

Results

Constitutional Data

1. Age:

- Mean age of enrolled subjects was 45.6 ± 7.2 years and ranged between 35 and 59 years.
- There was non-significant difference between studied subjects as regards mean age, (Table 1, Fig. 1).

2. Gender:

- The study included 27 males (60%) and 18 females (40%).
- There was non-significant difference between studied subjects as regards gender distribution, (Table 1).

3. Weight:

- Mean weight of enrolled subjects was 86.2 ± 5.2 kg and ranged between 73 and 97 kg.
- There was non-significant difference between positive control groups compared to negative control group and between both of C1 and C2.
- OSAS patients have significantly higher weight compared both to negative controls ($Z=2.736$, $p=0.009$) and to groups C1 ($Z=2.766$, $p=0.006$) and C2 ($Z=1.966$, $p=0.049$), (Table 1, Fig. 2).

4. **Height:**

- Mean age of enrolled subjects was 166.3 ± 5.1 cm and ranged between 145 and 173 cm.
- There was non-significant difference between studied subjects as regards mean height, (Table 1).

5. **BMI:**

- Mean weight of enrolled subjects was 31.3 ± 2.9 kg/m² and ranged between 25 and 39.6 kg/m².
- There was non-significant difference between positive control groups compared to negative control group and between both of C1 and C2.
- OSAS patients have significantly higher BMI compared to both negative control ($Z=2.045$, $p=0.041$) and C1 group ($Z=2.480$, $p=0.013$), but non-significantly higher compared to C2 ($Z=1.306$, $p>0.05$), (Table 1, Fig. 3).

Table (1): Patients' enrollment data

Group		Negative control	Positive control		Study group	Total
			C1	C2		
Age (years)		43.5±9.7	46.1±6.6	45.9±8	44.9±7.6	45.6±7.2
Gender	Males	9 (60%)	8 (53.3%)	10 (66.7%)	9 (60%)	27 (60%)
	Females	6 (40%)	7 (46.7%)	5 (33.3%)	6 (40%)	18 (40%)
Weight (kg)		82.4±5.9	84.3±6.2	85.7±4.3	88.5±3.9	86.2±5.1
Height (cm)		166.6±4.4	167.8±3.3	165.7±5.5	165.3±6	166.3±5.1
BMI (kg/m ²)		29.8±2.8	30±2.4	31.3±2.7	32.5±3.1	31.3±2.9

