

## **AIM OF THE WORK**

The aim of this study is to study the additive effect of oral pregabalin premedication to intravenous fentanyl as regards the effectiveness and safety to attenuate the haemodynamic stress response to laryngoscopy and endotracheal intubation.

## PATIENTS AND METHODS

### Patients

After approval of the local ethics committee and taking an informed written consent from each patient, the present study was carried out in Alexandria main university hospitals on 60 adult patients of either sex. All of them were of ASA physical status class I-II patients scheduled for elective, minor lower abdominal surgeries under general anaesthesia with endotracheal intubation.

The sample size was approved by the biostatistics department of the high Institute of public health using stata G.Power software (Appendix I).

### Exclusion criteria:

Patients with any of the following conditions were excluded from the Study:

1. Patients with known or anticipated difficult intubation.
2. Patients with history of cardiac, pulmonary or renal disease.
3. Patients with allergy to any intravenous anaesthetics.
4. Patients taking sedatives, hypnotics or antihypertensive medications or any medications that may affect blood pressure or heart rate.

Patients were randomized in a double blinded study using closed envelop method into 3 equal groups (twenty patients each).

**Group I:** Each patient received a placebo tablet given orally with sips of water 1 hour before induction of general anaesthesia and intravenous fentanyl at a dose of 1 µg/kg three minutes before induction.

**Group II:** Each patient received a pregabalin 75 mg tablet given orally with sips of water 1 hour before induction of general anaesthesia and intravenous fentanyl at a dose of 1 µg/kg three minutes before induction.

**Group III:** Each patient received a pregabalin 150 mg tablet given orally with sips of water 1 hour before induction of general anaesthesia and intravenous fentanyl at a dose of 1 µg/kg three minutes before induction.

### Methods

#### Preoperative evaluation, preparation:

Evaluations of the patients were carried out through:

- Proper history taking and clinical examination, to exclude cardiovascular, respiratory, neurological and metabolic diseases.
- Airway assessment: including: Mallampati classification, thyromental distance and mouth opening.<sup>(74)</sup>

- Routine laboratory investigations (complete blood picture, coagulation profile, blood urea, serum creatinine, alanine aminotransferase (ALT), aspartate aminotransferase (AST) and fasting blood sugar).

### **Premedication:**

All patients were premedicated intravenously with metoclopramide 10 mg 90 minutes preoperatively.<sup>(75)</sup>

### **Anaesthetic technique:**

- On arrival to the operating room each patient was attached to a multi-channel monitor (Trakmon Kontron limited-England) to display:
  - Continuous electrocardiogram (ECG) monitoring for heart rate (beat/min) and detection of dysrhythmias (lead II).
  - Non-invasive arterial blood pressure monitoring: mean arterial blood pressure (MAP), systolic arterial blood pressure (SAP) and diastolic arterial blood pressure (DAP).
  - Arterial oxygen saturation (SaO<sub>2</sub>).
  - End-tidal carbon dioxide tension (Et CO<sub>2</sub>).
- A crystalloid intravenous infusion of 6-8 ml/kg was started.
- Anaesthesia was induced by intravenous fentanyl 1µg/kg followed by oxygenation for three minutes with 100% then propofol at 2mg/kg or in a dose sufficient for loss of verbal commands. The direct laryngoscopy and intubation was facilitated with rocuronium 0.9 mg/kg after 90 seconds.<sup>(76)</sup>
- Patients were mechanically ventilated with 100% oxygen and tidal volume and respiratory rate were manipulated to maintain normocapnia (CO<sub>2</sub> between 35 and 40 mmHg).
- Anaesthesia was maintained using isoflurane 1-2 % in oxygen and increments of rocuronium 0.1 mg/kg and of fentanyl as needed till the end of surgery.
- Patients were monitored for any haemodynamic instability like hypotension, hypertension, dysrhythmias, and will be treated as required.
- Tachycardia is defined as heart rate greater than 100 b/min.
- Bradycardia is defined as a heart rate less than 60 b/min, and was treated with intravenous atropine (0.01 mg/kg).
- Hypertension is defined as a mean arterial blood pressure more than 110 mmHg.<sup>(77)</sup>
- Hypotension is defined as a mean arterial blood pressure less than 60 mmHg<sup>(77)</sup> and was treated by increasing the intravenous infusion and, additionally, with increments of ephedrine (3 mg) if needed.
- At the end of surgery, anaesthesia was terminated and rocuronium was reversed as usual by neostigmine and atropine and patient was extubated after full return of consciousness and reflexes.
- Patients were transferred to the post-anaesthesia care unit (PACU) and were monitored for at least 2 hours before discharging to the surgical ward.

## Measurements:

The following parameters were measured:

### A. Demographic Data:

- Age.
- Sex.
- Body weight in kg.

### B. Haemodynamic measurements:

- Heart rate (beats per minute) using lead II electrocardiogram (ECG) waves.
- Systolic arterial blood pressure (SAP), diastolic arterial blood pressure (DAP) and mean arterial blood pressure: (MAP) were measured in mmHg.
- Arterial oxygen saturation (S<sub>a</sub>O<sub>2</sub>): using pulse oximeter.
- Dysrhythmias.

They were monitored continuously and recorded at the following times before starting the surgery:

- Pre-induction.
- Immediately before endotracheal intubation.
- Immediately after endotracheal intubation.
- At 1, 3, 5 and 10 minutes after intubation.

### C. The level of sedation:

It was assessed before induction (before fentanyl administration) by Ramsy sedation scale.<sup>(78)</sup>

Score	Response
1	Anxious, agitated or restless or both
2	Cooperative, oriented, tranquil
3	Responding to commands only
4	Brisk response to light glabellar tap
5	Sluggish response to light glabellar tap
6	No response to light glabellar tap

### D. Side effects:

Percentage of patients developed dizziness and somnolence or respiratory depression within the first 2 hours postoperatively was recorded.

## **Statistical analysis of the data**

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. Qualitative data were described using number and percent. Quantitative data were described using range (minimum and maximum), mean, standard 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. 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 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) , comparison between different periods using ANOVA with repeated measures and Post Hoc test was assessed using Bonferroni adjusted. Significance of the obtained results was judged at the 5% level.

## RESULTS

The present study was carried out at Alexandria university hospital on 60 patients ASA physical status I-II scheduled for elective, minor lower abdominal surgeries under general anaesthesia with endotracheal intubation. The department of statistics, high institute of public health, and university of Alexandria approved the sample size to be sufficient. Patients were randomly allocated into 3 equal groups using the closed envelope technique.

These three groups were:

**Group I:** Each patient received a placebo tablet given orally with sips of water 1 hour before induction of general anaesthesia and intravenous fentanyl at a dose of 1 µg/kg three minutes before induction.

**Group II:** Each patient received a pregabalin 75 mg tablet given orally with sips of water 1 hour before induction of general anaesthesia and intravenous fentanyl at a dose of 1 µg/kg three minutes before induction.

**Group III:** Each patient received a pregabalin 150 mg tablet given orally with sips of water 1 hour before induction of general anaesthesia and intravenous fentanyl at a dose of 1 µg/kg three minutes before induction.

The results of the present study showed:

## **1. Demographic Data [Tables II, III, IV and Figures 6, 7, 8]**

### **a. Age (in years): Table II**

- In group I, the age ranged between 22-52 years with a mean of  $39.5 \pm 8.72$  year.
- In group II, the age ranged between 24-49 years with a mean of  $39.5 \pm 7.72$  year.
- In group III, The age ranged between 25-50 years with a mean of  $38.8 \pm 7.14$  year.

There was no statistically significant difference among the three studied groups regarding age ( $P=0.949$ ).

### **b. Body weight (in kilograms): Table III**

- In group I, the body weight ranged between 59-92 Kg with a mean of  $77.8 \pm 7.83$  Kg.
- In group II, the body weight ranged between 58-96 Kg with a mean of  $76.85 \pm 8.84$  Kg.
- In group III, the body weight ranged between 58-90 Kg with a mean of  $72.05 \pm 8.06$  Kg.

There was no statistically significant difference among the three studied groups regarding body weight ( $P=0.070$ ).

### **c. Sex: Table IV**

- In group I, There were 12 male patients (60%) and 8 female patients (40%).
- In group II, There were 9 male patients (45%) and 11 female patients (55%).
- In group III, There were 13 male patients (65%) and 7 female patients (35%).

There was no statistically significant difference among the three studied groups regarding sex ( $P=0.414$ ).

Table (II): Comparison between the three studied groups according to age (years).

Cases	Age (years)		
	Group I	Group II	Group III
1	38	48	42
2	41	32	29
3	29	49	47
4	32	38	37
5	48	46	40
6	49	44	29
7	43	37	36
8	50	24	39
9	29	48	42
10	47	37	50
11	36	39	49
12	48	33	30
13	41	46	25
14	38	38	46
15	49	25	36
16	28	48	41
17	37	49	44
18	33	41	32
19	22	35	37
20	52	33	45
<b>Min.</b>	22.0	24.0	25.0
<b>Max.</b>	52.0	49.0	50.0
<b>Mean</b>	39.50	39.50	38.80
<b>SD.</b>	8.72	7.72	7.14
<b>F (p)</b>	0.052 (0.949)		
<b>p<sub>1</sub></b>		1.000	0.961
<b>p<sub>2</sub></b>		0.961	

F: F test (ANOVA)

p<sub>1</sub>: p value for Post Hoc test (Scheffe) for comparing between group I with group II and III

p<sub>2</sub>: p value for Post Hoc test (Scheffe) for comparing between group II and group III

**Table (III): Comparison between the three studied groups according to body weight (Kg).**

Cases	Body weight (Kg)		
	Group I	Group II	Group III
1	76	74	81
2	82	88	71
3	64	68	66
4	68	86	73
5	82	79	75
6	86	66	58
7	77	74	78
8	78	58	74
9	81	75	68
10	72	89	68
11	78	77	79
12	86	96	61
13	81	78	63
14	78	69	70
15	86	72	68
16	77	79	90
17	92	83	83
18	73	70	74
19	59	76	78
20	80	80	63
<b>Min.</b>	59.00	58.00	58.00
<b>Max.</b>	92.00	96.00	90.00
<b>Mean</b>	77.80	76.85	72.05
<b>SD.</b>	7.83	8.84	8.06
<b>F (p)</b>	2.790 (0.070)		
<b>p<sub>1</sub></b>		0.936	0.097
<b>p<sub>2</sub></b>		0.193	

