RESULTS

The results of this work were depicted and statistically analyzed in the following Tables **(1 - 14)** and Figures **(1 - 12)** :

Table (1) & Figure (1) : Show the etiological distribution of heart failure patients with their sex and age characteristics. 30 patients had rheumatic heart disease *(60%)*, 10 patients had dilated cardiomyopathy *(20%)*, and 10 patients had congenital heart disease *(20%)*.

Tables (2) & (3) : Show statistical comparison "as regards sex and age distribution" between all patients versus the control group. There was no significant difference between all patients and the control group with respect to sex and age. Thus, subjects of the control group were sex- and age- matched to the combined cohort of patients with heart failure.

Table (4) : Shows ranges and mean ± standard deviation of body weight (expressed as % of ideal) among the studied groups. Cachexia was a dominant feature among our patients with CHF as their mean weight was below 85% of ideal weight. However, there was no significant difference in body weight among patients with heart failure in the 3 studied groups.

Table (5) : Shows the distribution of HF grades among the studied groups. There was no significant difference among the different groups of heart failure with respect to distribution of HF grades.

Table (6) & Figure (2) : Show the frequency distribution of clinical signs of heart failure in Rheumatic and Cardiomyopathy groups. *Dyspnea* and *cardiomegaly* were present in all patients with CHF in both groups, followed by *tachycardia* and *hepatomegaly*, *neck vein distension*, and *edema*, in order of frequency. *Rales* and *tachypnea* were the least frequent clinical signs of heart failure in both groups.

Table (7) & Figure (3) : Show the frequency distribution of clinical signs of heart failure in the Congenital group. All infants with CHF in the congenital group had *feeding difficulty* (which is the infantile equivalent of exertional dyspnea in older children) and *cardiomegaly*, followed by *tachycardia* and *tachypnea*, *hepatomegaly*, *decreased peripheral perfusion*, and S_3, in order of frequency. *Abnormal respiratory pattern* was the least frequent clinical sign of heart failure in the congenital group.

Table (8) : Shows ranges and mean ± standard deviation of the basic laboratory, ECG, X-ray, and echocardiographic quantitative data among different studied groups of heart failure.

Table (9) & Figure (4) : Show statistical comparison of mean ± standard deviation of serum TNF-α in different studied groups of heart failure as compared to the control group. The values for serum TNF-α in patients with CHF in the 3 studied groups were statistically higher than the respective values obtained in the control subjects. However, these values were not significant statistically among the different etiologic groups.

Table (10) & Figure (5) *:* Show the frequency percent of patients with elevated serum level of TNF-α (pg/ml) among different studied groups of heart failure. 70% of all patients with CHF had elevated levels of serum TNF-α. The percentage was highest in the Congenital group (80%), followed by the cardiomyopathy group (70%), and lastly the Rheumatic group (67%), with no statistically significant difference among the 3 studied groups.

Table (11) & Figure (6) : Show statistical comparison of mean ± standard deviation of serum TNF-α (pg/ml) among the studied groups in relation to different grades of heart failure.

- *Compared with age-matched control subjects*, there was a progressive increase in serum levels of TNF-α as the grade of heart failure deteriorates.
- *In the Rheumatic and Cardiomyopathy groups :* The level of serum TNF-α was significantly higher in patients with severe heart failure than those with mild and moderate heart failure.
- *In the Congenital group:* The level of serum TNF-α was not significantly different in patients with severe heart failure than those with mild and moderate heart failure.
- *In the 3 studied groups :* There was significant difference in the levels of serum TNF-α in patients with moderate and severe heart failure compared with normal age-matched subjects, whereas there was no significant difference in serum TNF-α levels in patients with mild heart failure compared with control subjects.

Table (12) & Figure (7) : Show the mean ± standard deviation of serum TNF-α (pg/ml) in different studied groups of heart failure presented with and without cachexia. There was significant relation between presence of cachexia and the high levels of serum TNF-α among patients with CHF in the 3 studied groups.

Table (13) & Figure (8) : Show the mean ± standard deviation of serum TNF-α (pg/ml) in Rheumatic patients with heart failure presented with and without carditis. There was no significant association between carditis (i.e. rheumatic activity) and the high levels of serum TNF-α in Rheumatic patients with CHF.

Table (14) & Figures (9,10,11,12) : Show correlation coefficient of serum TNF-α (pg/ml) with other parameters in different studied groups of heart failure.

- There was *significant negative correlation* between serum levels of TNF-α and body weight in the 3 studied groups ***(Figure 9).***
- There was also a statistically *significant negative correlation* between serum levels of TNF-α and hemoglobin% ***(Figure 10),*** hematocrit value ***(Figure 11)***, and EF% ***(Figure 12)*** in patients with heart failure in the Rheumatic group only.
- Otherwise, there was *no significant correlation* between serum TNF-α level and any other clinical, laboratory, ECG, X-ray, or echocardiographic variables in the 3 studied groups.

Table (1) : Etiological distribution of heart failure patients with their sex and age characteristics :

GROUP	No.	SEX		AGE (years)
		Male	Female	Range (Mean ± SD)
* Group I (Rheumatic)	30 (60%)	13 :	17	6 - 15 (10.47 ± 2.88)
* Group II (Cardiomyopathy)	10 (20%)	6 :	4	3 - 15 (8.90 ± 4.22)
* Group III (Congenital)	10 (20%)	6 :	4	2/12 - 1.5 (0.71 ± 0.43)

Figure (1)