Data are presented as mean±SD & numbers; percentages are in parenthesis

Fig. (1): Mean (\pm SD) age of study participants

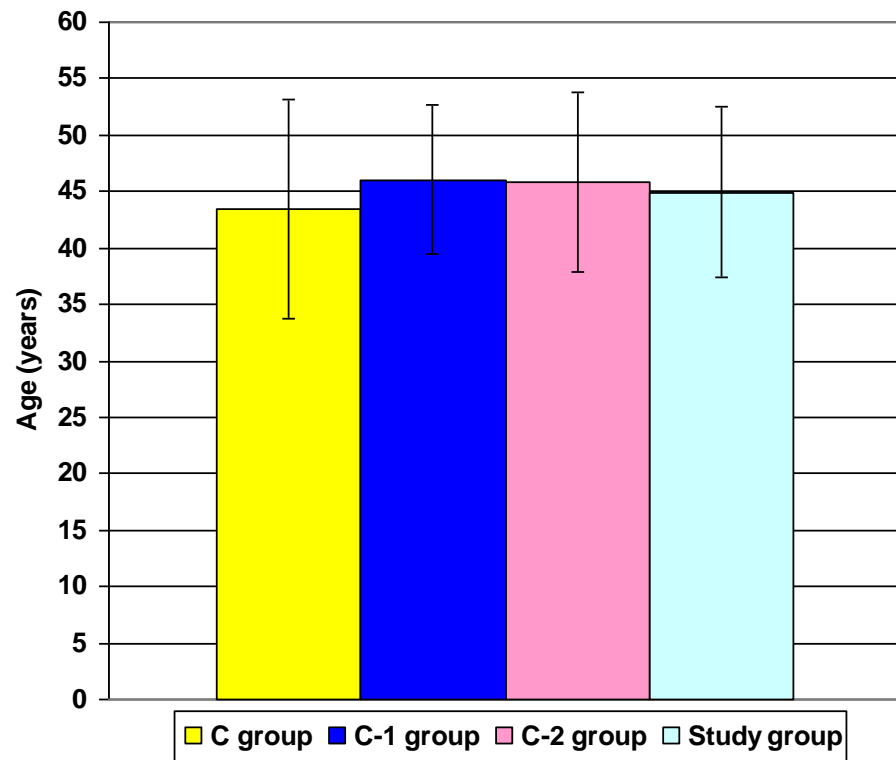


Fig. (2): Mean (\pm SD) weight of study participants

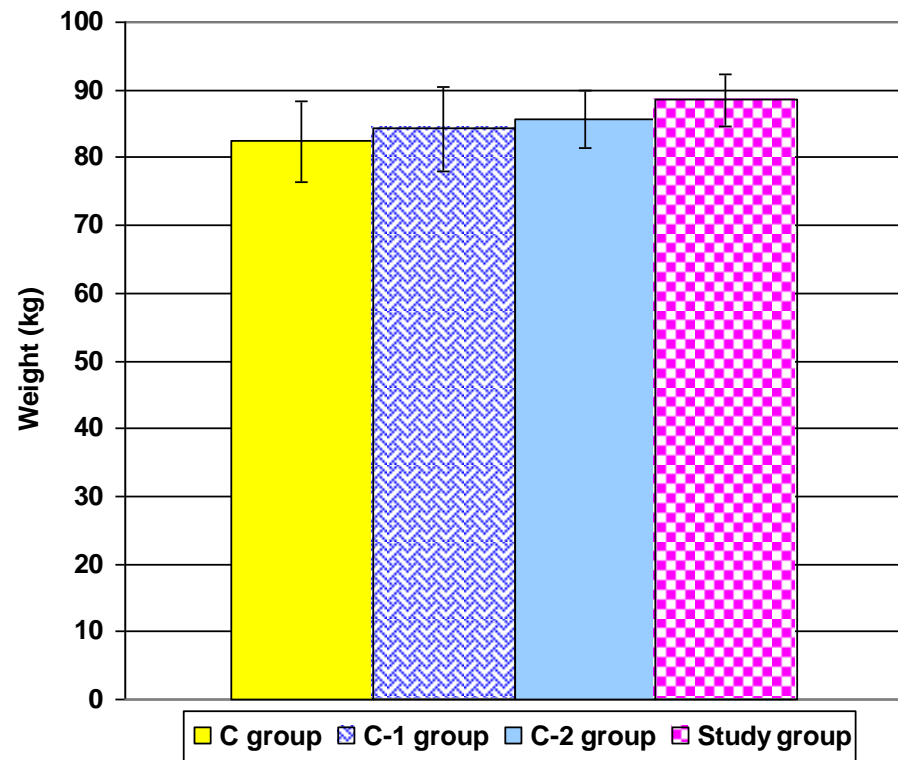
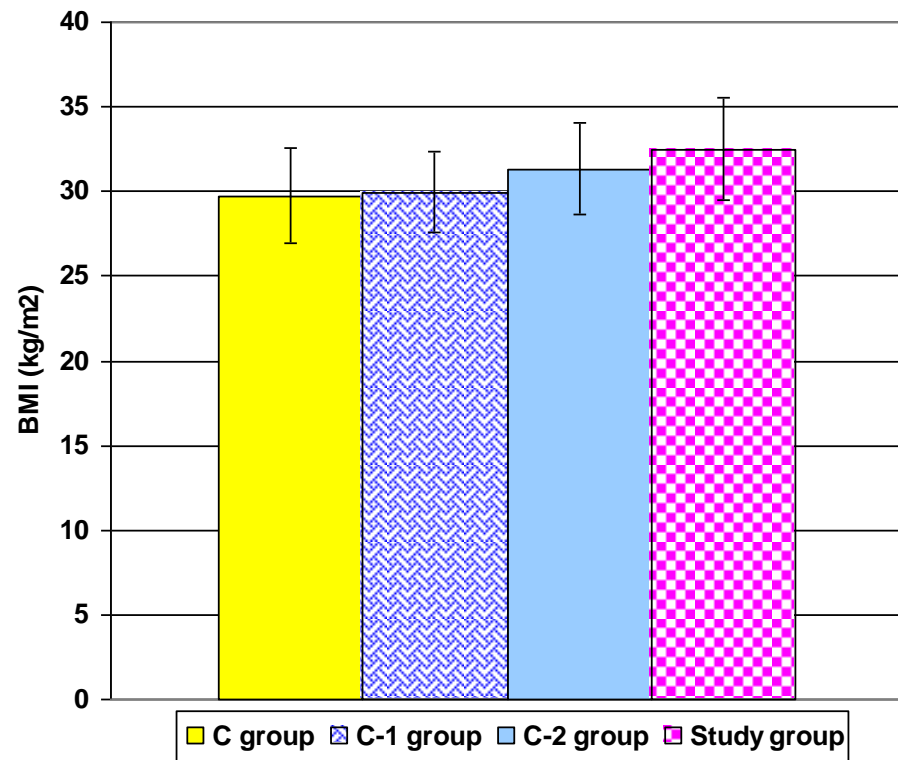


Fig. (3): Mean (\pm SD) BMI of study participants



Daytime Sleepiness scoring

- Mean ESS score of OSAS patients was significantly higher compared to negative control group ($Z=3.442$, $p=0.001$), C1 group ($Z=3.095$, $p=0.002$) and C2 group ($Z=2.599$, $p=0.009$).
- Mean ESS score of cardiac patients (C2 group) was significantly higher compared to negative control group ($Z=3.423$, $p=0.001$) and C1 group ($Z=3.420$, $p=0.001$).
- Mean ESS score of hypertensive patients (C1 group) was significantly higher compared to negative control group ($Z=2.294$, $p=0.022$), (Fig. 4).

Lowest Peripheral arterial oxygen saturation (SaO₂)

- Mean lowest SaO₂ percentage recorded in OSAS patients was significantly lower compared to negative control group ($Z=3.424$, $p=0.001$) and C1 group ($Z=3.190$, $p=0.001$), but non-significantly lower compared to C2 group ($Z=1.026$, $p<0.05$).
- Mean lowest SaO₂ percentage recorded in cardiac patients (C2 group) was significantly higher compared to negative control group ($Z=3.423$, $p=0.001$) and C1 group ($Z=3.181$, $p=0.001$).
- Mean lowest SaO₂ percentage recorded in hypertensive patients (C1 group) was significantly higher compared to negative control group ($Z=2.669$, $p=0.008$), (Fig. 5).