F: F test (ANOVA)

p<sub>1</sub>: p value for Post Hoc test (Scheffe) for comparing between group I with group II and III

p<sub>2</sub>: p value for Post Hoc test (Scheffe) for comparing between group II and group III

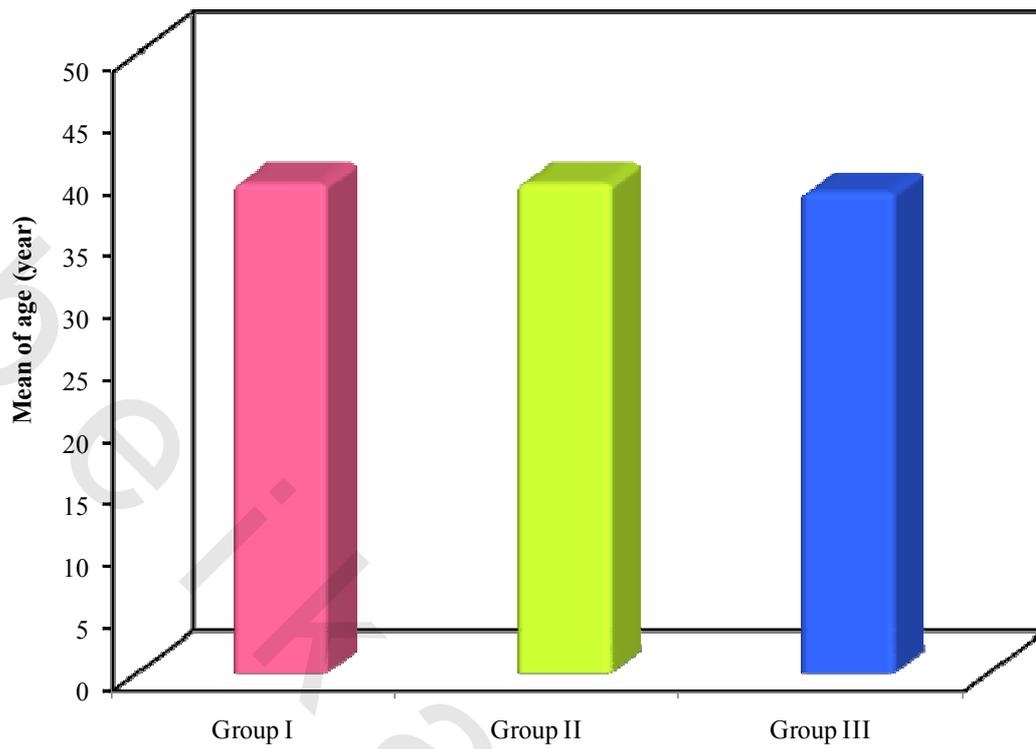
**Table (IV): Comparison between the three studied groups according to sex**

Cases	Sex		
	Group I	Group II	Group III
1	Male	Male	Male
2	Female	Female	Male
3	Male	Female	Female
4	Male	Male	Male
5	Female	Female	Male
6	Male	Female	Female
7	Female	Male	Male
8	Male	Female	Female
9	Male	Female	Male
10	Male	Male	Male
11	Female	Male	Male
12	Female	Female	Female
13	Male	Female	Male
14	Female	Male	Male
15	Male	Male	Female
16	Female	Female	Male
17	Male	Male	Female
18	Male	Female	Female
19	Male	Female	Male
20	Female	Male	Male
<b>Male</b>	12 (60%)	9 (45%)	13 (65%)
<b>Female</b>	8 (40%)	11 (55%)	7 (35%)
$\chi^2$ (p)	1.765 (0.414)		
<b>p<sub>1</sub></b>		0.342	0.744
<b>p<sub>2</sub></b>		0.204	

$\chi^2$ : Chi square test.

p<sub>1</sub>: p value for Chi square test for comparing between group I with group II and III.

p<sub>2</sub>: p value for Chi square test for comparing between group II and group II.



Figure(6): Comparison between the three studied groups according to age.

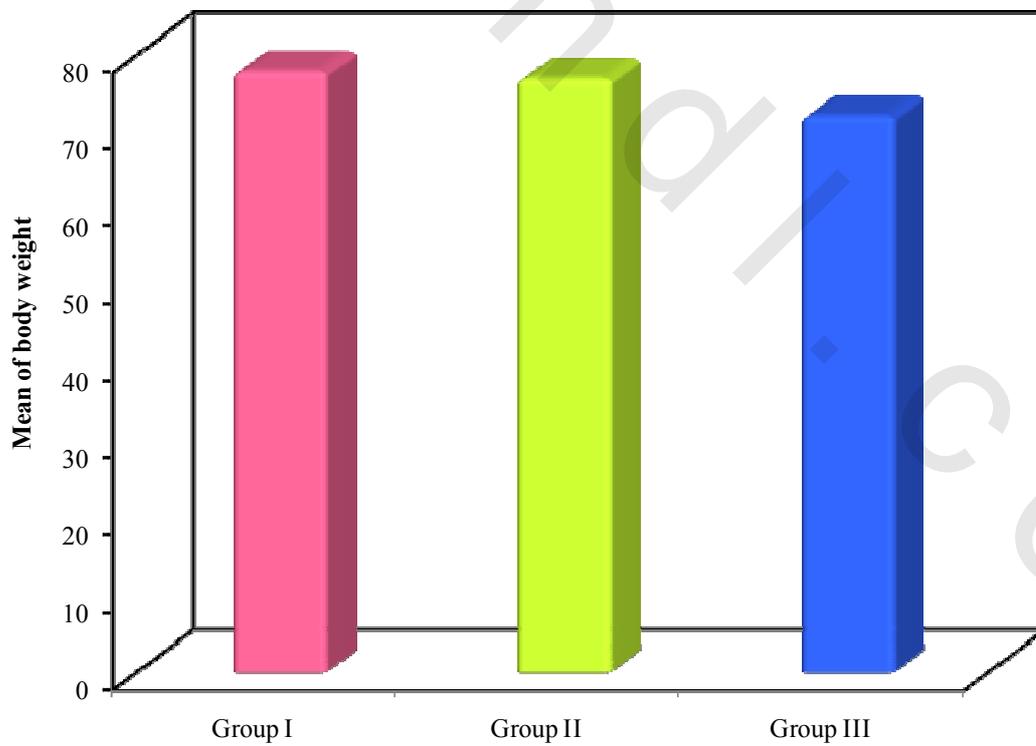


Figure (7): Comparison between the three studied groups according to body weight.

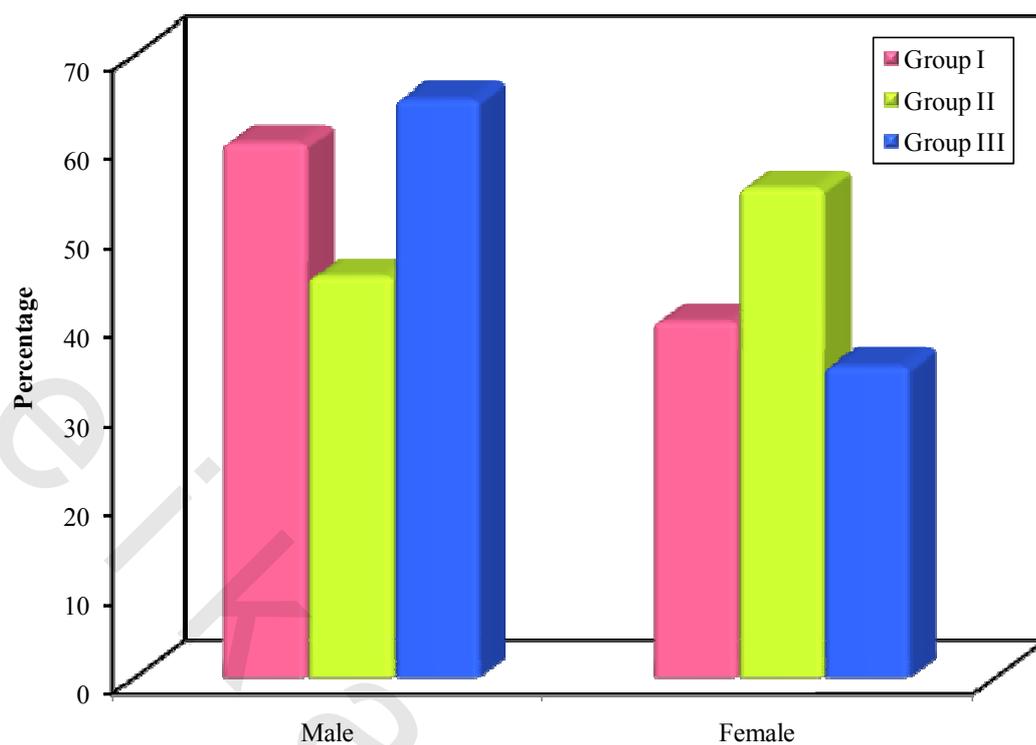


Figure (8): Comparison between the three studied groups according to sex

## **2. Haemodynamic measurements:**

### **a. Heart rate (beats/min): [Tables V, VI, VII, VIII and Figure 9]**

#### **Group I: Table V**

- It ranged between 68-83 beats/min with a mean of  $76.20 \pm 4.46$  beats/min at pre induction, ranged between 66- 84 with a mean of  $75.65 \pm 5.24$  beats/min immediately before intubation, ranged between 85-96 beats/min with a mean of  $90.45 \pm 3.75$  beats/min immediately after intubation, ranged between 85-97 beats/min with a mean of  $91.75 \pm 3.93$  beats/min at 1 min after intubation which was the maximal mean value of heart rate recorded in this group , ranged between 97-94 beats/min with a mean of  $86.70 \pm 3.57$  beats/min at 3 min after intubation, ranged between 75-90 beats/min with a mean of  $82.55 \pm 3.94$  beats/min at 5 min after intubation and ranged between 73-85 beats/min with a mean of  $79.10 \pm 3.14$  beats/min at 10 min after intubation.
- The heart rate was significantly higher immediately after intubation, at 1, 3, 5 and 10 min after intubation in comparison to immediately before intubation.