Etiological distribution of the patients

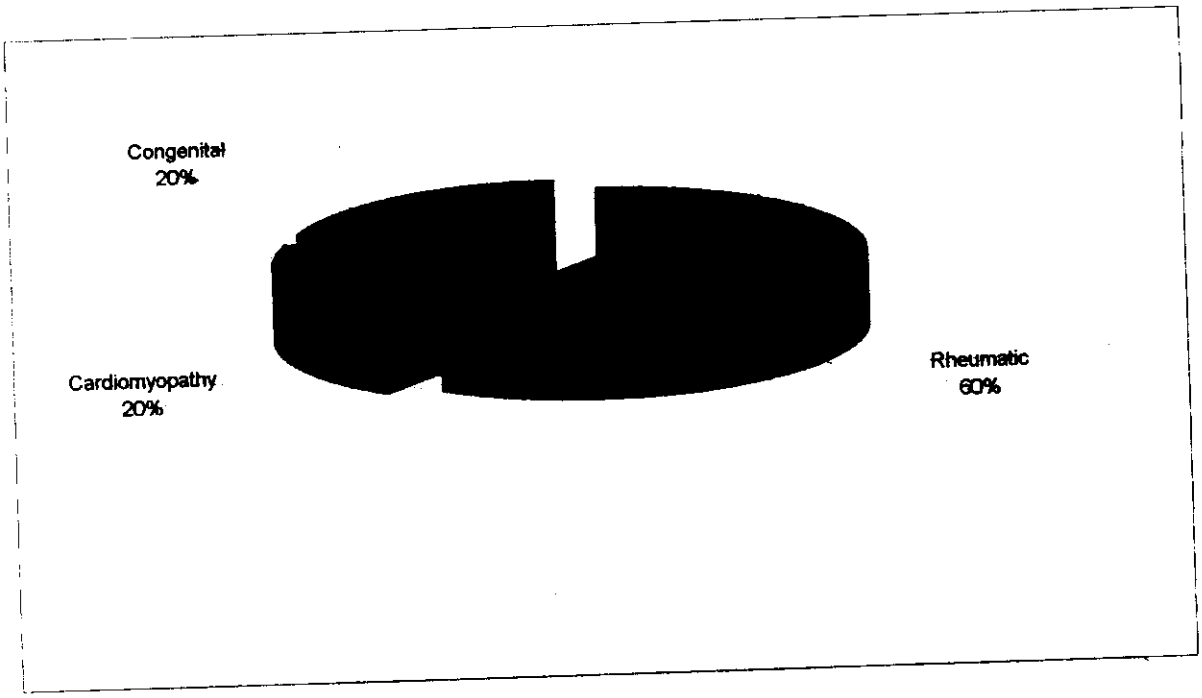


Table (2) : Statistical comparison "as regards sex distribution" between all patients versus control group :

GROUP	SEX			
	Male		Female	
	No.	%	No.	%
* All patients (n = 50)	25	50.0	25	50.0
* Control group (n = 20)	10	50.0	10	50.0

$X^2 = 0.00$ P (not significant)

Table (3) : Statistical comparison "as regards age distribution" between all patients versus control group :

GROUP	AGE (years)			
	Minimum	Maximum	Mean	± SD
* All patients (n = 50)	2/12	15	8.20	4.79
* Control group (n = 20)	1/12	15	8.26	3.89

t = 1.79 P (not significant)

Table (4) : Distribution of body weight among the studied groups :

GROUP	BODY WEIGHT (expressed as % of ideal)			
	Minimum	Maximum	Mean	± SD
* Rheumatic (n = 30)	61	95	82.53	8.79
* Cardiomyopathy (n = 10)	57	102	83.20	13.32
* Congenital (n = 10)	55	92	79.80	12.83

F = 0.56 **P (not significant)**

Table (5): Distribution of HF grades among the studied groups:

GROUP	GRADE OF HEART FAILURE					
	Mild		Moderate		Severe	
	No.	%	No.	%	No.	%
* Rheumatic (n = 30)	10	33.3	10	33.3	10	33.3
*Cardiomyopathy (n = 10)	3	30.0	3	30.0	4	40.0
*Congenital (n = 10)	4	40.0	3	30.0	3	30.0

$X^2 = 0.36$ **P (not significant)**

Figure (2)

Frequency of clinical signs of heart failure in Rheumatic and Cardiomyopathy groups

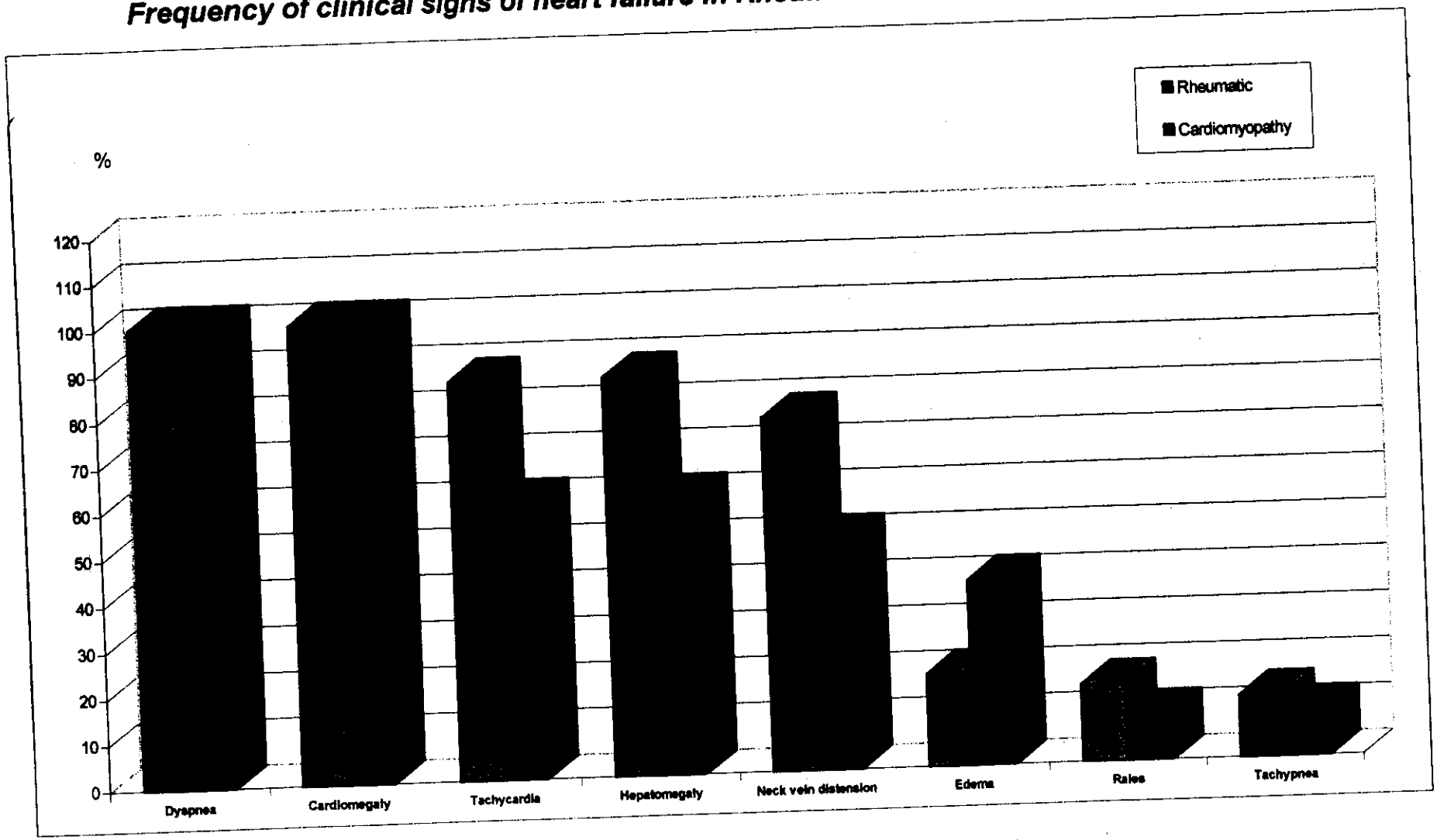


Table (7) : Frequency distribution of clinical signs of heart failure in group III "Congenital" :