Fig. (4): Mean (\pm SD) ESS of study participants

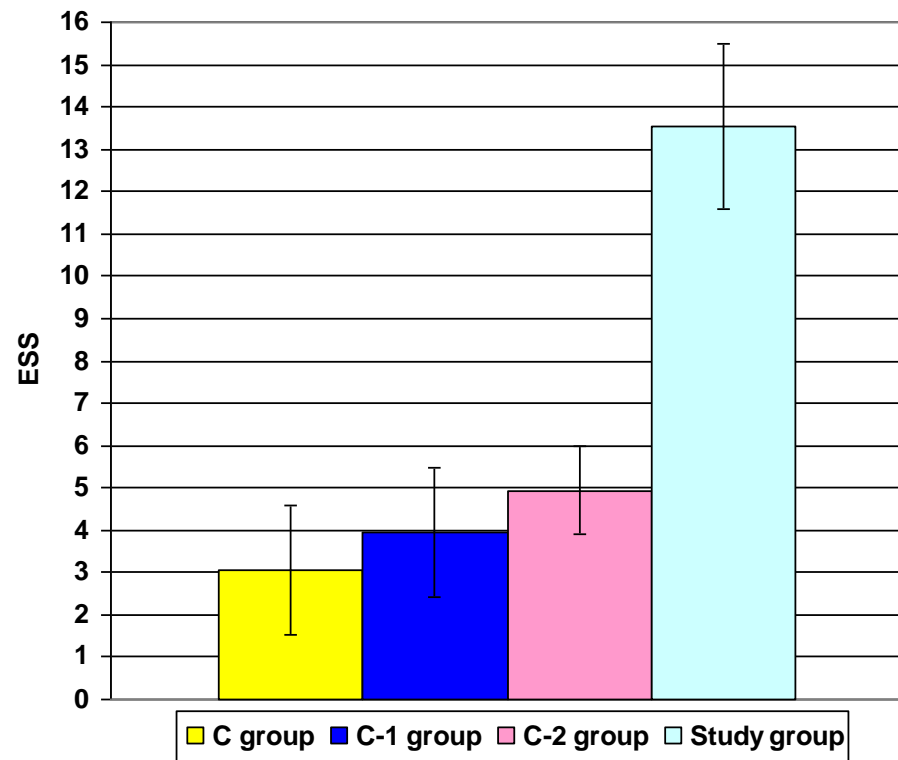
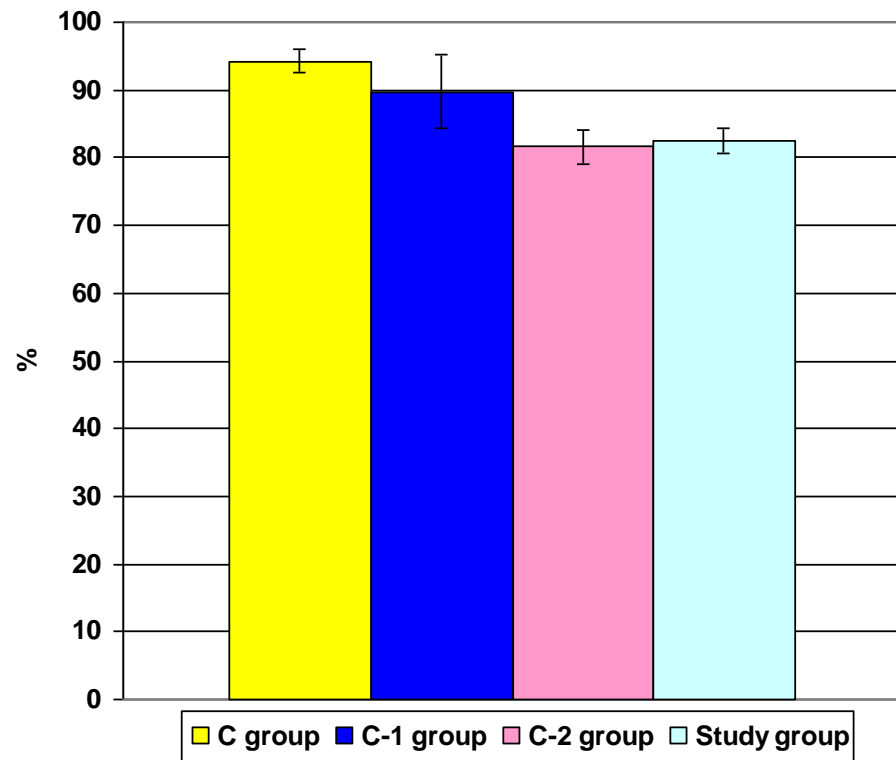


Fig. (5): Mean (\pm SD) lowest SaO₂ of study participants



Laboratory Findings

- **Serum hs-CRP levels**

- Mean serum level of hs-CRP estimated prior to CPAP treatment of OSAS patients was significantly higher compared to negative control group ($Z=3.408$, $p=0.001$), C1 group ($Z=3.352$, $p=0.001$) and C2 group ($Z=2.615$, $p=0.009$).
- Moreover, mean serum level of hs-CRP of cardiac patients (C2 group) was significantly higher compared to negative control group ($Z=3.351$, $p=0.001$) and C1 group ($Z=2.371$, $p=0.018$).
- Mean serum level of hs-CRP of hypertensive patients (C1 group) was significantly higher compared to negative control group ($Z=2.756$, $p=0.006$), (Table 2, Fig. 6).

Table (2): Mean (\pm SD) estimated serum levels of hs-CRP in studied groups and in OSAS patients 3-months after CPAP

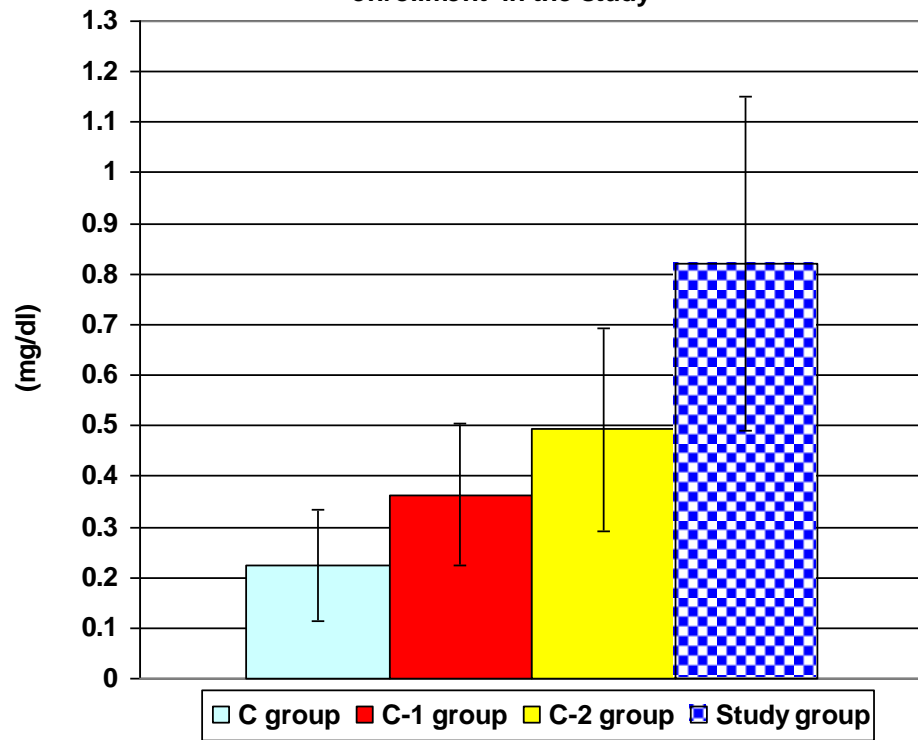
Group		Negative control	Positive control		Study group
			C1	C2	
Level (mg/dl)		0.23 \pm 0.11 (0.09-0.48)	0.36 \pm 0.14 (0.17-0.62)	0.49 \pm 0.2 (0.18-0.81)	0.82 \pm 0.33 (0.31-1.48)
Statistical analysis	Z		2.756	3.351	3.408
	P ₁		=0.006	=0.001	=0.001
	Z			2.371	3.352
	P ₂			=0.018	=0.001
	Z				2.615
	P ₃				=0.009