Table (V): Distribution of the studied cases according to heart rate in group I

Cases	Heart rate (beats/min)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
1	68	66	85	85	83	77	75
2	77	73	92	96	88	83	80
3	71	75	90	94	87	82	77
4	74	69	86	85	80	76	74
5	81	84	94	95	89	86	82
6	78	80	96	97	94	90	85
7	82	78	89	89	83	79	77
8	73	78	96	96	91	85	82
9	82	79	93	94	88	85	81
10	75	77	87	91	87	85	81
11	74	69	87	88	85	79	77
12	70	76	88	91	87	81	77
13	69	67	85	85	79	75	73
14	76	70	92	95	88	84	80
15	80	82	95	94	89	87	82
16	77	74	89	89	87	83	79
17	79	80	95	96	90	87	83
18	76	75	86	91	88	84	80
19	83	79	91	90	84	80	77
20	79	82	93	94	87	83	80
Min.	68.0	66.0	85.0	85.0	79.0	75.0	73.0
Max.	83.0	84.0	96.0	97.0	94.0	90.0	85.0
Mean	76.20	75.65	90.45	91.75	86.70	82.55	79.10
SD.	4.46	5.24	3.75	3.93	3.57	3.94	3.14
P			<0.001*	<0.001*	<0.001*	<0.001*	0.007*

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

\*: Statistically significant at  $p \leq 0.05$

**Group II: Table (VI)**

- It ranged between 69-81 beats/min with a mean of  $76.0 \pm 3.60$  beats/min at pre induction, ranged between 69-83 beats/min with a mean of  $76.70 \pm 4.08$  beats/min immediately before intubation, ranged between 86-98 beats/min with a mean of  $91.45 \pm 3.61$  beats/min immediately after intubation, ranged between 85-95 beats/min with a mean of  $91.70 \pm 2.92$  beats/min at 1 min after intubation which was the maximal mean value of heart rate recorded in this group, ranged between 97-91 beats/min with a mean of  $86.90 \pm 3.08$  beats/min at 3 min after intubation, ranged between 74-87 beats/min with a mean of  $82.60 \pm 3.57$  beats/min at 5 min after intubation and ranged between 73-85 beats/min with a mean of  $79.30 \pm 3.01$  beats/min at 10 min after intubation.
- The heart rate was significantly higher immediately after intubation, at 1, 3, 5 and 10 min after intubation in comparison to immediately before intubation.

**Table (VI): Distribution of the studied cases according to heart rate in group II**

Cases	Heart rate (beats/min)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
1	72	69	86	85	79	74	73
2	78	76	94	92	88	83	79
3	76	80	96	95	90	87	82
4	75	78	93	92	87	83	79
5	77	74	91	89	83	80	77
6	69	73	88	91	86	84	79
7	80	76	90	89	84	87	85
8	76	79	92	94	91	87	83
9	79	81	95	94	88	78	75
10	78	72	86	88	85	80	78
11	81	83	98	95	90	83	80
12	73	77	90	92	87	82	79
13	79	82	97	95	90	86	83
14	71	69	86	89	86	81	77
15	74	78	92	94	90	87	82
16	80	78	90	89	85	80	78
17	77	80	94	95	91	87	83
18	69	73	90	91	86	82	77
19	78	75	88	90	84	79	77
20	78	81	93	95	88	82	80
<b>Min.</b>	69.0	69.0	86.0	85.0	79.0	74.0	73.0
<b>Max.</b>	81.0	83.0	98.0	95.0	91.0	87.0	85.0
<b>Mean</b>	76.0	76.70	91.45	91.70	86.90	82.60	79.30
<b>SD.</b>	3.60	4.08	3.61	2.92	3.08	3.57	3.01
<b>P</b>			<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

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

\*: Statistically significant at  $p \leq 0.05$

**Group III: Table (VII)**

- It ranged between 68-84 beats/min with a mean of  $76.65 \pm 4.38$  beats/min at pre induction, ranged between 66-83 beats/min with a mean of  $75.65 \pm 4.56$  beats/min immediately before intubation, ranged between 84-96 beats/min with a mean of  $90.20 \pm 3.0$  beats/min immediately after intubation, ranged between 87-98 beats/min with a mean of  $91.15 \pm 2.58$  beats/min at 1 min after intubation which was the maximal mean value of heart rate recorded in this group, ranged between 82-93 beats/min with a mean of  $86.25 \pm 2.59$  beats/min at 3 min after intubation, ranged between 77-88 beats/min with a mean of  $81.85 \pm 2.68$  beats/min at 5 min after intubation and ranged between 76-85 beats/min with a mean of  $79.10 \pm 2.29$  beats/min at 10 min after intubation.
- The heart rate was significantly higher immediately after intubation, at 1, 3, 5 and 10 min after intubation in comparison to immediately before intubation.

Table (VII): Distribution of the studied cases according to heart rate in group III

Cases	Heart rate (beats/min)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
1	73	70	86	88	82	77	76
2	83	78	92	91	86	82	80
3	81	83	95	93	88	83	81
4	76	72	88	90	84	80	78
5	74	70	87	88	83	78	76
6	80	78	91	89	85	81	78
7	77	81	90	89	85	80	78
8	84	79	92	91	87	83	81
9	75	76	93	92	86	82	79
10	69	66	84	87	83	79	76
11	76	74	88	89	84	80	77
12	82	77	90	92	86	80	78
13	76	72	88	91	87	85	80
14	78	75	91	92	87	82	80
15	80	83	96	95	90	85	82
16	73	77	89	91	86	82	79
17	79	81	94	93	89	84	81
18	77	74	91	93	88	85	80
19	72	75	90	98	93	88	85
20	68	72	89	91	86	81	77
Min.	68.0	66.0	84.0	87.0	82.0	77.0	76.0
Max.	84.0	83.0	96.0	98.0	93.0	88.0	85.0
Mean	76.65	75.65	90.20	91.15	86.25	81.85	79.10
SD.	4.38	4.56	3.0	2.58	2.59	2.68	2.29
P			<0.001*	<0.001*	<0.001*	<0.001*	0.009*

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

\*: Statistically significant at  $p \leq 0.05$

**Comparison among the three studied groups: Table VIII and figure 9**

- The heart rate was insignificantly higher in group I than group II at pre induction ( $p_1=0.989$ ) then it was insignificantly lower in group I than group II immediately before intubation ( $p_1=0.776$ ) and immediately after intubation ( $p_1=0.662$ ) then it was insignificantly higher in group I than group II at 1 min after intubation ( $p_1=0.999$ ) then throughout the times of measurement as after 3min, 5 min, 10 min after intubation it was insignificantly lower in group I than group II as ( $p_1=0.979$ ), ( $p_1=0.999$ ), ( $p_1=0.976$ ) respectively.
- The heart rate was insignificantly lower in group I than group III at pre induction ( $p_2=0.943$ ) then there was no difference between the two groups immediately before intubation ( $p_2=1.000$ ) then it was insignificantly higher in group I than group III immediately after intubation, at 1, 3 and 5 min after intubation as ( $p_2=0.974$ ), ( $p_2=0.839$ ), ( $p_2=0.901$ ) and ( $p_2=0.814$ ) then there was no difference between the two groups at 10 min after intubation ( $p_2=1.000$ ).
- The heart rate was insignificantly lower in group II than group III at pre induction ( $p_3=0.885$ ) then it was insignificantly higher in group II than group III immediately before, immediately after intubation, at 1, 3, 5 and 10 min after intubation as ( $p_3=0.776$ ), ( $p_3=0.526$ ), ( $p_3=0.863$ ), ( $p_3=0.804$ ), ( $p_3=0.789$ ), ( $p_3=0.976$ ) respectively.

**Table (VIII): Comparison between the three studied groups according to hear rate**

	Heart rate (beats/min)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
<b>Group I</b>							
Min.	68.0	66.0	85.0	85.0	79.0	75.0	73.0
Max.	83.0	84.0	96.0	97.0	94.0	90.0	85.0
Mean	76.20	75.65	90.45	91.75	86.70	82.55	79.10
SD.	4.46	5.24	3.75	3.93	3.57	3.94	3.14
<b>Group II</b>							
Min.	69.0	69.0	86.0	85.0	79.0	74.0	73.0
Max.	81.0	83.0	98.0	95.0	91.0	87.0	85.0
Mean	76.0	76.70	91.45	91.70	86.90	82.60	79.30
SD.	3.60	4.08	3.61	2.92	3.08	3.57	3.01
<b>Group III</b>							
Min.	68.0	66.0	84.0	87.0	82.0	77.0	76.0
Max.	84.0	83.0	96.0	98.0	93.0	88.0	85.0
Mean	76.65	75.65	90.20	91.15	86.25	81.85	79.10
SD.	4.38	4.56	3.0	2.58	2.59	2.68	2.29
<b>F</b>	0.128	0.340	0.728	0.217	0.230	0.297	0.033
<b>P</b>	0.880	0.713	0.487	0.806	0.795	0.744	0.968
<b>p<sub>1</sub></b>	0.989	0.776	0.662	0.999	0.979	0.999	0.976
<b>p<sub>2</sub></b>	0.943	1.000	0.974	0.839	0.901	0.814	1.000
<b>p<sub>3</sub></b>	0.885	0.776	0.526	0.863	0.804	0.789	0.976

p<sub>1</sub>: p value for Post Hoc test (Scheffe) for comparing between group I and group II

p<sub>2</sub>: p value for Post Hoc test (Scheffe) for comparing between group I and group III

p<sub>3</sub>: p value for Post Hoc test (Scheffe) for comparing between group II and group III