GROUP Total No.	GROUP III (10 cases)	
CLINICAL SIGNS	No.	%
* Feeding difficulty	10	100.0
* Cardiomegaly	10	100.0
* Tachycardia (> 160 /minute)	9	90.0
* Tachypnea (> 50/minute)	9	90.0
*Palpable liver edge (> 2 cm)	8	80.0
* Decreased peripheral perfusion	7	70.0
* S_3 or diastolic rumble	6	60.0
* Abnormal respiratory pattern	3	30.0

Figure (3)

Frequency of clinical signs of heart failure among Congenital group of heart disease

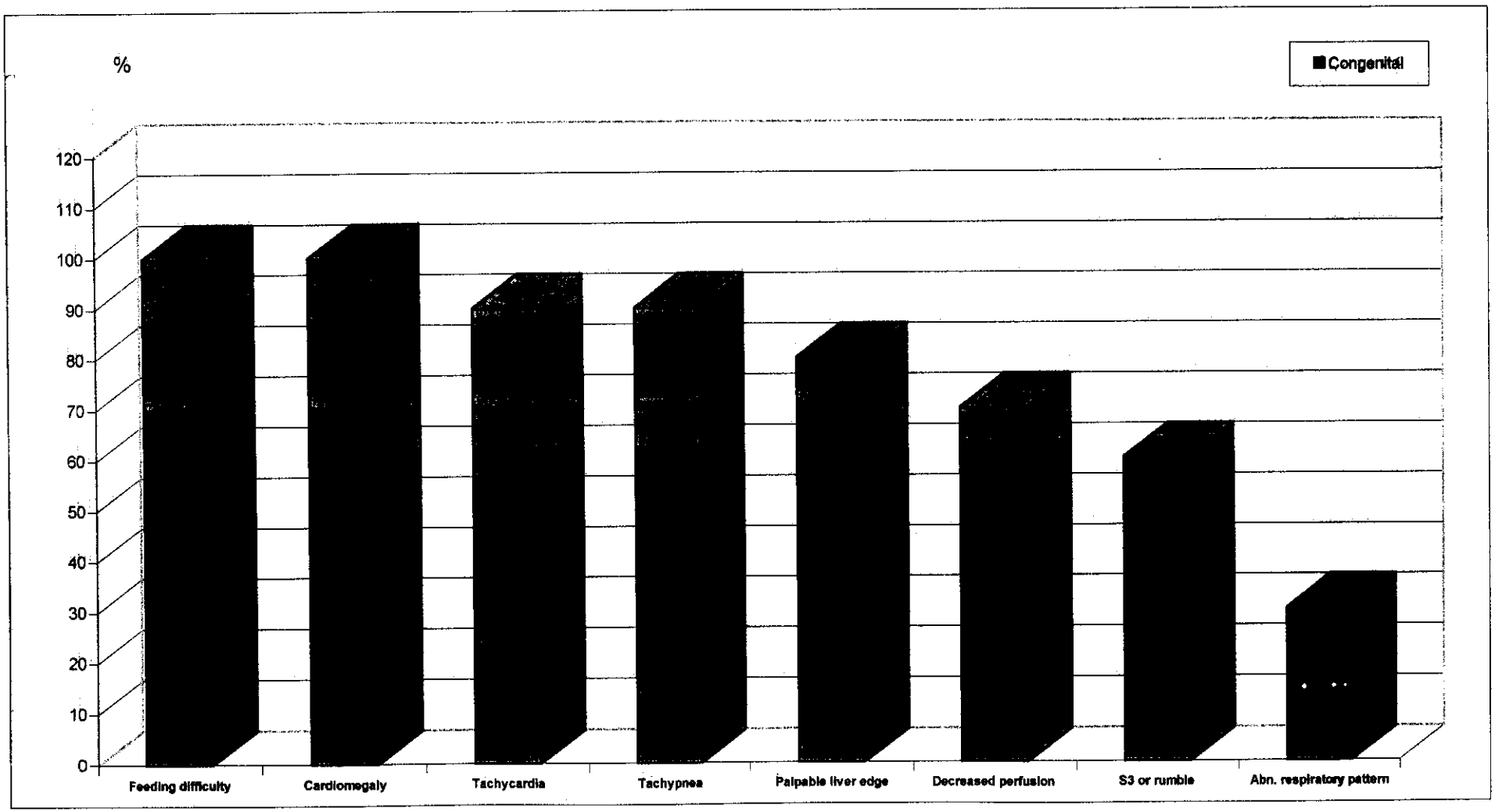


Table (8): Collective basic laboratory, ECG, X-ray, and Echo quantitative data among the studied groups:

DATA		Rheumatic (n = 30)	Cardiomyopathy (n = 10)	Congenital (n = 10)
*Hemoglobin (g/dl)	*Range*	8.90 - 13.00	7.80 - 13.30	8.60 - 17.10
	Mean ±SD	11.09 ± 1.11	11.18 ± 1.60	14.19 ± 2.49
* Hematocrit (%)	*Range*	25.80 - 38.70	25.00 - 40.10	24.90 - 54.30
	Mean ±SD	33.21 ± 3.46	33.76 ± 4.48	42.80 ± 8.89
* ESR (mm)	*Range*	8 - 120	12 - 28	5 - 45
	Mean ±SD	53.97 ± 23.43	17.20 ± 4.83	12.30 ± 11.73
*ASOT (Todd units)	*Range*	120 - 640	—	—
	Mean ±SD	385.30 ± 148.22	—	—
*ECG rate	*Range*	95 - 160	95 - 120	140 - 180
	Mean ±SD	121.83 ± 17.44	108.50 ± 10.01	162.50 ± 11.61
* CT ratio	*Range*	0.60 - 0.85	0.58 - 0.76	0.59 - 0.72
	Mean ±SD	0.73 ± 0.07	0.66 ± 0.06	0.68 ± 0.05
* LVEDV (ml)	*Range*	44.13 - 289.45	40.96 - 223.61	9.72 - 50.87
	Mean ±SD	174.71 ± 65.48	142.17 ± 59.62	28.17 ± 12.42
* LVESV (ml)	*Range*	8.39 - 492.72	24.61 - 153.66	2.06 - 22.32
	Mean ±SD	118.41 ± 130.26	83.49 ± 43.01	9.10 ± 6.11
* FS (%)	*Range*	21 - 66	14-36	26 - 50
	Mean ±SD	36.33 ± 10.70	20.90 ± 7.06	37.90 ± 8.10
* EF (%)	*Range*	30- 80	29 - 50	37 - 78
	Mean ±SD	60.70 ± 10.84	35.20 ± 6.58	63.80 ± 14.00