P₁: significance versus negative control group

P₂: significance versus positive control group (C1)

P₃: significance versus positive control group (C2)

Fig. (6): Mean (\pm SD) serum levels of hs-CRP estimated at time of enrollment in the study



Serum TNF- α levels

- Mean serum level of TNF- α estimated prior to CPAP treatment of OSAS patients was significantly higher ($Z=3.408$, $p=0.001$) compared to negative control group, C1 group and C2 group.
- Moreover, mean serum level of TNF- α estimated in cardiac patients (C2 group) was significantly higher ($Z=3.408$, $p=0.001$) compared to negative control group and C1 group.
- Mean serum level of TNF- α estimated in hypertensive patients (C1 group) was significantly higher compared to negative control group ($Z=2.316$, $p=0.021$), (Table 3, Fig. 7).

Table (3): Mean (\pm SD) estimated serum levels of TNF- α in studied groups and in OSAS patients 3-months after CPAP

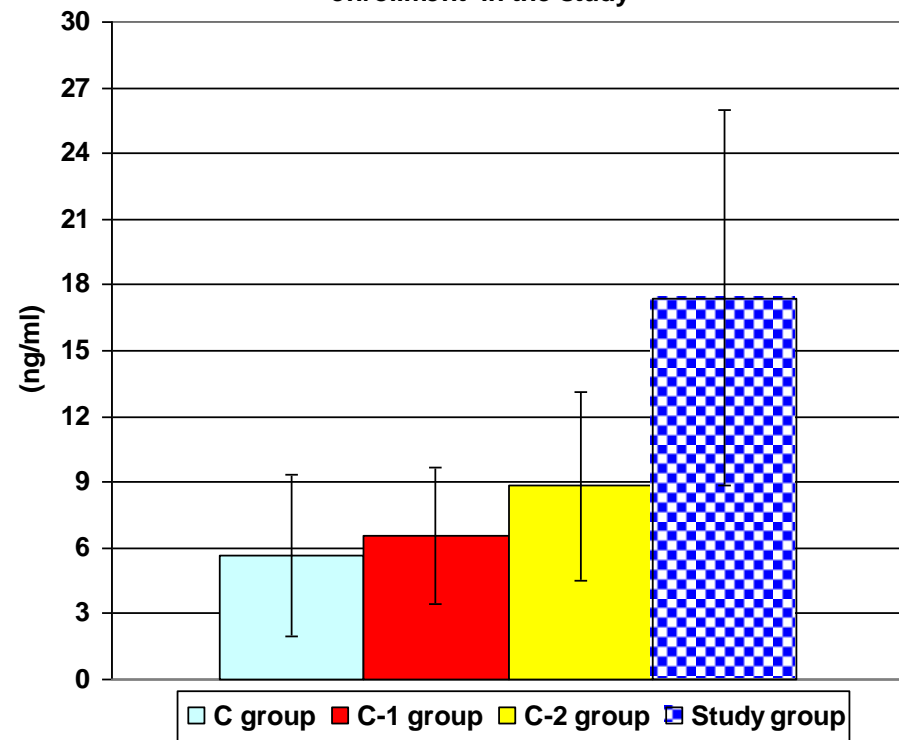
Group		Negative control	Positive control		Study group
			C1	C2	Pre
Level (mg/dl)		5.64 \pm 1.1 (4.15-8.1)	6.57 \pm 1.27 (4.9-8.9)	8.82 \pm 1.99 (6.36-11.93)	17.41 \pm 4.44 (11.73-25.5)
Statistical analysis	Z		2.316	3.408	3.408
	P ₁		=0.021	=0.001	=0.001
	Z			3.408	3.408
	P ₂			=0.001	=0.001
	Z				3.408
	P ₃				=0.001

P₁: significance versus negative control group

P₂: significance versus positive control group (C1)

P₃: significance versus positive control group (C2)

Fig. (7): Mean (\pm SD) serum levels of TNF- α estimated at time of enrollment in the study



Serum IL-6 levels

- Mean serum level of IL-6 estimated prior to CPAP treatment of OSAS patients was significantly higher compared to negative control group ($Z=3.351$, $p=0.001$), C1 group ($Z=3.010$, $p=0.003$) and C2 group ($Z=2.897$, $p=0.004$).
- Moreover, mean serum level of IL-6 estimated in cardiac patients (C2 group) was significantly higher compared to negative control group ($Z=2.669$, $p=0.008$) and C1 group ($Z=2.101$, $p=0.036$).
- Mean serum level of IL-6 estimated in hypertensive patients (C1 group) was non-significantly higher compared to negative control group ($Z=1.761$, $p>0.05$), (Table 4, Fig. 8).

Table (4): Mean (\pm SD) estimated serum levels of IL-6 in studied groups and in OSAS patients; 3-months after CPAP