Statistically significant at  $p \leq 0.05$

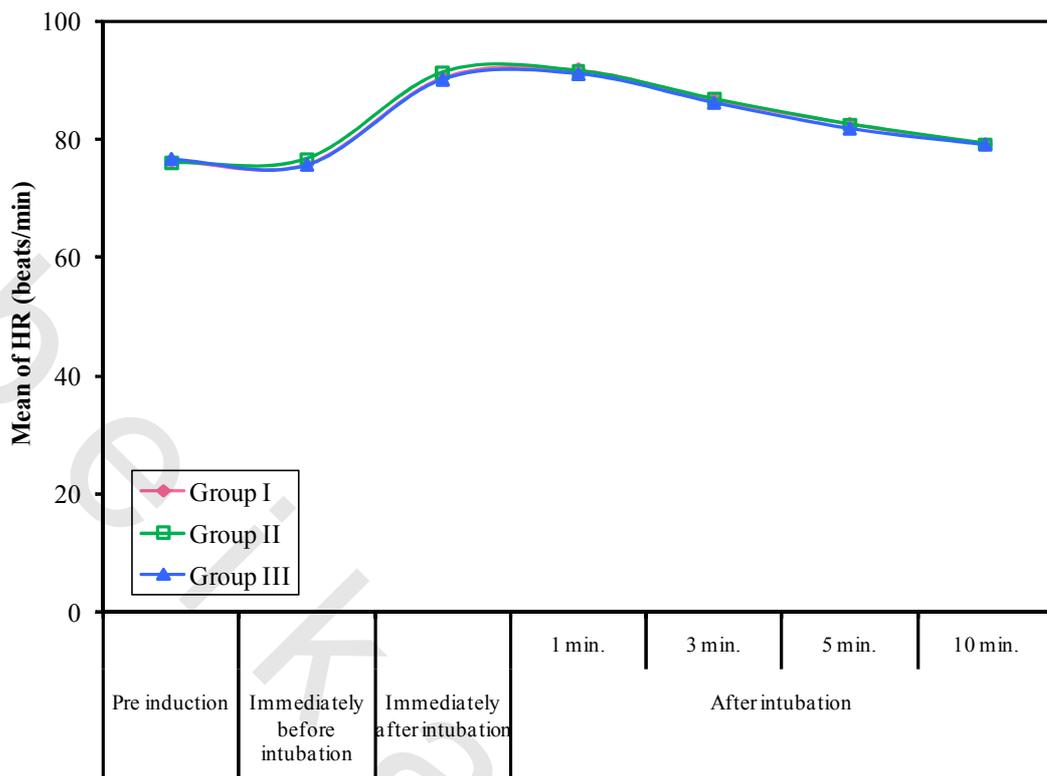


Figure (9): Comparison between the three studied groups according to heart rate.

**b. Systolic arterial blood pressure; SAP (mmHg): Tables [IX, X, XI, XII and figure 10]**

**Group I: Table IX**

- It ranged between 118-137 mmHg with a mean of  $127.75 \pm 4.98$  mmHg at pre induction, ranged between 105-123 mmHg with a mean of  $112.50 \pm 5.37$  mmHg immediately before intubation, ranged between 136-158 mmHg with a mean of  $145.90 \pm 6.56$  mmHg immediately after intubation which was the maximal mean value of SAP recorded in this group, ranged between 135-155 mmHg with a mean of  $143.70 \pm 6.17$  mmHg at 1 min after intubation, ranged between 128-149 mmHg with a mean of  $137.50 \pm 6.10$  mmHg at 3 min after intubation, ranged between 125-143 mmHg with a mean of  $133.20 \pm 5.48$  mmHg at 5 min after intubation and ranged between 120-136 mmHg with a mean of  $126.90 \pm 5.05$  mmHg at 10 min after intubation.
- The mean SAP was significantly higher immediately after intubation, at 1, 3, 5 and 10 min after intubation in comparison to immediately before intubation.

Table (IX): Distribution of the studied cases according to SAP in group I

Cases	SAP (mmHg)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
1	132	118	154	150	143	138	130
2	118	110	148	146	139	136	129
3	125	109	139	136	131	129	123
4	128	111	148	147	140	135	129
5	130	113	146	145	140	136	130
6	122	108	137	135	129	125	120
7	135	123	152	151	146	141	133
8	129	117	158	155	149	143	136
9	125	105	138	136	128	125	120
10	131	115	149	146	140	135	129
11	127	105	136	136	130	128	121
12	126	110	142	139	132	127	120
13	137	122	151	147	140	136	130
14	128	109	140	138	133	129	123
15	120	110	147	146	139	133	128
16	124	108	144	141	135	130	124
17	123	112	146	146	140	135	130
18	130	109	137	135	130	126	120
19	131	115	152	149	142	137	130
20	134	121	154	150	144	140	133
<b>Min.</b>	118.0	105.0	136.0	135.0	128.0	125.0	120.0
<b>Max.</b>	137.0	123.0	158.0	155.0	149.0	143.0	136.0
<b>Mean</b>	127.75	112.50	145.90	143.70	137.50	133.20	126.90
<b>SD.</b>	4.98	5.37	6.56	6.17	6.10	5.48	5.05
<b>P</b>			<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

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

\*: Statistically significant at  $p \leq 0.05$

**Group II: Table x**

- It ranged between 110-137 mmHg with a mean of  $125.85 \pm 7.44$  mmHg at pre induction, ranged between 97-121 mmHg with a mean of  $110.15 \pm 6.08$  mmHg immediately before intubation, ranged between 133-156 mmHg with a mean of  $142.85 \pm 6.58$  mmHg immediately after intubation which was the maximal mean value of SAP recorded in this group, ranged between 132-153 mmHg with a mean of  $140.30 \pm 6.27$  mmHg at 1 min after intubation, ranged between 126-146 mmHg with a mean of  $134.25 \pm 5.89$  mmHg at 3 min after intubation, ranged between 122-142 mmHg with a mean of  $130.0 \pm 5.53$  mmHg at 5 min after intubation and ranged between 115-136 mmHg with a mean of  $124.35 \pm 5.54$  mmHg at 10 min after intubation.
- The mean SAP was significantly higher immediately after intubation, at 1, 3, 5 and 10 min after intubation in comparison to immediately before intubation.

Table (X): Distribution of the studied cases according to SAP in group II

Cases	SAP (mmHg)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
1	125	111	142	140	135	130	125
2	127	114	147	144	137	131	125
3	121	109	135	134	129	125	120
4	133	121	156	153	146	142	136
5	127	113	144	139	133	129	124
6	134	119	150	149	143	138	132
7	118	107	142	140	134	130	125
8	131	112	137	133	128	125	120
9	115	103	136	133	126	122	117
10	128	110	148	144	138	133	128
11	136	117	151	147	141	136	130
12	125	108	146	142	136	132	125
13	129	113	152	150	142	137	131
14	133	116	147	144	138	133	128
15	130	108	141	140	135	131	126
16	117	102	136	134	129	125	120
17	110	97	133	132	126	122	117
18	119	104	140	137	130	124	119
19	122	105	139	138	131	130	124
20	137	114	135	133	128	125	115
<b>Min.</b>	110.0	97.0	133.0	132.0	126.0	122.0	115.0
<b>Max.</b>	137.0	121.0	156.0	153.0	146.0	142.0	136.0
<b>Mean</b>	125.85	110.15	142.85	140.30	134.25	130.0	124.35
<b>SD.</b>	7.44	6.08	6.58	6.27	5.89	5.53	5.54
<b>P</b>			<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

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

\*: Statistically significant at  $p \leq 0.05$

**Group III: Table XI**

- It ranged between 110-135 mmHg with a mean of  $124.65 \pm 7.66$  mmHg at pre induction, ranged between 97-118 mmHg with a mean of  $109.25 \pm 5.78$  mmHg immediately before intubation, ranged between 117-133 mmHg with a mean of  $125.65 \pm 4.60$  mmHg immediately after intubation which was the maximal value of mean SAP recorded in this group, ranged between 115-130 mmHg with a mean of  $123.60 \pm 4.48$  mmHg at 1 min after intubation, ranged between 109-121 mmHg with a mean of  $115.90 \pm 3.96$  mmHg at 3 min after intubation, ranged between 100-112 mmHg with a mean of  $106.55 \pm 4.14$  mmHg at 5 min after intubation and ranged between 97-102 mmHg with a mean of  $100.15 \pm 1.60$  mmHg at 10 min after intubation.
- The mean SAP was significantly higher immediately after intubation, at 1 and 3 min after intubation in comparison to immediately before intubation but was significantly lower at 5 and 10 min after intubation in comparison to immediately before intubation.

Table (XI): Distribution of the studied cases according to SAP in group III.

Cases	SAP (mmHg)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
1	123	112	130	125	117	110	102
2	128	112	128	126	118	110	100
3	115	106	124	123	115	106	100
4	118	109	130	128	120	111	101
5	132	116	133	130	121	112	102
6	123	110	126	123	115	106	99
7	129	113	131	129	116	107	101
8	134	115	129	126	120	110	101
9	118	106	127	124	117	108	102
10	111	97	120	118	110	100	98
11	128	110	122	119	112	103	99
12	127	107	123	126	119	111	102
13	130	112	128	126	118	107	101
14	129	111	125	124	117	107	100
15	133	116	130	128	120	110	101
16	135	118	129	128	121	110	102
17	110	98	117	115	109	100	98
18	115	101	120	117	110	100	99
19	126	105	118	117	111	102	97
20	129	111	123	120	112	101	98
<b>Min.</b>	110.0	97.0	117.0	115.0	109.0	100.0	97.0
<b>Max.</b>	135.0	118.0	133.0	130.0	121.0	112.0	102.0
<b>Mean</b>	124.65	109.25	125.65	123.60	115.90	106.55	100.15
<b>SD.</b>	7.66	5.78	4.60	4.48	3.96	4.14	1.60
<b>P</b>			<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

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

\*: Statistically significant at  $p \leq 0.05$

**Comparison among the three studied groups: Table XII and figure 10**

- The SAP was insignificantly higher in group I than group II at pre induction, immediately before intubation, immediately after intubation, at 1, 3, 5, 10 min after intubation as ( $p_1= 0.679$ ), ( $p_1= 0.439$ ), ( $p_1=0.281$ ), ( $p_1=0.178$ ), ( $p_1=0.173$ ), ( $p_1=0.148$ ), ( $p_1=0.199$ ) respectively.
- The SAP was insignificantly higher in group I than group III at pre induction ( $p_2=0.361$ ) and immediately before intubation ( $p_2=0.211$ ) then it was significantly higher in group I than group III immediately after intubation, at 1, 3 and 5, 10 min after intubation as ( $p_2=<0.001$ ), ( $p_2=<0.001$ ), ( $p_2=<0.001$ ), ( $p_2=<0.001$ ), ( $p_2=<0.001$ ).
- The SAP was insignificantly higher in group II than group III at pre induction ( $p_3= 0.856$ ) and immediately before intubation ( $p_3=0.885$ ) then it was significantly higher in group II than group III immediately after intubation, at 1, 3, 5 and 10 min after intubation as ( $p_3=<0.001$ ), ( $p_3=<0.001$ ), ( $p_3=<0.001$ ), ( $p_3=<0.001$ ), ( $p_3=<0.001$ ) respectively.