Table (9) : Statistical comparison of mean serum TNF-α (pg/ml) in different studied groups of heart failure as compared to the control group :

SERUM TNF-α	STUDIED GROUPS			CONTROL GROUP (n = 20)
	Rheumatic (n = 30)	Cardiomyopathy (n = 10)	Congenital (n = 10)	
Range	26.4 - 873	30.1 - 175	39.5 - 163.6	10.8 - 41
Mean	116.61	81.10	80.37	30.97
±SD	174.42	47.87	44.25	9.91
t	**2.19**	**4.57**	**4.84**	
P	**< 0.05**	**< 0.05**	**< 0.05**	

Figure (4)

Mean ± SD of serum TNF-α (pg/ml) among different studied groups of heart failure and controls.

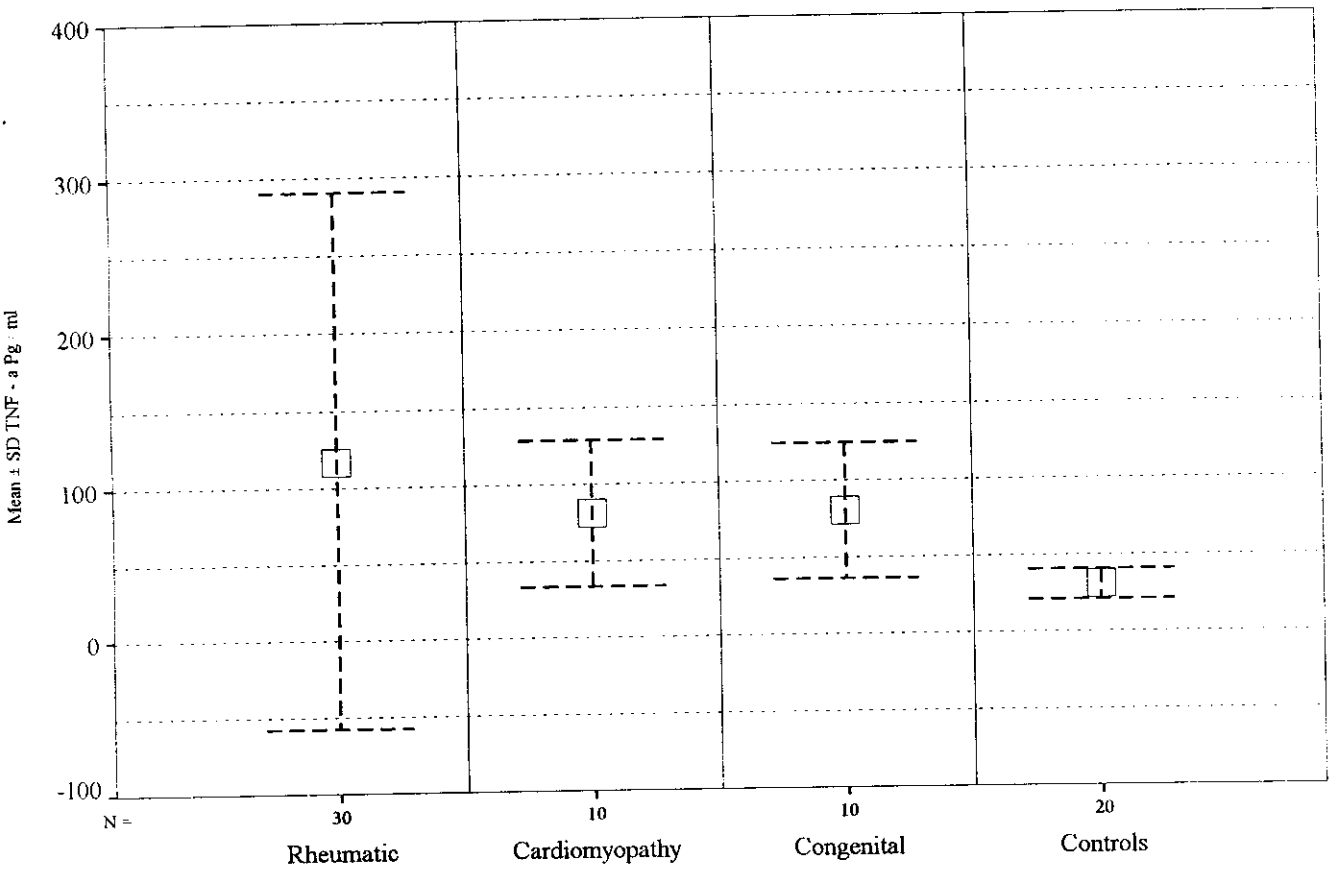


Table (10) : Frequency percent of patients with elevated serum level of TNF-α among different studied groups of heart failure:*