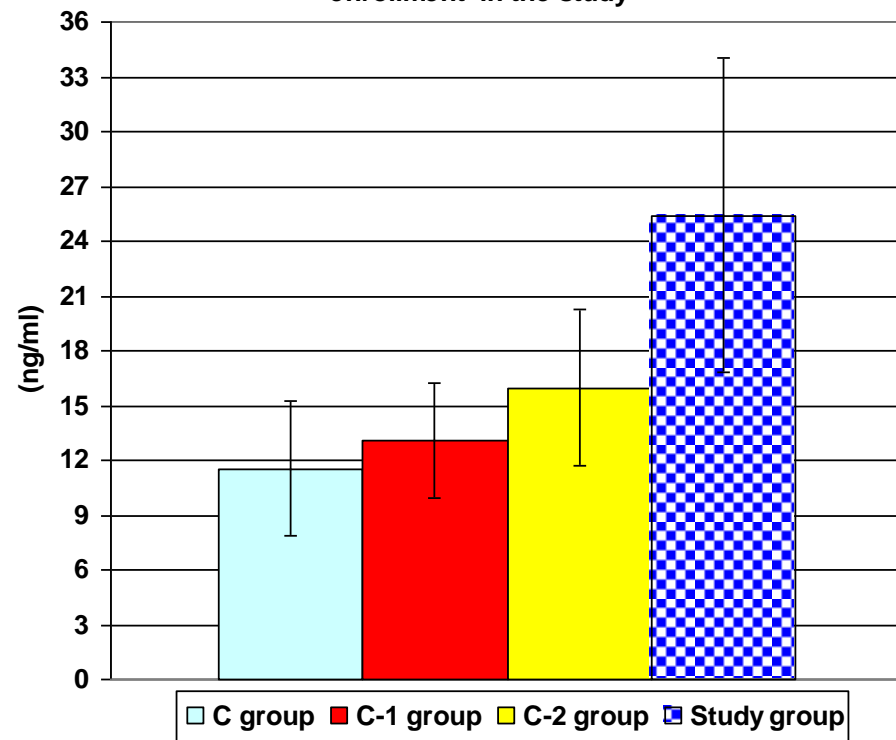
Group		Negative control	Positive control		Study group
			C1	C2	Pre
Level (mg/dl)		11.53 \pm 3.69 (6.5-17.5)	13.1 \pm 3.13 (7.9-17.3)	15.9 \pm 4.28 (8.25-23.7)	25.4 \pm 8.6 (10.7-39.3)
Statistical analysis	Z		1.761	2.669	3.351
	P ₁		>0.05	=0.008	=0.001
	Z			2.101	3.010
	P ₂			=0.036	=0.003
	Z				2.897
	P ₃				=0.004

P₁: significance versus negative control group

P₂: significance versus positive control group (C1)

P₃: significance versus positive control group (C2)

Fig. (8): Mean (\pm SD) serum levels of IL-6 estimated at time of enrollment in the study