Table (XII): Comparison between the three studied groups according to SAP

	SAP (mmHg)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
<b>Group I</b>							
Min.	118.0	105.0	136.0	135.0	128.0	125.0	120.0
Max.	137.0	123.0	158.0	155.0	149.0	143.0	136.0
Mean	127.75	112.50	145.90	143.70	137.50	133.20	126.90
SD.	4.98	5.37	6.56	6.17	6.10	5.48	5.05
<b>Group II</b>							
Min.	110.0	97.0	133.0	132.0	126.0	122.0	115.0
Max.	137.0	121.0	156.0	153.0	146.0	142.0	136.0
Mean	125.85	110.15	142.85	140.30	134.25	130.0	124.35
SD.	7.44	6.08	6.58	6.27	5.89	5.53	5.54
<b>Group III</b>							
Min.	110.0	97.0	117.0	115.0	109.0	100.0	97.0
Max.	135.0	118.0	133.0	130.0	121.0	112.0	102.0
Mean	124.65	109.25	125.65	123.60	115.90	106.55	100.15
SD.	7.66	5.78	4.60	4.48	3.96	4.14	1.60
<b>F</b>	1.056	1.704	66.518*	71.277*	92.896*	163.292*	222.858*
<b>P</b>	0.355	0.191	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
<b>p<sub>1</sub></b>	0.679	0.439	0.281	0.178	0.173	0.148	0.199
<b>p<sub>2</sub></b>	0.361	0.211	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
<b>p<sub>3</sub></b>	0.856	0.885	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

F: F test (ANOVA)

p<sub>1</sub>: p value for Post Hoc test (Scheffe) for comparing between group I and group II

p<sub>2</sub>: p value for Post Hoc test (Scheffe) for comparing between group I and group III

p<sub>3</sub>: p value for Post Hoc test (Scheffe) for comparing between group II and group III

\*: Statistically significant at  $p \leq 0.05$

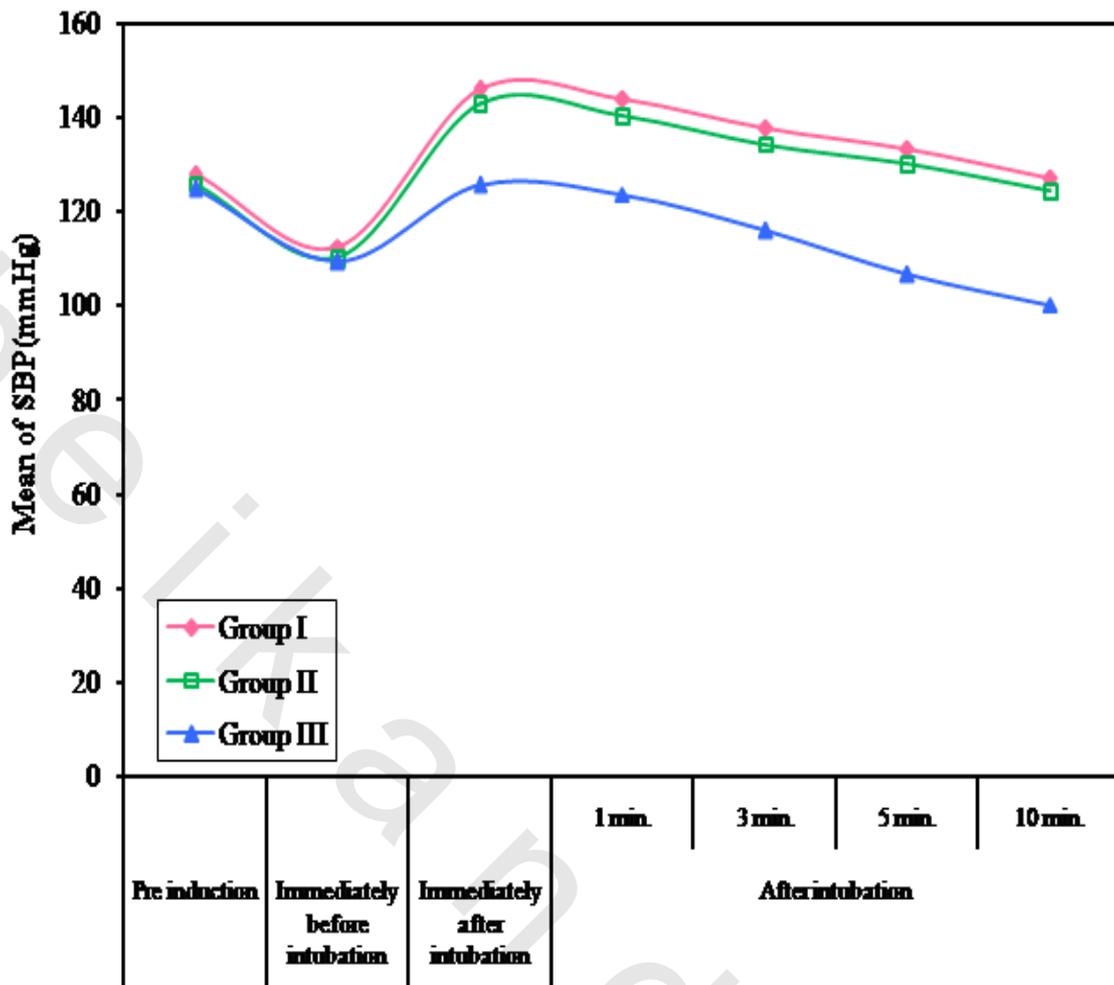


Figure (10): Comparison between the three studied groups according to SAP

**c. Diastolic arterial blood pressure; DAP (mmHg): [Tables XIII, XIV, XV, XVI and figure 11]**

**Group I: Table XIII**

- It ranged between 64-84 mmHg with a mean of  $74.80 \pm 5.24$  mmHg at pre induction, ranged between 58-78 mmHg with a mean of  $68.55 \pm 5.24$  mmHg immediately before intubation, ranged between 77-94 mmHg with a mean of  $86.95 \pm 5.07$  mmHg immediately after intubation, ranged between 79-98 mmHg with a mean of  $89.35 \pm 4.87$  mmHg at 1 min after intubation, ranged between 81-100 mmHg with a mean of  $91.70 \pm 4.86$  mmHg at 3 min after intubation which was the maximal mean value of DAP recorded in this group, ranged between 78-94 mmHg with a mean of  $87.05 \pm 4.22$  mmHg at 5 min after intubation and ranged between 77-93 mmHg with a mean of  $85.20 \pm 4.10$  mmHg at 10 min after intubation.
- The mean DAP was significantly higher immediately after intubation, at 1, 3, 5 and 10 min after intubation in comparison to immediately before intubation.

**Table (XIII): Distribution of the studied cases according to DAP in group I**

Cases	DAP (mmHg)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
1	80	75	93	98	100	93	92
2	77	72	89	93	94	88	88
3	68	64	82	87	89	87	84
4	75	70	89	90	91	85	83
5	73	68	87	89	92	85	83
6	69	62	80	84	85	80	80
7	71	65	84	89	91	85	85
8	74	69	88	89	92	87	83
9	70	63	81	85	89	86	84
10	78	71	89	91	93	89	86
11	83	75	91	93	94	90	87
12	84	78	93	94	98	93	90
13	81	75	94	98	100	94	93
14	77	70	92	92	95	91	89
15	76	68	87	84	88	84	83
16	64	58	78	83	86	83	80
17	74	67	86	87	89	85	83
18	78	71	90	92	96	91	89
19	75	69	89	90	91	87	85
20	69	61	77	79	81	78	77
<b>Min.</b>	64.0	58.0	77.0	79.0	81.0	78.0	77.0
<b>Max.</b>	84.0	78.0	94.0	98.0	100.0	94.0	93.0
<b>Mean</b>	74.80	68.55	86.95	89.35	91.70	87.05	85.20
<b>SD.</b>	5.24	5.24	5.07	4.87	4.86	4.22	4.10
<b>P</b>			<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

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

\*: Statistically significant at  $p \leq 0.05$

**Group II: Table XIV**

- It ranged between 64-84 mmHg with a mean of  $75.45 \pm 6.35$  mmHg at pre induction, ranged between 58-78 mmHg with a mean of  $69.0 \pm 6.25$  mmHg immediately before intubation, ranged between 76-95 mmHg with a mean of  $85.05 \pm 6.14$  mmHg immediately after intubation, ranged between 77-96 mmHg with a mean of  $87.50 \pm 6.33$  mmHg at 1 min after intubation, ranged between 81-101 mmHg with a mean of  $91.35 \pm 5.49$  mmHg at 3 min after intubation which was the maximal mean value of DAP recorded in this group, ranged between 75-94 mmHg with a mean of  $85.45 \pm 5.70$  mmHg at 5 min after intubation and ranged between 75-91 mmHg with a mean of  $82.95 \pm 4.84$  mmHg at 10 min after intubation.
- The mean DAP was significantly higher immediately after intubation, at 1, 3, 5 and 10 min after intubation in comparison to immediately before intubation.