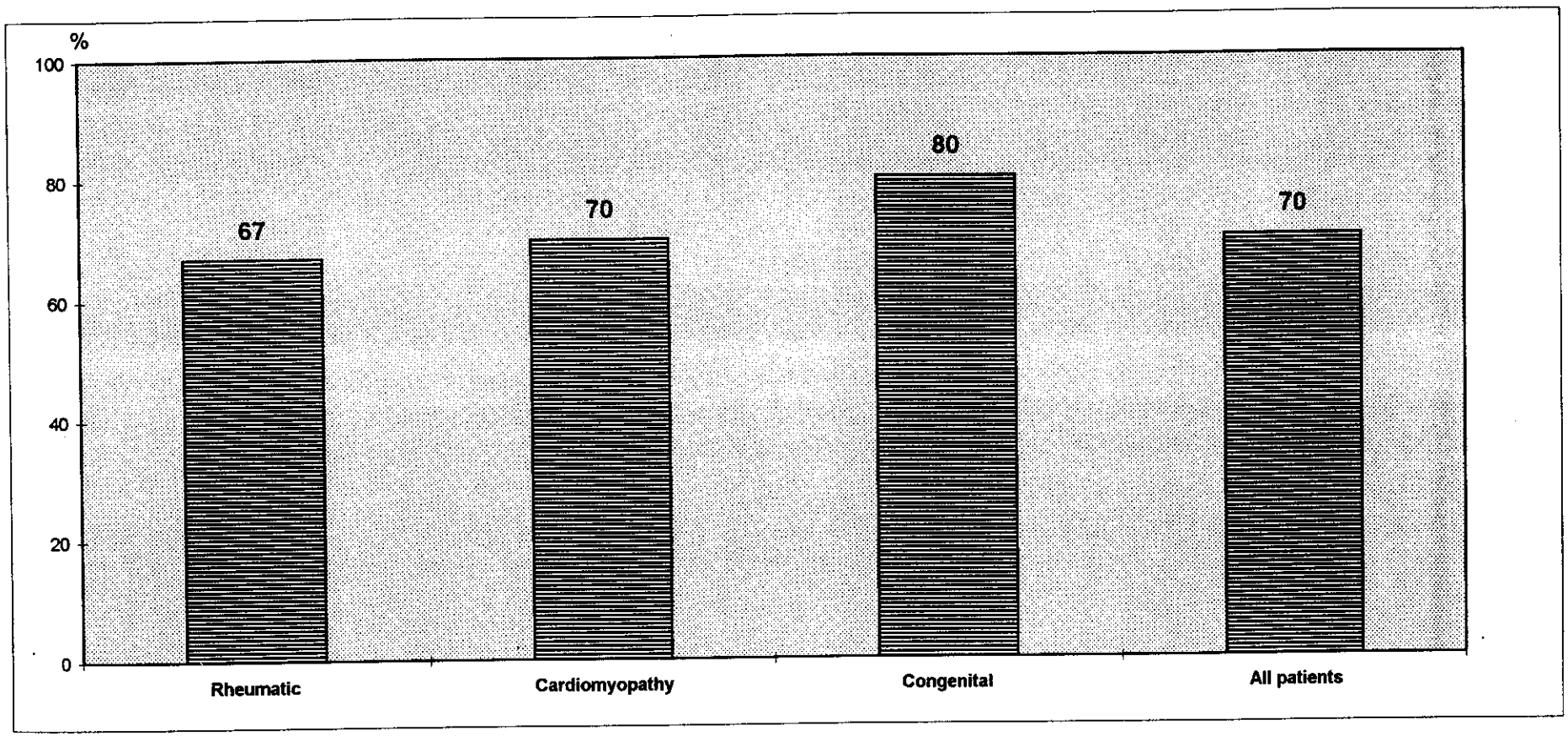
GROUP	Patients having elevated serum TNF-α	
	No.	%
* Rheumatic (n = 30)	20	67.0
* Cardiomoypathy (n = 10)	7	70.0
* Congenital (n = 10)	8	80.0
* All patients (n = 50)	35	70.0

$X^2 = 0.64$ **P (not significant)**

**Elevated level = > 2 SD above the mean value for the control subjects (i.e. level > 50.79 pg/ml).*

Figure (5)

Frequency percent of patients with elevated* serum level of TNF-α among the studied groups



** Elevated level = > 2 SD above the mean of controls*

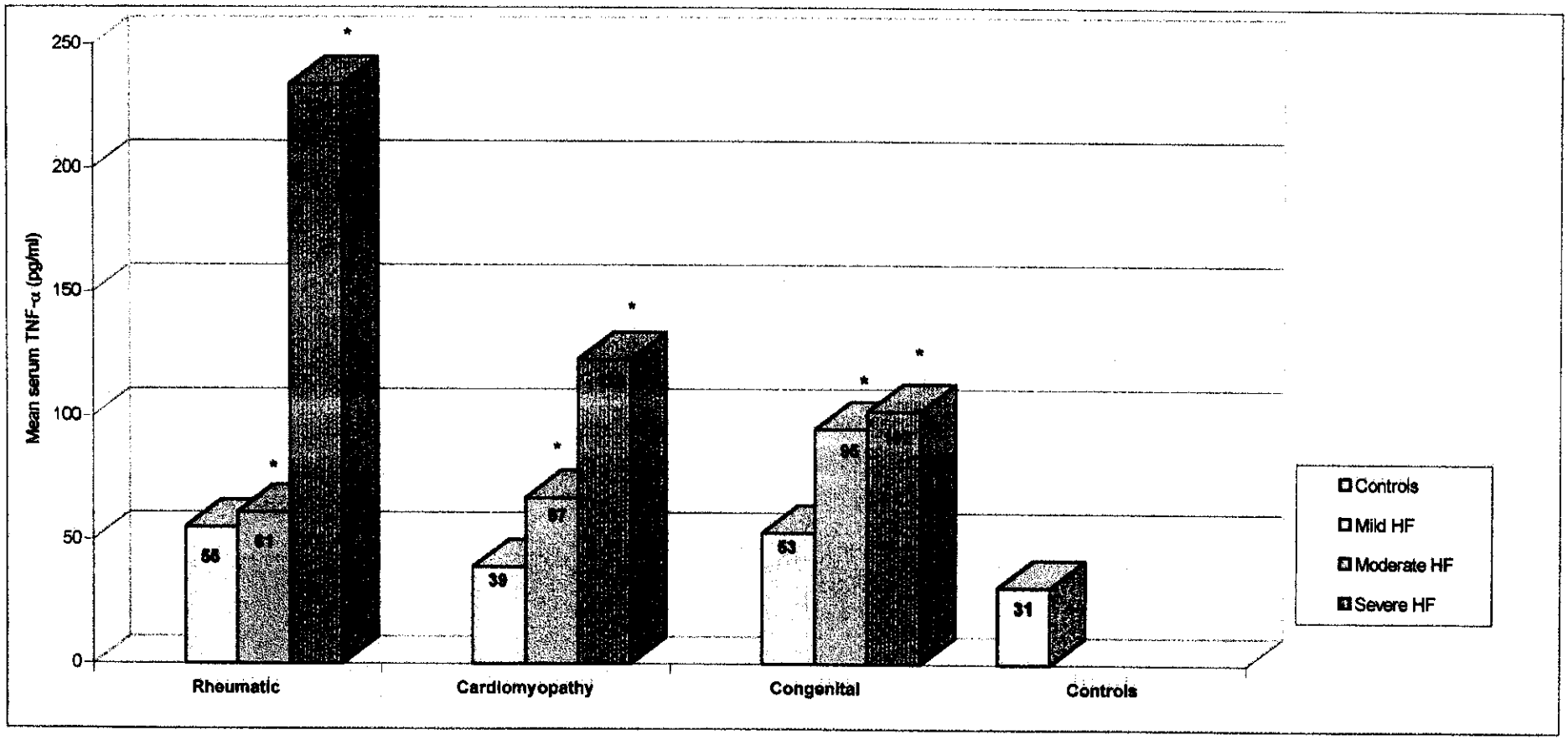
Table (11): Statistical comparison of mean serum TNF-α(pg/ml) among the studied groups in relation to different grades of HF:

GRADE OF HEART FAILURE	Rheumatic (30 cases) *Mean ± SD*	Cardiomyopathy (10 cases) *Mean ± SD*	Congenital (10 cases) *Mean ± SD*
* Mild	55.39 ± 34.78	39.43 ± 8.38	53.20 ± 17.83
* Moderate	60.73 ± 25.57	67.13 ± 13.16	94.90 ± 59.77
* Severe	233.72 ± 270.73	122.83 ± 49.59	102.07 ± 47.82
F	4.11	5.68	1.39
P	< 0.05	< 0.05	NS*

** NS denotes not significant.*

Figure (6)

Mean serum TNF-α (pg/ml) among studied groups & controls in relation to different grades of heart failure



* P < 0.05 versus normal controls

Table (12) : Mean serum TNF-α (pg/ml) in different groups of heart failure presented with and without cachexia* :

PRESENTATION		Rheumatic (n = 30)	Cardiomyopathy (n = 10)	Congenital (n = 10)
With Cachexia	*No.*	15 **(50%)**	5 **(50%)**	6 **(60%)**
	Mean	183.96	111.60	102.25
	±SD	230.36	49.74	45/27
Without Cachexia	*No.*	15 **(50%)**	5 **(50%)**	4 **(40%)**
	Mean	49.27	50.60	47.55
	±SD	15.26	18.85	8.08
t		**2.26**	**2.56**	**2.51**
P		**< 0.05**	**< 0.05**	**< 0.05**

* *Patients were considered cachectic if their weight was less than 85% of the predicted ideal body weight (i.e. 50th percentile). This definition has been used in previous studies of malnutrition and cachexia in cardiac disorders* ***(Morrison and Edwards, 1991).***

Figure (7)

Mean serum TNF-α (pg/ml) among studied groups of HF presented with and without cachexia

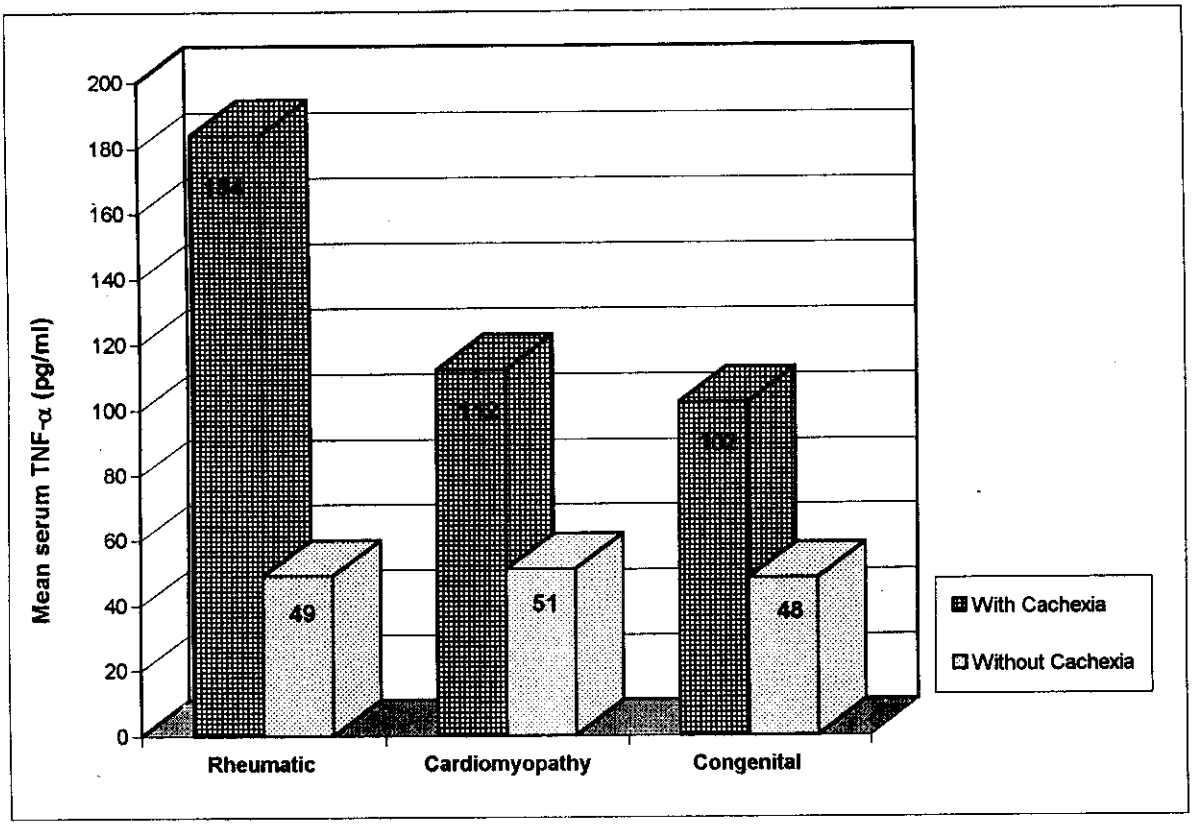


Table (13) : Mean serum TNF-α (pg/ml) in Rheumatic patients with heart failure presented with and without carditis :

PRESENTATION		Rheumatic group (n = 30)
With Carditis	*No.*	25 (83%)
	Mean	115.94
	±SD	189.48
Without Carditis	*No.*	5 (17%)
	Mean	119.98
	±SD	71.71
t		0.05
P		NS*

** NS denotes not significant.*

Figure (8)

