difference.
- **Comparison between group I and group III** according to Ramsay sedation score there was not any significant difference.
- **Comparison between group II and group II** according to Ramsay sedation score there was only significant change on arrival to ward.

Table (19): Changes in post operative sedation in group I.

Patient	Arrival to ward	After			
		6 hrs	12hrs	18 hrs	24 hrs
1	2	2	2	2	2
2	3	2	2	2	2
3	2	2	2	2	2
4	1	2	2	2	2
5	2	2	3	2	2
6	2	2	2	2	2
7	2	2	2	2	2
8	2	3	2	2	2
9	3	2	2	2	2
10	3	2	2	2	2
11	2	2	2	2	2
12	2	2	2	2	2
13	2	3	2	2	2
14	2	2	2	2	2
15	2	2	2	2	2
Min. – Max.	1.0 – 3.0	2.0 – 3.0	2.0 – 3.0	2.0 – 2.0	2.0 – 2.0
Mean ± SD.	2.13 ± 0.52	2.13 ± 0.35	2.07 ± 0.26	2.0 ± -	2.0 ± -
Median	2.0	2.0	2.0	2.0	2.0
1	1 (6.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
2	11 (73.3%)	13 (86.7%)	14 (93.3%)	15 (100.0%)	15 (100.0%)
3	3 (20.0%)	2 (13.3%)	1 (6.7%)	0 (0.0%)	0 (0.0%)

Table (20): Changes in post operative sedation in group II.

Patient	Arrival to ward	After			
		6 hrs	12hrs	18 hrs	24 hrs
1	3	2	2	2	2
2	3	2	2	2	2
3	2	3	2	2	2
4	2	2	2	2	2
5	2	2	2	2	2
6	2	3	2	2	2
7	3	2	2	2	2
8	2	2	2	2	2
9	3	2	2	2	2
10	2	2	2	2	2
11	3	2	2	2	2
12	2	2	2	2	2
13	3	2	2	2	2
14	1	2	2	2	2
15	2	2	2	2	2
Min. – Max.	1.0 – 3.0	2.0 – 3.0	2.0 – 3.0	2.0 – 2.0	2.0 – 2.0
Mean ± SD.	2.13 ± 0.52	2.13 ± 0.35	2.07 ± 0.26	2.0 ± -	2.0 ± -
Median	2.0	2.0	2.0	2.0	2.0
1	1 (6.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
2	8 (53.3%)	13 (86.7%)	15 (100.0%)	15 (100.0%)	15 (100.0%)
3	6 (40.0%)	2 (13.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Table (21): Changes in post operative sedation in group III.

Patient	Arrival to ward	After			
		6 hrs	12hrs	18 hrs	24 hrs
1	1	2	2	2	2
2	2	2	3	2	2
3	2	2	2	2	2
4	2	2	2	2	2
5	2	2	2	2	2
6	2	2	2	2	2
7	2	2	2	2	2
8	2	2	2	2	2
9	1	2	2	2	2
10	2	2	2	2	2
11	2	2	2	2	2
12	2	2	2	2	2
13	2	2	2	2	2
14	2	2	2	2	2
15	2	2	2	2	2
Min. – Max.	1.0 – 2.0	2.0 – 2.0	2.0 – 3.0	2.0 – 2.0	2.0 – 2.0
Mean ± SD.	1.87 ± 0.35	2.0 ± -	2.07 ± 0.26	2.0 ± -	2.0 ± -
Median	2.0	2.0	2.0	2.0	2.0
1	2 (13.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
2	13 (86.7%)	15 (100.0%)	14 (93.3%)	15 (100.0%)	15 (100.0%)
3	0 (0.0%)	0 (0.0%)	1 (6.7%)	0 (0.0%)	0 (0.0%)

Table (22): Comparison between the studied group according to post operative sedation.