Table (XIV): Distribution of the studied cases according to DAP in group II

Cases	DAP (mmHg)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
1	72	67	81	83	87	82	80
2	84	78	95	96	101	94	91
3	77	70	89	90	92	88	84
4	71	65	84	86	90	84	82
5	65	59	78	79	82	83	77
6	69	60	77	82	90	80	78
7	76	70	88	92	96	94	87
8	81	75	92	93	96	93	86
9	82	75	89	90	92	86	85
10	78	72	87	91	94	88	88
11	74	68	78	79	81	75	75
12	66	60	76	78	94	78	78
13	79	72	90	95	97	91	89
14	83	75	92	92	95	88	84
15	77	72	88	93	93	86	85
16	72	65	80	85	88	83	83
17	82	75	92	94	95	89	85
18	84	77	88	93	96	90	89
19	64	58	76	77	83	76	76
20	73	67	81	82	85	81	77
<b>Min.</b>	64.0	58.0	76.0	77.0	81.0	75.0	75.0
<b>Max.</b>	84.0	78.0	95.0	96.0	101.0	94.0	91.0
<b>Mean</b>	75.45	69.0	85.05	87.50	91.35	85.45	82.95
<b>SD.</b>	6.35	6.25	6.14	6.33	5.49	5.70	4.84
<b>P</b>			<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

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

\*: Statistically significant at  $p \leq 0.05$

**Group III: Table XV**

- It ranged between 67-87 mmHg with a mean of  $76.50 \pm 5.78$  mmHg at pre induction, ranged between 60-79 mmHg with a mean of  $68.90 \pm 5.74$  mmHg immediately before intubation, ranged between 70-91 mmHg with a mean of  $80.30 \pm 5.79$  mmHg, ranged between 70-91 mmHg with a mean of  $80.65 \pm 5.71$  mmHg at 1 min after intubation which was the maximal mean value of DAP recorded in this group, ranged between 66-85mmHg with a mean of  $76.45 \pm 5.18$  mmHg at 3 min after intubation, ranged between 65-80 mmHg with a mean of  $72.80 \pm 4.72$  mmHg at 5 min after intubation and ranged between 62-75mmHg with a mean of  $68.20 \pm 4.09$  mmHg at 10 min after intubation.
- The mean DAP was significantly higher immediately after intubation, at 1, 3 and 5 min after intubation while it was insignificantly lower at 10 min after intubation in comparison to immediately before intubation.

**Table (XV): Distribution of the studied cases according to DAP in group III**

Cases	DAP (mmHg)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
1	70	62	74	74	69	67	64
2	81	74	85	88	82	80	75
3	87	79	91	91	85	80	74
4	67	60	72	75	70	65	63
5	75	67	78	78	72	69	64
6	78	70	81	81	75	71	65
7	82	74	85	84	80	75	70
8	69	61	70	71	76	71	67
9	77	69	80	80	75	71	66
10	83	74	86	85	79	76	70
11	81	74	84	84	80	75	71
12	75	67	79	79	74	70	66
13	70	63	77	78	73	71	67
14	79	71	82	82	77	73	67
15	74	67	78	79	73	70	65
16	81	74	85	85	80	76	71
17	73	66	78	78	83	80	74
18	84	77	89	90	84	79	75
19	76	69	81	81	76	72	68
20	68	60	71	70	66	65	62
<b>Min.</b>	67.0	60.0	70.0	70.0	66.0	65.0	62.0
<b>Max.</b>	87.0	79.0	91.0	91.0	85.0	80.0	75.0
<b>Mean</b>	76.50	68.90	80.30	80.65	76.45	72.80	68.20
<b>SD.</b>	5.78	5.74	5.79	5.71	5.18	4.72	4.09
<b>P</b>			<0.001*	<0.001*	<0.001*	0.001*	0.415

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

\*: Statistically significant at  $p \leq 0.05$ .

**Comparison among the three studied groups: Table XVI and figure 11**

- The DAP was insignificantly lower in group I than group II at pre induction and immediately before intubation as ( $p_1=0.939$ ) and ( $p_1=0.970$ ) respectively then it was insignificantly higher in group I than group II immediately after intubation and at 1, 3, 5, 10 min after intubation as ( $p_1=0.575$ ), ( $p_1=0.590$ ), ( $p_1=0.977$ ), ( $p_1=0.592$ ), ( $p_1=0.271$ ) respectively.
- The DAP was insignificantly lower in group I than group III at pre induction and immediately before intubation as ( $p_2=0.654$ ) and ( $p_2=0.982$ ) respectively then it was significantly higher in group I than group III immediately after intubation and at 1, 3 and 5, 10 min after intubation as ( $p_2=0.002$ ), ( $p_2<0.001$ ), ( $p_2<0.001$ ), ( $p_2<0.001$ ), ( $p_2<0.001$ ).
- The DAP was insignificantly lower in group II than group III at pre induction ( $p_3=0.850$ ) and insignificantly higher in group II than group III immediately before intubation ( $p_3=0.998$ ) then it was significantly higher in group II than group III immediately after intubation and at 1, 3, 5 and 10 min after intubation as ( $p_3=0.037$ ), ( $p_3=0.002$ ), ( $p_3<0.001$ ), ( $p_3<0.001$ ), ( $p_3<0.001$ ) respectively.

**Table (XVI): Comparison between the three studied groups according to DAP**

	DAP (mmHg)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
<b>Group I</b>							
Min.	64.0	58.0	77.0	79.0	81.0	78.0	77.0
Max.	84.0	78.0	94.0	98.0	100.0	94.0	93.0
Mean	74.80	68.55	86.95	89.35	91.70	87.05	85.20
SD.	5.24	5.24	5.07	4.87	4.86	4.22	4.10
<b>Group II</b>							
Min.	64.0	58.0	76.0	77.0	81.0	75.0	75.0
Max.	84.0	78.0	95.0	96.0	101.0	94.0	91.0
Mean	75.45	69.0	85.05	87.50	91.35	85.45	82.95
SD.	6.35	6.25	6.14	6.33	5.49	5.70	4.84
<b>Group III</b>							
Min.	67.0	60.0	70.0	70.0	66.0	65.0	62.0
Max.	87.0	79.0	91.0	91.0	85.0	80.0	75.0
Mean	76.50	68.90	80.30	80.65	76.45	72.80	68.20
SD.	5.78	5.74	5.79	5.71	5.18	4.72	4.09
<b>F</b>	0.436	0.034	7.261*	13.071*	56.476*	50.375*	89.896*
<b>P</b>	0.649	0.967	0.002	<0.001	<0.001	<0.001	<0.001
<b>p<sub>1</sub></b>	0.939	0.970	0.575	0.590	0.977	0.592	0.271
<b>p<sub>2</sub></b>	0.654	0.982	0.002*	<0.001*	<0.001*	<0.001*	<0.001*
<b>p<sub>3</sub></b>	0.850	0.998	0.037*	0.002*	<0.001*	<0.001*	<0.001*

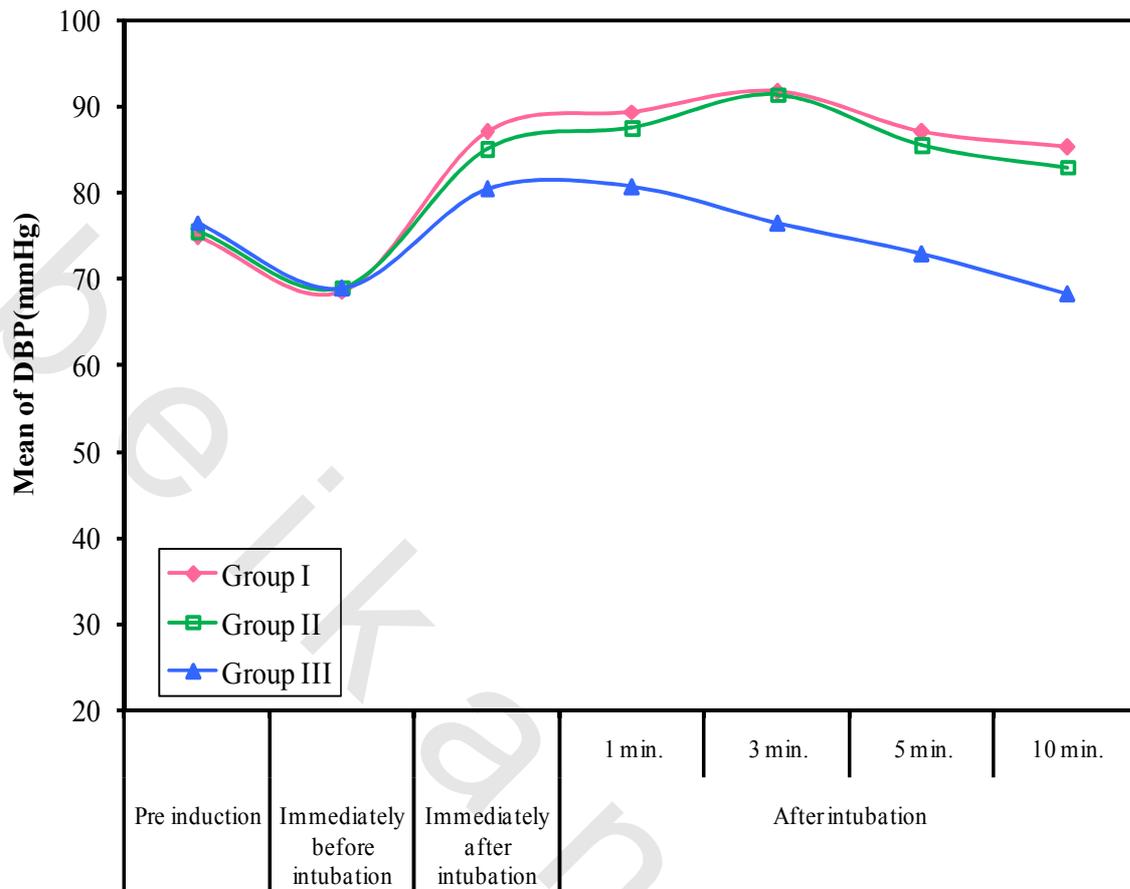
F: F test (ANOVA)

p<sub>1</sub>: p value for Post Hoc test (Scheffe) for comparing between group I and group II

p<sub>2</sub>: p value for Post Hoc test (Scheffe) for comparing between group I and group III

p<sub>3</sub>: 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 three studied groups according to DAP**