Mean serum TNF-α (pg/ml) in Rheumatic patients with HF presented with and without carditis

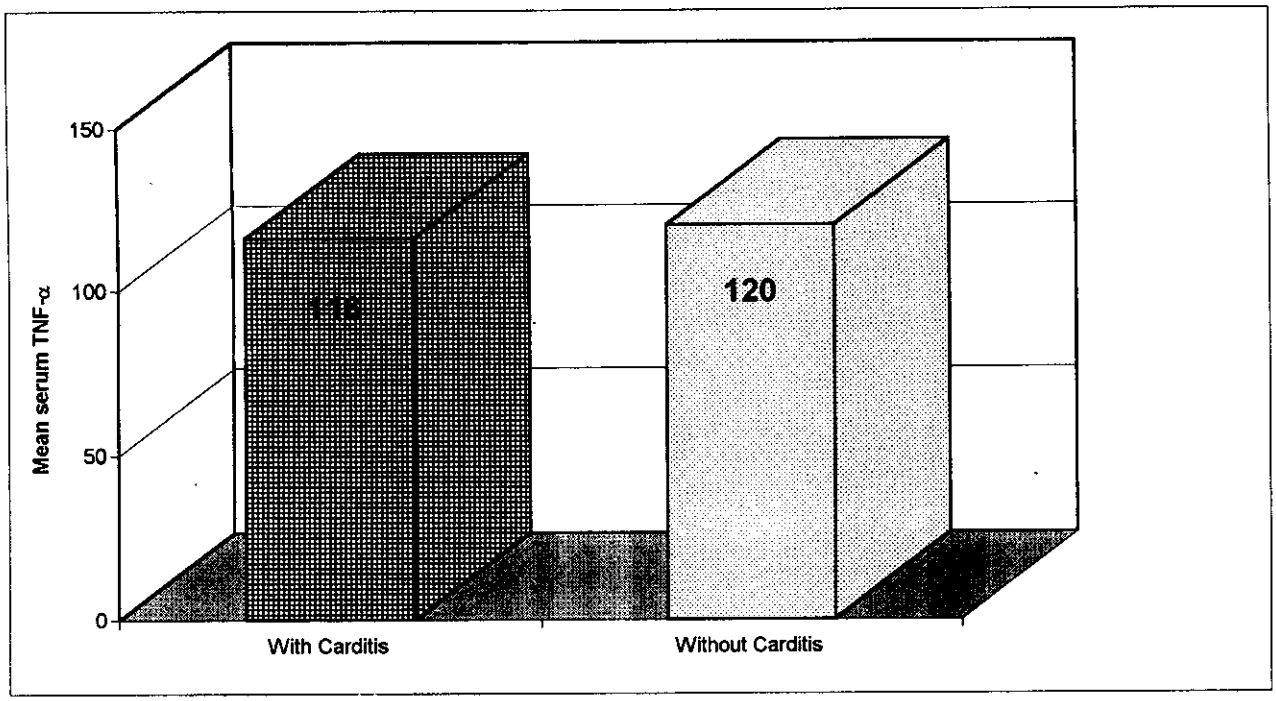


Table (14) : Correlation coefficient of serum TNF-α with other parameters in different studied groups of heart failure:

PARAMETER	Rheumatic		Cardiomyopathy		Congenital	
	r	P	r	P	r	P
* Age (years)	- 0.08	NS*	0.04	NS	- 0.48	NS
* Weight (kg)	- 0.75	< 0.05	- 0.94	< 0.05	- 0.93	< 0.05
* HF duration (months)	0.11	NS	0.07	NS	- 0.14	NS
* Heart rate	0.22	NS	0.47	NS	0.58	NS
* CT ratio	0.20	NS	0.44	NS	0.53	NS
* Hemoglobin (g/dl)	- 0.62	< 0.05	- 0.01	NS	0.38	NS
* Hematocrit (%)	- 0.58	< 0.05	0.02	NS	0.42	NS
* ESR (mm)	- 0.10	NS	- 0.01	NS	0.05	NS
* ASOT (Todd units)	- 0.08	NS	—	—	—	—
* LVEDV (ml)	- 0.06	NS	0.30	NS	- 0.46	NS
* LVESV (ml)	- 0.12	NS	0.40	NS	- 0.47	NS
* FS (%)	- 0.11	NS	- 0.13	NS	0.50	NS
* EF (%)	- 0.45	< 0.05	- 0.13	NS	0.47	NS

* *NS denotes not significant.*

Figure (9)

Scatterplot showing the relation between serum TNF-α (pg/ml) and weight (% of ideal) among different studied groups of HF.