	Arrival to ward	After			
		6 hrs	12hrs	18 hrs	24 hrs
Group I					
Min. – Max.	1.0 – 3.0	2.0 – 3.0	2.0 – 3.0	2.0 – 2.0	2.0 – 2.0
Mean ± SD.	2.13 ± 0.52	2.13 ± 0.35	2.07 ± 0.26	2.0 ± -	2.0 ± -
Median	2.0	2.0	2.0	2.0	2.0
1	1 (6.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
2	11 (73.3%)	13 (86.7%)	14 (93.3%)	15 (100.0%)	15 (100.0%)
3	3 (20.0%)	2 (13.3%)	1 (6.7%)	0 (0.0%)	0 (0.0%)
Group II					
Min. – Max.	1.0 – 3.0	2.0 – 3.0	2.0 – 2.0	2.0 – 2.0	2.0 – 2.0
Mean ± SD.	2.33 ± 0.62	2.13 ± 0.35	2.0 ± -	2.0 ± -	2.0 ± -
Median	2.0	2.0	2.0	2.0	2.0
1	1 (6.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
2	8 (53.3%)	13 (86.7%)	15 (100.0%)	15 (100.0%)	15 (100.0%)
3	6 (40.0%)	2 (13.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Group III					
Min. – Max.	1.0 – 2.0	2.0 – 2.0	2.0 – 3.0	2.0 – 2.0	2.0 – 2.0
Mean ± SD.	1.87 ± 0.35	2.0 ± -	2.07 ± 0.26	2.0 ± -	2.0 ± -
Median	2.0	2.0	2.0	2.0	2.0
1	2 (13.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
2	13 (86.7%)	15 (100.0%)	14 (93.3%)	15 (100.0%)	15 (100.0%)
3	0 (0.0%)	0 (0.0%)	1 (6.7%)	0 (0.0%)	0 (0.0%)
p	0.047*	0.342	0.600	1.000	1.000
p_1	0.304	1.000	0.317	1.000	1.000
p_2	0.108	0.150	1.000	1.000	1.000
p_3	0.017*	0.150	0.317	1.000	1.000

p: p value for Kruskal Wallis test for comparing between the different studied groups
p_1: p value for Mann Whitney test for comparing between group I and group II
p_2: p value for Mann Whitney test for comparing between group I and group III
p_3: p value for Mann Whitney test for comparing between group II and group III
*: Statistically significant at $p \leq 0.05$

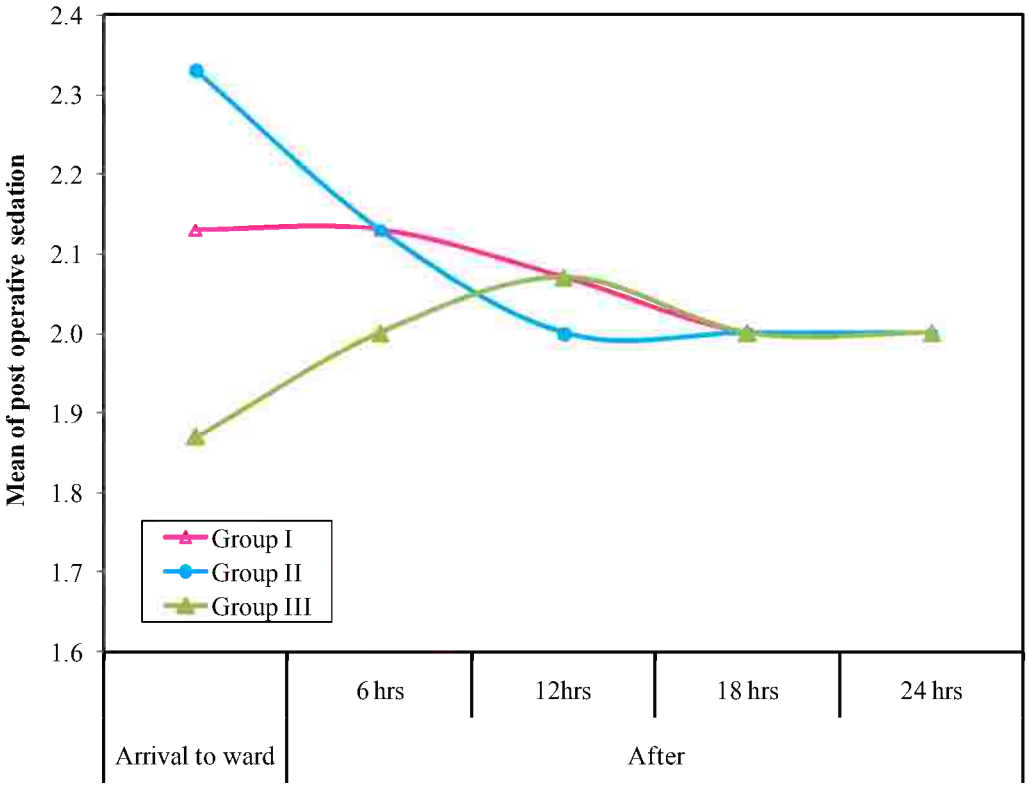

Figure (13): Comparison between the studied groups according to post operative sedation.