**d. Mean arterial blood pressure; MBP (in mmHg): [Tables XVII, XVIII, XIX, XX and figure 12]**

**Group I: Table XVII**

- It ranged between 84-100 mmHg with a mean of  $92.50 \pm 4.15$  mmHg at pre induction, ranged between 75-91 mmHg with a mean of  $83.25 \pm 4.09$  mmHg immediately before intubation, ranged between 99-113 mmHg with a mean of  $106.65 \pm 4.16$  mmHg immediately after intubation, ranged between 101-115 mmHg with a mean of  $107.45 \pm 3.94$  mmHg at 1 min after intubation which was the maximal mean value of MAP recorded in this group, ranged between 100-114 mmHg with a mean of  $106.90 \pm 3.74$  mmHg at 3 min after intubation, ranged between 95-108 mmHg with a mean of  $102.43 \pm 3.16$  mmHg at 5 min after intubation and ranged between 93-105 mmHg with a mean of  $99.10 \pm 2.99$  mmHg at 10 min after intubation.
- The mean value of MAP was significantly higher immediately after intubation, at 1, 3, 5 and 10 min after intubation in comparison to immediately before intubation.

Table (XVII): Distribution of the studied cases according to MAP in group I

Cases	MAP (mmHg)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
1	97	89	113	115	114	108.0	105
2	91	85	109	111	109	104.0	102
3	87	79	101	103	103	101.0	97
4	93	84	109	109	107	101.67	98
5	92	83	107	108	108	102.0	99
6	87	77	99	101	100	95.0	93
7	92	84	107	110	109	103.67	101
8	92	85	111	111	111	105.67	101
9	88	77	100	102	102	99.0	96
10	96	86	109	109	109	104.33	100
11	98	85	106	107	106	102.67	98
12	98	89	109	109	109	104.33	100
13	100	91	113	114	113	108.0	105
14	94	83	108	107	108	103.67	100
15	91	82	107	105	105	100.33	98
16	84	75	100	102	102	98.67	95
17	90	82	106	107	106	101.67	99
18	95	84	106	106	107	102.67	99
19	94	84	110	110	108	103.67	100
20	91	81	103	103	102	98.67	96
<b>Min.</b>	84.0	75.0	99.0	101.0	100.0	95.0	93.0
<b>Max.</b>	100.0	91.0	113.0	115.0	114.0	108.0	105.0
<b>Mean</b>	92.50	83.25	106.65	107.45	106.90	102.43	99.10
<b>SD.</b>	4.15	4.09	4.16	3.94	3.74	3.16	2.99
<b>P</b>			<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

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

\*: Statistically significant at  $p \leq 0.05$ .

**Group II: Table XVIII**

- It ranged between 83-100 mmHg with a mean of  $92.40 \pm 4.50$  mmHg at pre induction, ranged between 74-90 mmHg with a mean of  $82.75 \pm 4.23$  mmHg immediately before intubation, ranged between 97-112 mmHg with a mean of  $104.25 \pm 4.34$  mmHg immediately after intubation, ranged between 97-113 mmHg with a mean of  $105.05 \pm 4.59$  mmHg at 1 min after intubation, ranged between 99-113 mmHg with a mean of  $105.78 \pm 4.0$  mmHg at 3 min after intubation which was the maximal mean value of MAP recorded in this group, ranged between 94-106 mmHg with a mean of  $100.20 \pm 3.75$  mmHg at 5 min after intubation and ranged between 90-103 mmHg with a mean of  $96.80 \pm 3.50$  mmHg at 10 min after intubation.
- The mean value of MAP was significantly higher immediately after intubation, at 1, 3, 5 and 10 min after intubation in comparison to immediately before intubation.

**Table (XVIII): Distribution of the studied cases according to MAP in group II**

Cases	MAP (mmHg)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
1	90	82	101	102	102	98	95
2	98	90	112	112	103	106	102
3	92	83	104	105	113	100	96
4	92	84	108	108	104.33	103	100
5	86	77	100	99	108.67	98	93
6	91	80	101	104	99	99	96
7	90	82	106	108	107.67	106	100
8	98	87	107	106	108.67	104	97
9	93	84	105	104	106.67	98	96
10	95	85	107	109	103.33	103	101
11	95	84	102	102	108.67	95	93
12	86	76	99	99	101	96	94
13	96	86	111	113	108	106	103
14	100	89	110	109	112	103	99
15	95	84	106	109	109.33	101	99
16	87	77	99	101	107	97	95
17	91	82	106	107	101.67	100	96
18	96	86	105	108	105.33	101	99
19	83	74	97	97	107.33	94	92
20	94	83	99	99	99	96	90
<b>Min.</b>	83.0	74.0	97.0	97.0	99.0	94.0	90.0
<b>Max.</b>	100.0	90.0	112.0	113.0	113.0	106.0	103.0
<b>Mean</b>	92.40	82.75	104.25	105.05	105.78	100.20	96.80
<b>SD.</b>	4.50	4.23	4.34	4.59	4.0	3.75	3.50
<b>p</b>			<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

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

\*: Statistically significant at  $p \leq 0.05$ .

**Group III: table XIX**

- It ranged between 84-99 mmHg with a mean of  $92.60 \pm 4.13$  mmHg at pre induction, ranged between 76-89 mmHg with a mean of  $82.30 \pm 3.87$  mmHg immediately before intubation, ranged between 88-102 mmHg with a mean of  $95.35 \pm 3.67$  mmHg immediately after intubation which was the maximal mean value of MAP recorded in this group, ranged between 87-102 mmHg with a mean of  $95.0 \pm 3.88$  mmHg at 1 min after intubation, ranged between 81-95 mmHg with a mean of  $89.65 \pm 3.3$  mmHg at 3 min after intubation, ranged between 77-90 mmHg with a mean of  $84.0 \pm 2.99$  mmHg at 5 min after intubation and ranged between 74-83 mmHg with a mean of  $78.80 \pm 2.55$  mmHg at 10 min after intubation.
- The mean value of MAP was significantly higher immediately after intubation and at 1, 3 min after intubation and was insignificantly higher at 5 min after intubation in comparison to immediately before intubation while it was significantly lower at 10 min after intubation in comparison to immediately before intubation.

Table (XIX): Distribution of the studied cases according to MAP in group III

Cases	MAP (mmHg)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
1	88	79	93	91	85	81	77
2	97	87	99	101	94	90	83
3	96	88	102	102	95	89	83
4	84	76	91	93	87	80	76
5	94	83	96	95	88	83	77
6	93	83	96	95	88	83	76
7	98	87	100	99	92	86	80
8	91	79	90	89	91	84	78
9	91	81	96	95	89	83	78
10	92	82	97	96	89	84	79
11	97	86	97	96	91	84	80
12	92	80	94	95	89	84	78
13	90	79	94	94	88	83	78
14	96	84	96	96	90	84	78
15	94	83	95	95	89	83	77
16	99	89	100	99	94	87	81
17	85	77	91	90	92	87	82
18	94	85	99	99	93	86	83
19	93	81	93	93	88	82	78
20	88	77	88	87	81	77	74
<b>Min.</b>	84.0	76.0	88.0	87.0	81.0	77.0	74.0
<b>Max.</b>	99.0	89.0	102.0	102.0	95.0	90.0	83.0
<b>Mean</b>	92.60	82.30	95.35	95.0	89.65	84.0	78.80
<b>SD.</b>	4.13	3.87	3.67	3.88	3.31	2.99	2.55
<b>P</b>			<0.001*	<0.001*	<0.001*	0.203	0.001*

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

\*: Statistically significant at  $p \leq 0.05$ .

**Comparison among the three studied groups: XX and figure 12**

- The MAP was insignificantly higher in group I than group II at pre induction, immediately before intubation, immediately after intubation, at 1, 3, 5 and 10 min after intubation as ( $p_1=0.997$ ), ( $p_1=0.927$ ), ( $p_1=0.185$ ), ( $p_1=0.197$ ), ( $p_1=0.636$ ), ( $p_1=0.113$ ), ( $p_1=0.065$ ) respectively.
- The MAP was insignificantly lower in group I than group III at pre induction ( $p_2=0.997$ ) and insignificantly higher in group I than group III immediately before intubation ( $p_2=0.762$ ) and then it was significantly higher in group I than group III immediately after intubation, at 1, 3 and 5, 10 min after intubation as ( $p_2<0.001$ ), ( $p_2<0.001$ ), ( $p_2<0.001$ ), ( $p_2<0.001$ ), ( $p_2<0.001$ ).
- The MAP was insignificantly lower in group II than group III at pre induction ( $p_3=0.989$ ) and insignificantly higher in group II than group III immediately before intubation ( $p_3=0.941$ ) then it was significantly higher in group II than group III immediately after intubation, at 1, 3, 5 and 10 min after intubation as ( $p_3<0.001$ ), ( $p_3<0.001$ ), ( $p_3<0.001$ ), ( $p_3<0.001$ ) respectively.