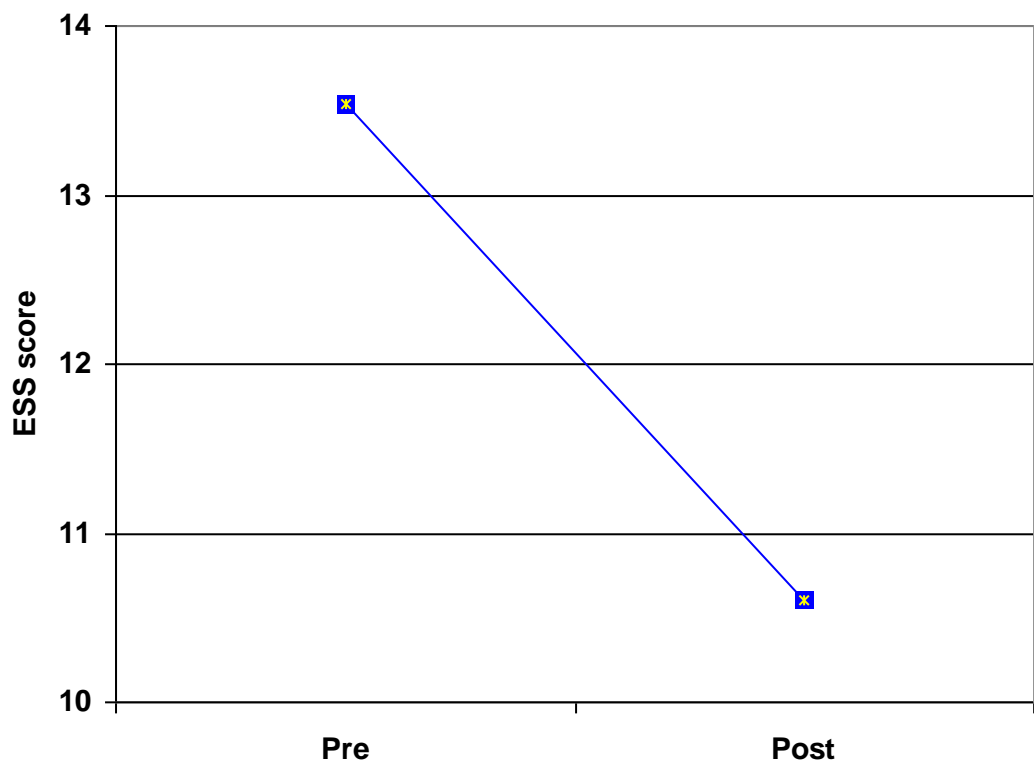


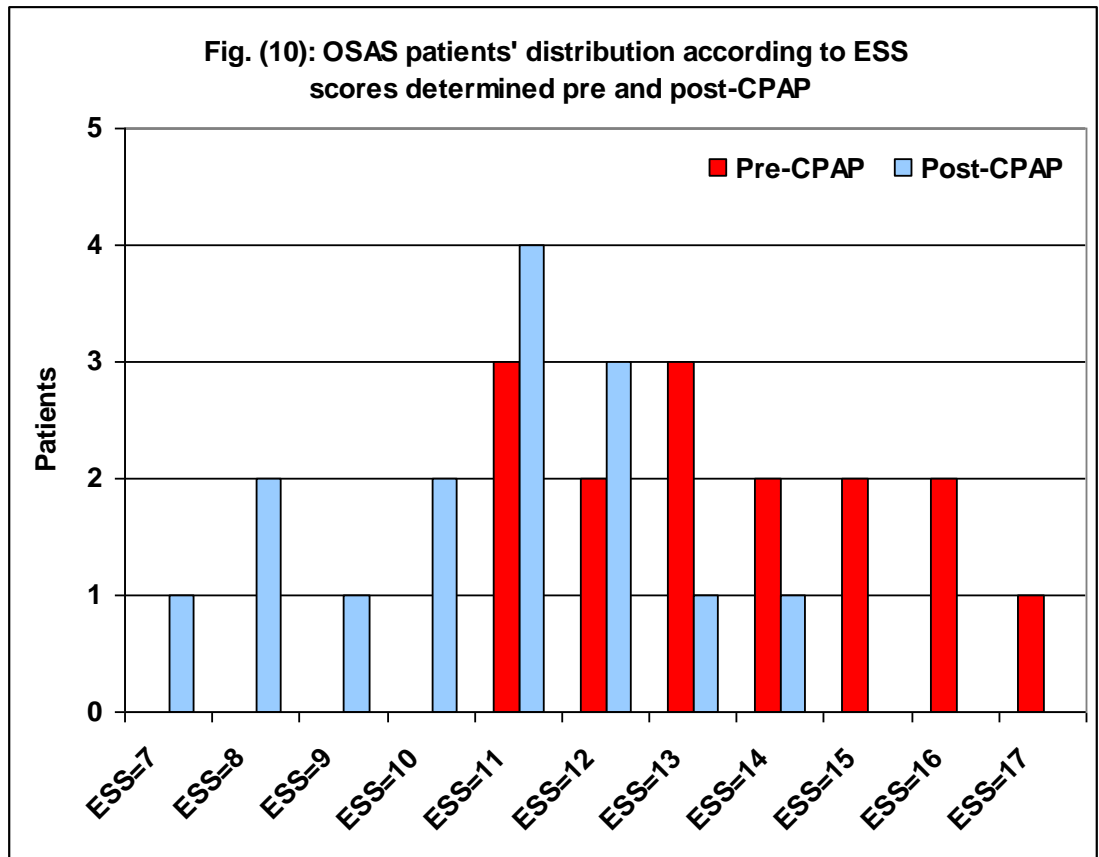
Effects of CPAP Treatment

- **Effects on ESS score**

- Mean ESS score evaluated at 3-months of CPAP was significantly lower ($t=11$, $p<0.001$) compared to pre-treatment ESS, (Fig. 9).
- Moreover, at end 3-months of CPAP, 4 patients (26.7%) had ESS score of <10 , 2 patients (13.3%) had ESS score of 10 and 9 patients still had ESS score of >10 and still diagnosed as OSAS patients. There was significant difference of the frequency of OSAS patients on pre-treatment ESS evaluation compared to post-treatment evaluation, ($X^2=5.518$, $p<0.01$), (Fig. 10).