E. Postoperative nausea and vomiting (Table 23, Figure 14)

There were no any significant changes between three studied groups or between group I and group II or between group I and group III or between group II and group III according post operative nausea and vomiting.

Table (23): Comparison between the studied groups according to post operative nausea and vomiting.

	Group I	Group II	Group III
1	0	0	1
2	0	1	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	1	0
7	0	1	0
8	0	0	1
9	0	1	0
10	0	0	0
11	1	0	0
12	0	0	0
13	0	1	0
14	0	0	0
15	0	0	0
0	14 (93.3%)	10 (66.7%)	13 (86.7%)
1	1 (6.7%)	5 (33.3%)	2 (13.3%)
p	0.145		
p_1	0.073		
p_2	0.550		
p_3	0.203		

p: p value for Kruskal Wallis test for comparing between the different studied groups
p_1: p value for Mann Whitney test for comparing between group I and group II
p_2: p value for Mann Whitney test for comparing between group I and group III
p_3: p value for Mann Whitney test for comparing between group II and group III
*: Statistically significant at $p \leq 0.05$

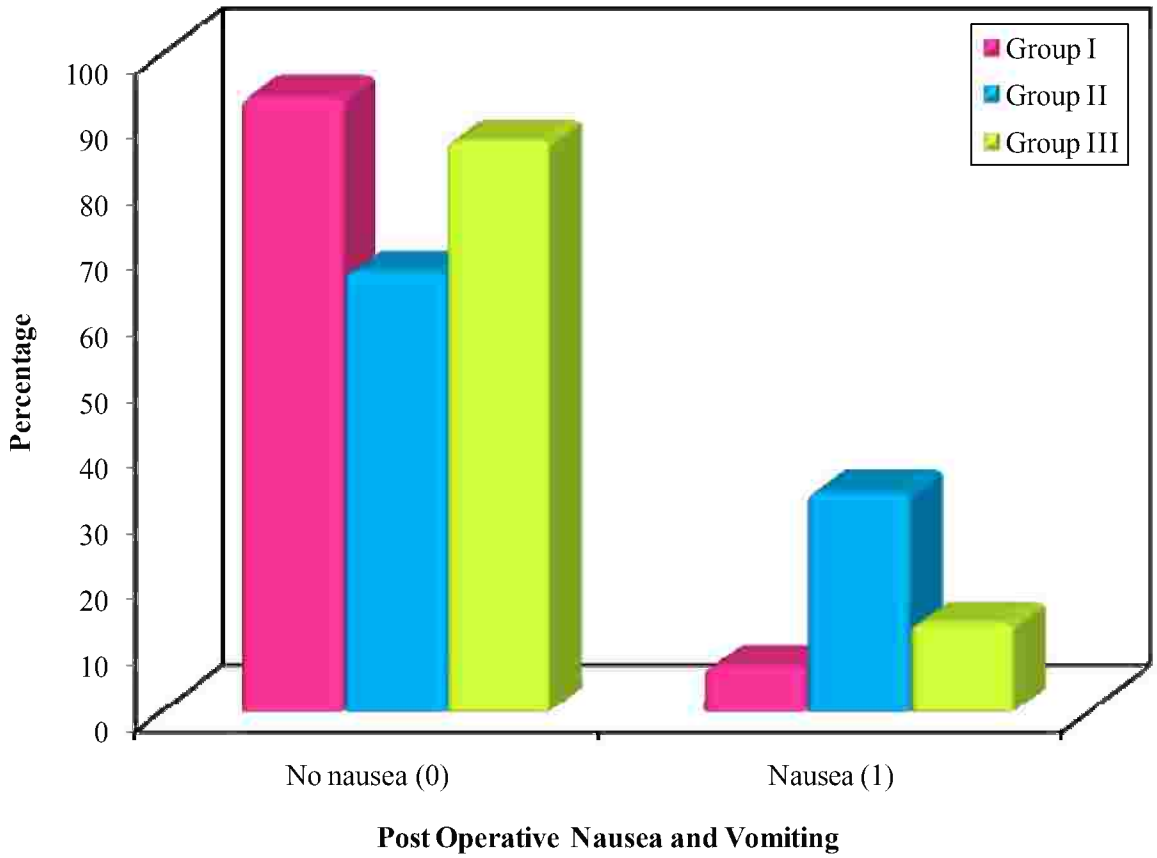

Figure (14): Comparison between the studied groups according to post operative nausea and vomiting.