Table (XX): Comparison between the three studied groups according to MAP

	MAP (mmHg)						
	Pre induction	Immediately before intubation	Immediately after intubation	After intubation			
				1 min.	3 min.	5 min.	10 min.
<b>Group I</b>							
Min.	84.0	75.0	99.0	101.0	100.0	95.0	93.0
Max.	100.0	91.0	113.0	115.0	114.0	108.0	105.0
Mean	92.50	83.25	106.65	107.45	106.90	102.43	99.10
SD.	4.15	4.09	4.16	3.94	3.74	3.16	2.99
<b>Group II</b>							
Min.	83.0	74.0	97.0	97.0	99.0	94.0	90.0
Max.	100.0	90.0	112.0	113.0	113.0	106.0	103.0
Mean	92.40	82.75	104.25	105.05	105.78	100.20	96.80
SD.	4.50	4.23	4.34	4.59	4.0	3.75	3.50
<b>Group III</b>							
Min.	84.0	76.0	88.0	87.0	81.0	77.0	74.0
Max.	99.0	89.0	102.0	102.0	95.0	90.0	83.0
Mean	92.60	82.30	95.35	95.0	89.65	84.0	78.80
SD.	4.13	3.87	3.67	3.88	3.31	2.99	2.55
<b>F</b>	0.011	0.273	42.855*	50.652*	136.545*	183.961*	267.697*
<b>P</b>	0.989	0.762	<0.001	<0.001	<0.001	<0.001	<0.001
<b>p<sub>1</sub></b>	0.997	0.927	0.185	0.197	0.636	0.113	0.065
<b>p<sub>2</sub></b>	0.997	0.762	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
<b>p<sub>3</sub></b>	0.989	0.941	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

F: F test (ANOVA)

p<sub>1</sub>: p value for Post Hoc test (Scheffe) for comparing between group I and group IIp<sub>2</sub>: p value for Post Hoc test (Scheffe) for comparing between group I and group IIIp<sub>3</sub>: p value for Post Hoc test (Scheffe) for comparing between group II and group III\*: Statistically significant at  $p \leq 0.05$

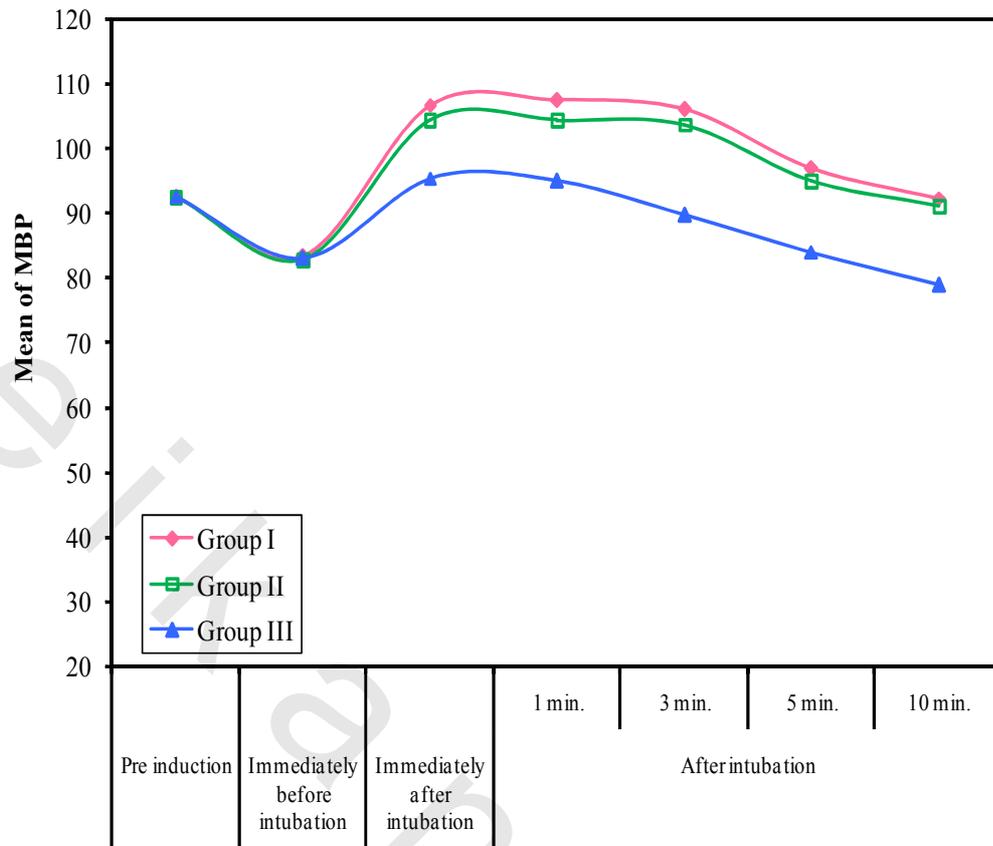


Figure (12): Comparison between the three studied groups according to MAP

### 3. The level of sedation: [table XXI figure 13]

#### a. mild sedation: (scores 1, 2 and 3)

##### Group I

5 patients had a sedation score 1 and 15 patients had a sedation score 2 representing 25% and 75% of the group respectively.

##### Group II:

3 patients had a sedation score 1 and 17 patients had a sedation score 2 representing 15% and 85% of the group respectively.

##### Group III:

4 patients had a sedation score 2 and 4 patients had a sedation score 3 representing 20% and 20% of the group respectively.

#### b. deep sedation: (scores 4, 5 and 6)

##### Group I

None of the patients in this group had deep sedation.

##### Group II:

None of the patients in this group had deep sedation

##### Group III:

10 patients had a sedation score 4 and 2 patients had a sedation score 5 representing 50% and 10% of the group respectively.

#### Comparison among the three studied groups: [table XXI figure 20]

#### a. mild sedation: (scores 1, 2 and 3)

- The sedation level was the same on comparing group I with group II as all the patients in both groups were in level of mild sedation with no difference between the groups statistically ( $p=$ -).
- The sedation level was significantly milder in group I than in group III ( $p_2 < 0.001$ ).
- The sedation level was significantly milder in group II than in group III ( $p_3 < 0.001$ ).

#### b. deep sedation: (scores 4, 5 and 6)

- The sedation level was the same on comparing group I with group II as none of the patients in both groups was in level of deep sedation with no difference between the groups statistically ( $p_1 = -$ ).
- The sedation level was significantly deeper in group III than in group I ( $p_2 < 0.001$ ).
- The sedation level was significantly deeper in group III than in group II ( $p_3 < 0.001$ ).

**Table (XXI): Comparison between the three studied groups according to sedation level (Ramsay sedation scale.)**

Cases	Sedation level according to Ramsay sedation scale		
	Group I	Group II	Group III
1	1	2	4
2	2	2	4
3	2	2	2
4	2	2	5
5	2	2	4
6	1	1	4
7	1	2	2
8	2	2	3
29	2	2	4
10	2	2	4
11	2	2	2
12	2	2	4
13	2	1	3
14	2	1	2
15	2	2	4
16	1	2	4
17	2	2	5
18	2	2	3
19	2	2	4
20	1	2	3
<b>Mild sedation</b>	20 (100.0%)	20 (100.0%)	8 (40.0%)
$\chi^2(p)$	30.000* (<0.001*)		
p <sub>1</sub>	-		
p <sub>2</sub>	<0.001*		
p <sub>3</sub>	<0.001*		
<b>Deep sedation</b>	0 (0.0%)	0 (0.0%)	12 (60.0%)
$\chi^2(p)$	30.000* (<0.001*)		
p <sub>1</sub>	-		
p <sub>2</sub>	<0.001*		
p <sub>3</sub>	<0.001*		

$\chi^2$ : Chi square test.

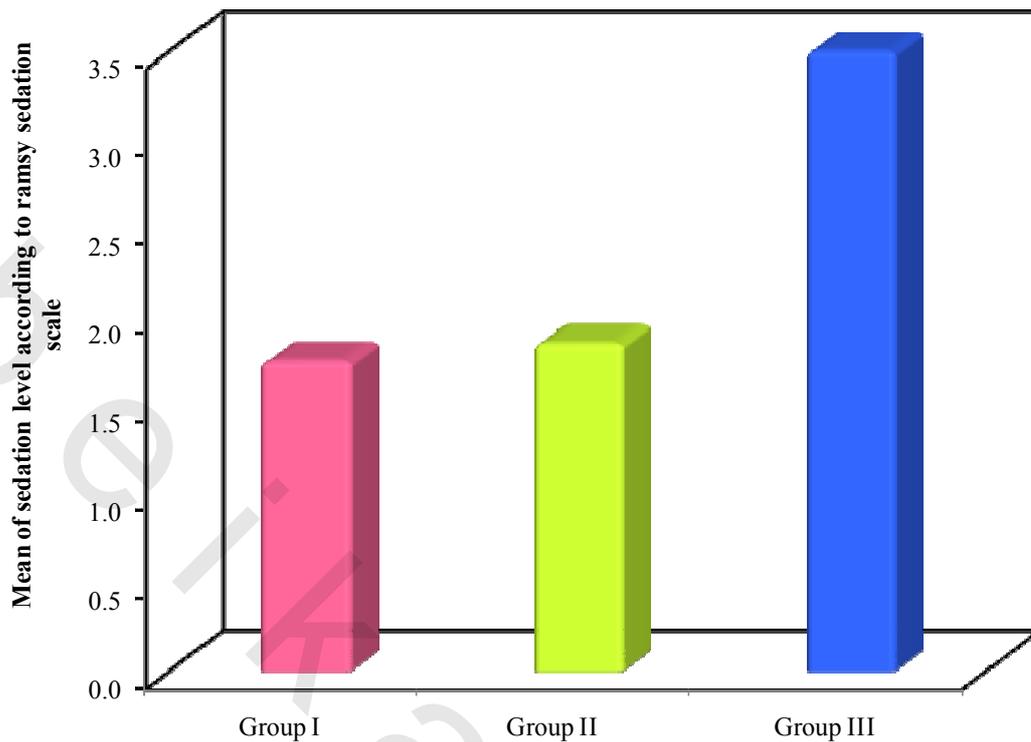
MC: Monte Carlo test

p<sub>1</sub>: p value for Fisher Exact test for comparing between group I with group II

p<sub>2</sub>: p value Fisher Exact test for comparing between group I with group III

p<sub>3</sub>: p value Fisher Exact test for comparing between group II with group III

\*: Statistically significant at  $p \leq 0.05$



**Figure (13): Comparison between the three studied groups according to sedation level according to Ramsay sedation scale.**

#### **4. Side effects:**

As regarding the comparison between the three studied groups according to the development of dizziness and somnolence or respiratory depression within the first two hours postoperatively, no post-operative complications have occurred and also no post-operative nausea or vomiting was recorded in any group during this study.