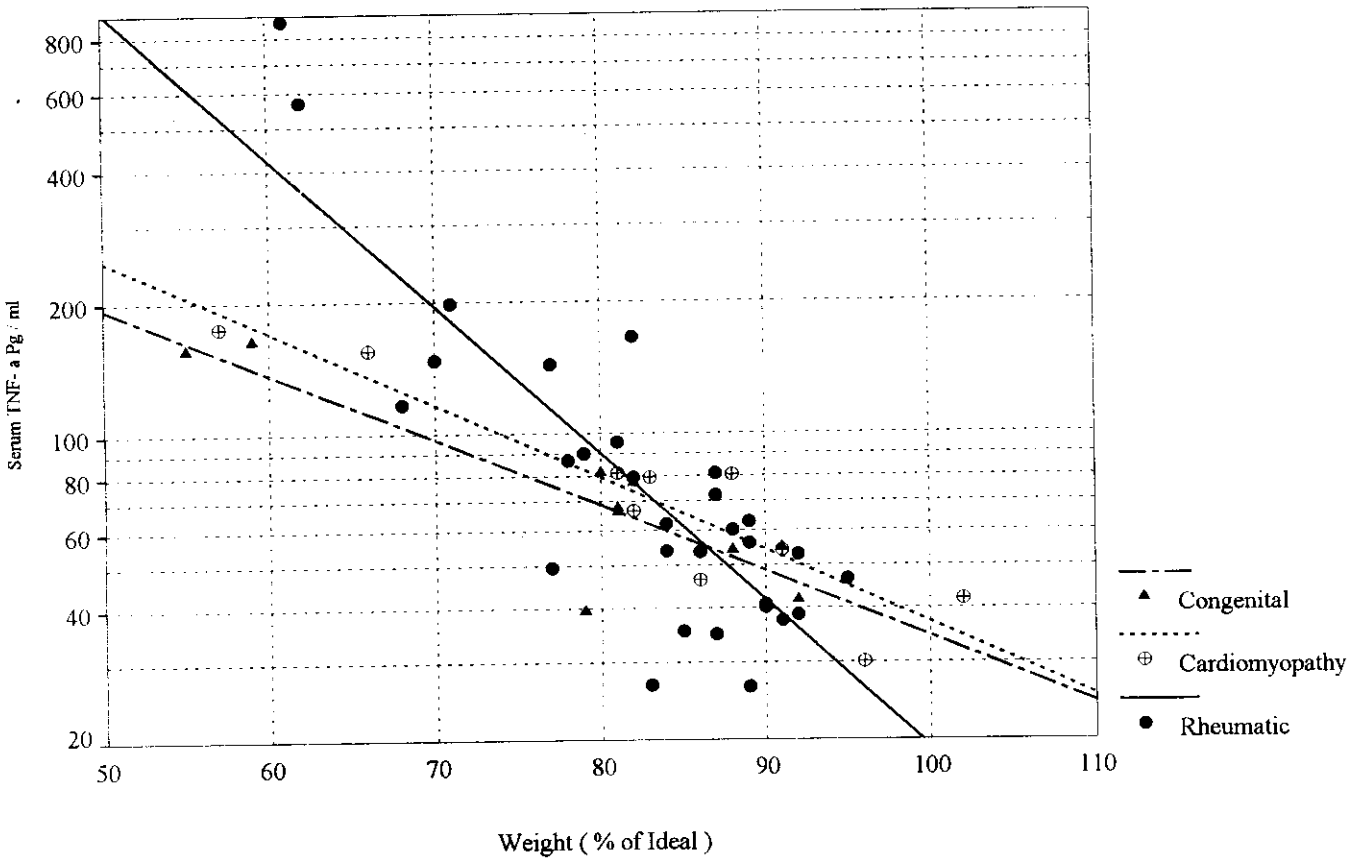


Figure (10)

Scatterplot showing relation between serum TNF-α (pg/ml) and hemoglobin (g/dl) in the Rheumatic group.

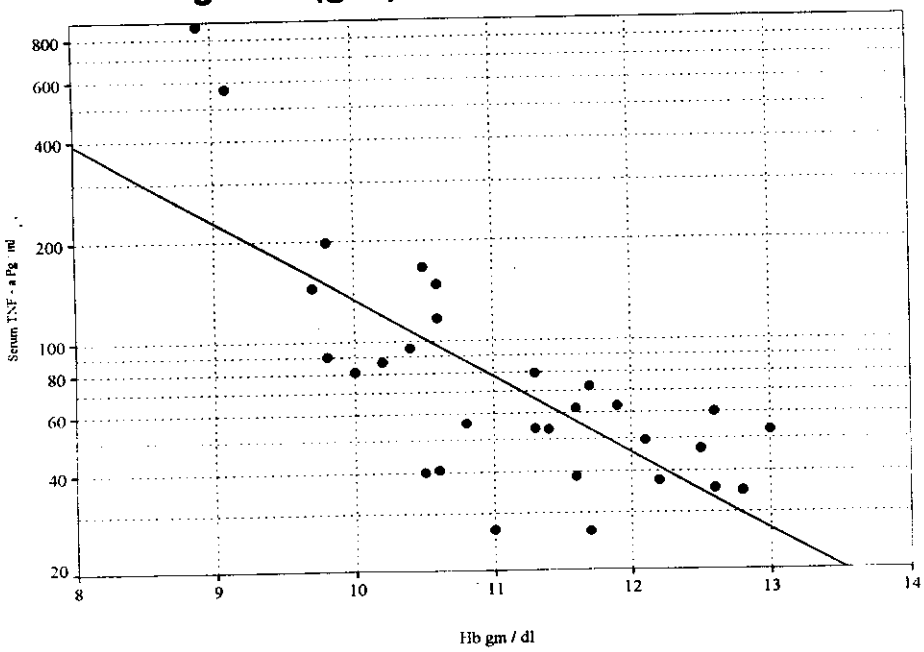


Figure (11)

Scatterplot showing the relation between serum TNF-α (pg/ml) and hematocrit value (%) in the Rheumatic group.

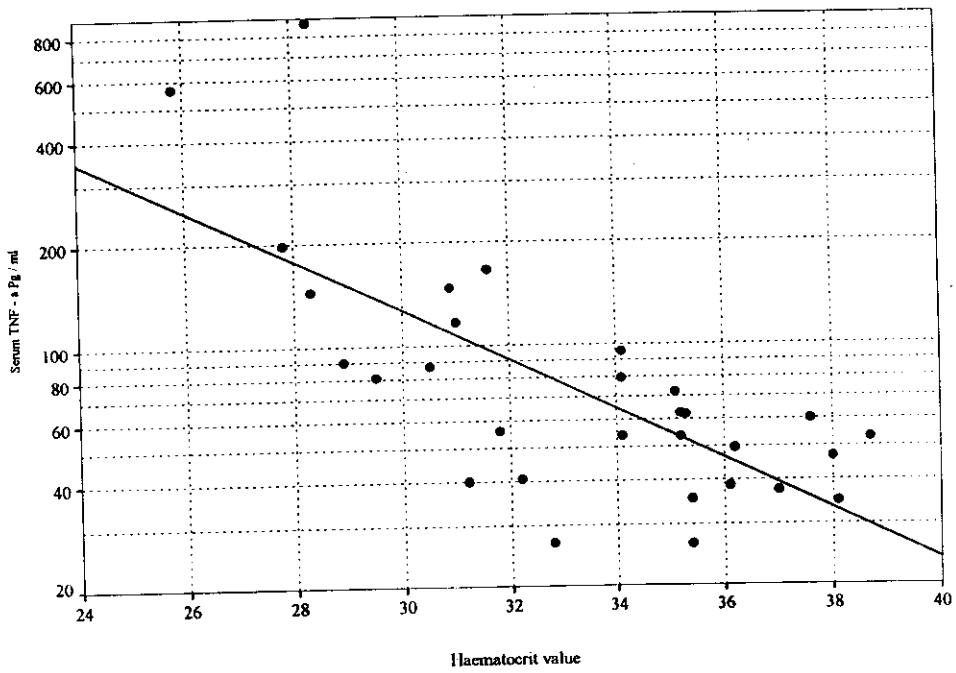


Figure (12)

Scatterplot showing the relation between serum TNF-α (pg/ml) and ejection fraction (%) in the Rheumatic group.