F. Postoperative side effects (Table 24, Figure 15)

There were no any significant changes between three studied groups or between group I and group II or between group I and group III or between group II and group III according post operative side effects.

Table (24): Comparison between the studied groups according to post operative side effects

	Group I	Group II	Group III
1	No	No	No
2	No	No	No
3	No	No	No
4	No	Yes	No
5	No	No	No
6	No	No	No
7	No	No	No
8	No	Yes	Yes
9	No	Yes	No
10	Yes	Yes	No
11	No	No	No
12	Yes	No	No
13	No	No	Yes
14	Yes	No	No
15	No	Yes	No
No	12 (80.0%)	10 (66.7%)	13 (86.7%)
Yes	3 (20.0%)	5 (33.3%)	2 (13.3%)
p	0.552		
p_1	0.682		
p_2	1.000		
p_3	0.390		

p: p value for Monte Carlo test for comparing between the different studied groups
p_1: p value for Fisher Exact test for comparing between group I and group II
p_2: p value for Fisher Exact test for comparing between group I and group III
p_3: p value for Fisher Exact test for comparing between group II and group III
*: Statistically significant at $p \leq 0.05$

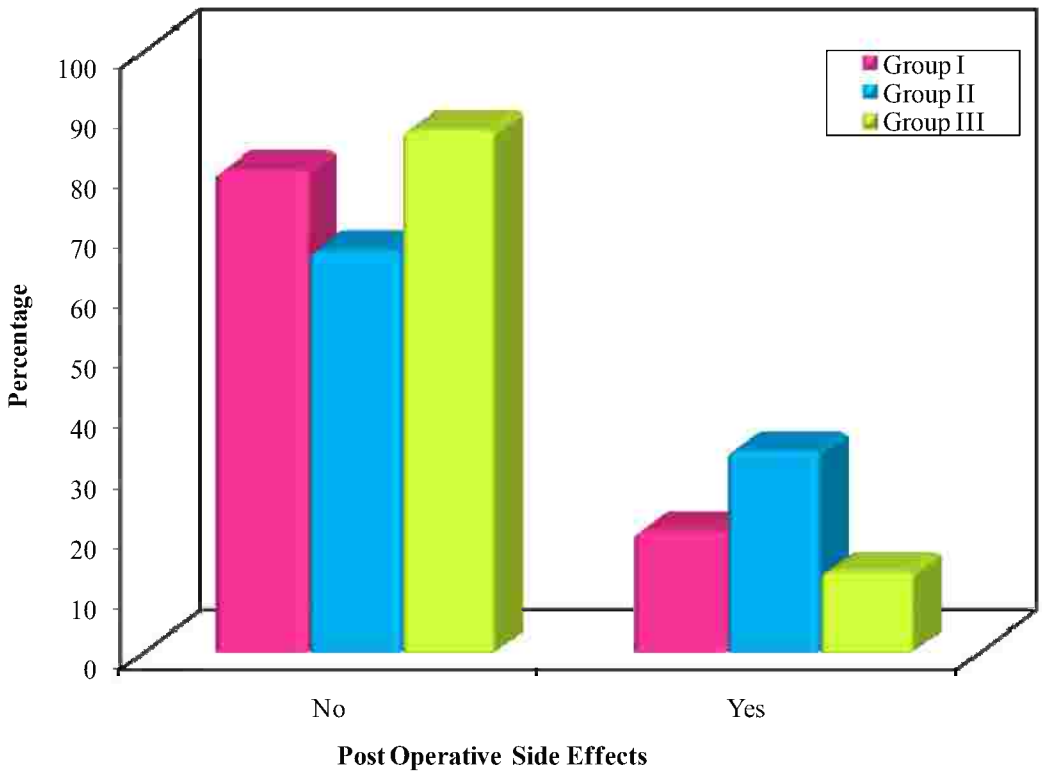

Figure (15): Comparison between the studied groups according to post operative side effects.