Fig. (9): Mean ESS score determined prior to and after 3-months of CPAP

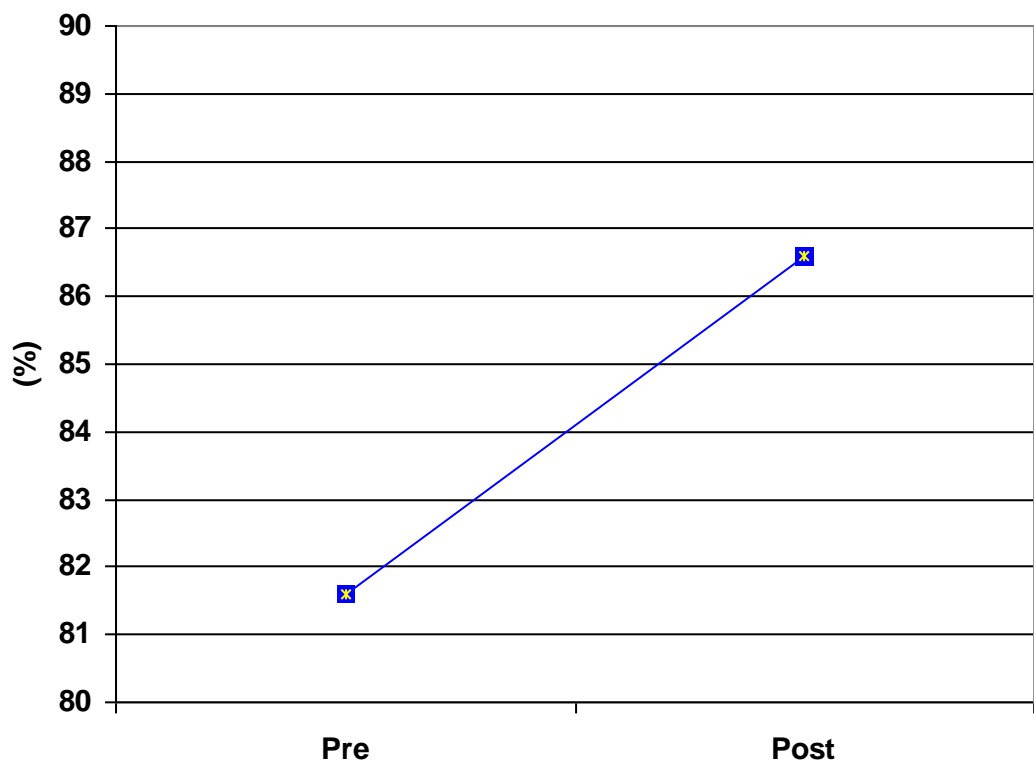


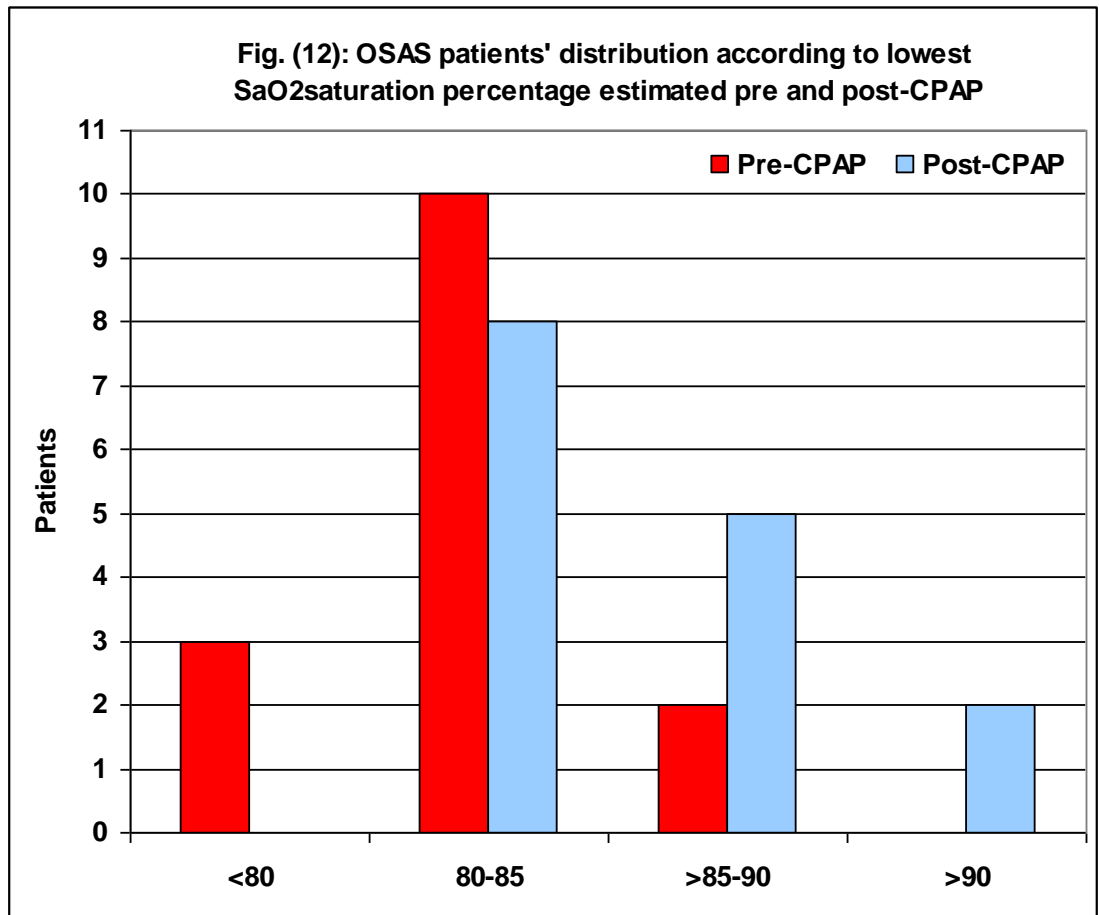


- **Effects on Lowest SaO₂%**

- Mean lowest SaO₂% evaluated at 3-months of CPAP was significantly higher ($t=13.229$, $p<0.001$) compared to pre-treatment lowest SaO₂ percentage, (Fig. 11).
- Moreover, at end 3-months of CPAP, 8 patients (53.3%) had lowest SaO₂% in range of 80% to 85%, 5 patients (33.3%) had lowest SaO₂% in range of >85% to 90% and 2 patients (13.4%) had lowest SaO₂% in range of >90%, (Fig. 12).

Fig. (11): Mean lowest SaO₂ saturation percentage estimated prior to and after 3-months of CPAP





- **Effects on Laboratory data**

A) Effects on serum hs-CRP level

1. CPAP treatment significantly ($Z=3.153$, $p=0.002$) reduced serum hs-CRP levels in OSAS patients compared to their pre-treatment levels, (Table 5, Fig. 13).
2. However, post-treatment serum hs-CRP levels were still significantly higher compared to those reported in negative control group ($Z=3.237$, $p=0.001$) and C1 group ($Z=2.040$, $p=0.041$), but were non-significantly higher compared to those reported in C2 group, ($Z=0.714$, $p>0.05$).

B) Effects on serum TNF- α level

1. CPAP treatment significantly ($Z=2.669$, $p=0.008$) reduced serum TNF- α levels in OSAS patients compared to their pre-treatment levels, (Table 5, Fig. 14).
2. However, post-treatment serum TNF- α levels were still significantly higher compared to those reported in negative control group ($Z=3.408$, $p=0.001$), C1 group ($Z=3.408$, $p=0.001$) and C2 group ($Z=2.669$, $p=0.008$).

C) Effects on serum IL-6 level

1. CPAP treatment significantly ($Z=2.840$, $p=0.005$) reduced serum IL-6 levels in OSAS patients compared to their pre-treatment levels, (Table 5, Fig. 15).
2. However, post-treatment serum IL-6 levels were still significantly higher compared to those reported in negative control group ($Z=3.067$, $p=0.002$) and C1 group ($Z=2.442$, $p=0.015$), but were non-significantly higher compared to those reported in C2 group, ($Z=1.079$, $p>0.05$).

Table (5): Serum levels of studied laboratory parameters estimated prior to and after CPAP treatment

	Pre-CPAP	Post-CPAP	Statistical analysis	
			t	P
hs-CRP (mg/dl)	0.82±0.33	0.58±0.27	6.380	<0.001
TNF- α (ng/ml)	17.4±4.4	13.9±3.1	3.400	=0.004
IL-6 (ng/ml)	25.4±4.2	17.8±4.2	4.116	=0.001

Fig. (13): Mean serum levels of hs-CRP estimated prior to and after 3-months of CPAP

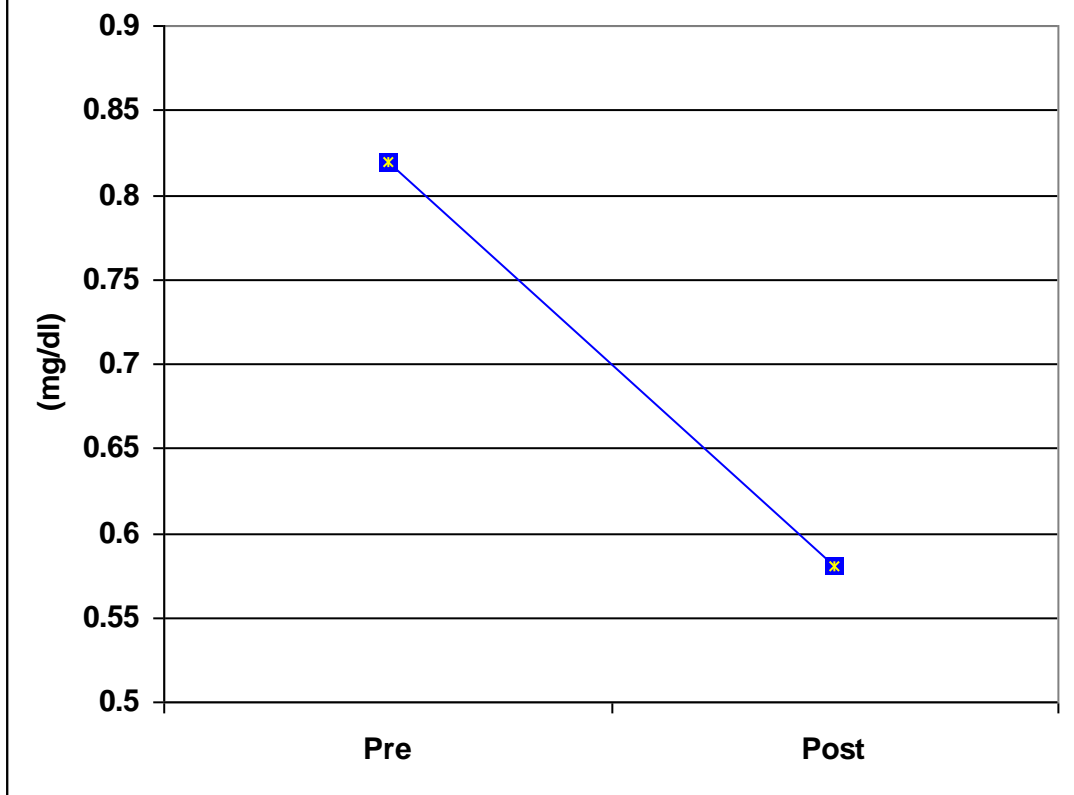


Fig. (14): Mean serum levels of TNF- α estimated prior to and after 3-months of CPAP

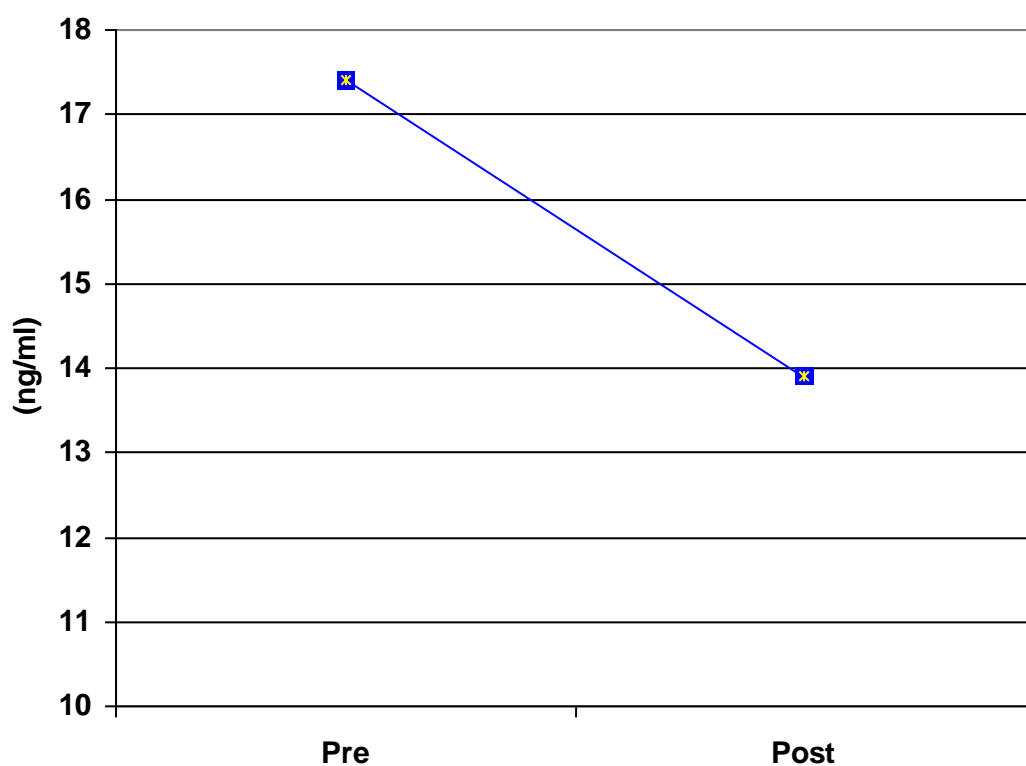
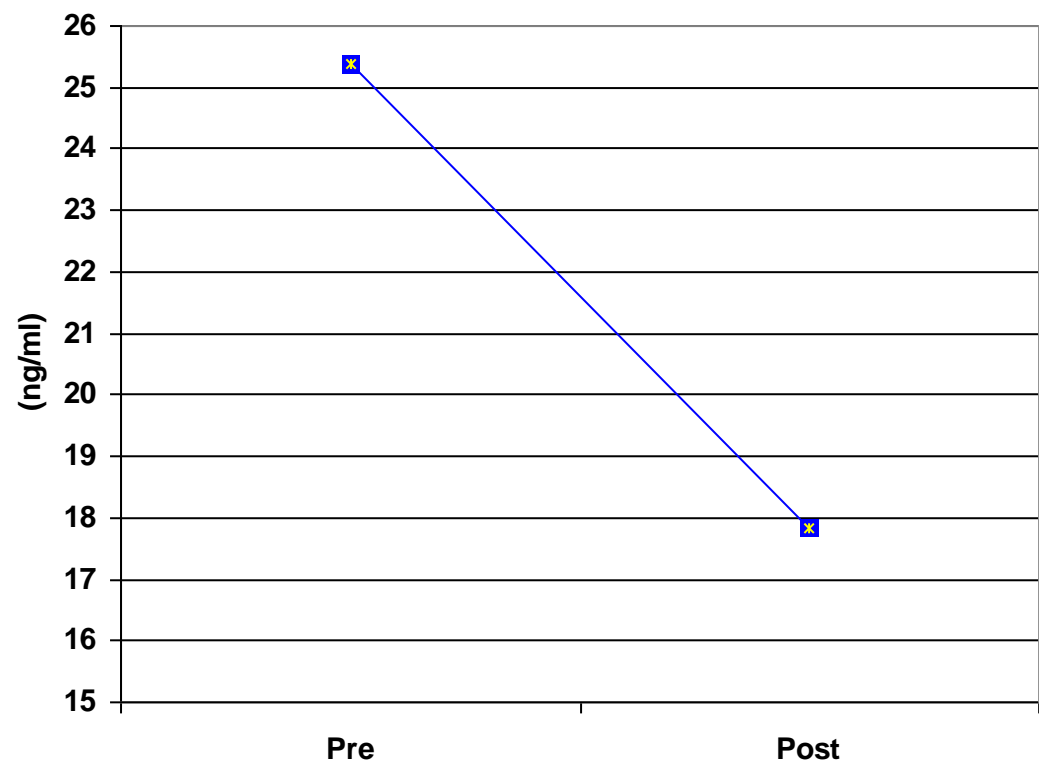


Fig. (15): Mean serum levels of IL-6 estimated prior to and after 3-months of CPAP



- **CPAP Compliance**

- Good compliance was recorded by 11 patients (73.3%), while the other 4 patients (26.7%) showed poor compliance, (Fig. 16).

Fig. (16): OSAS patients' distribution according to CPAP compliance

