Results

The clinical findings of the 30 studied cases with acute rheumatic fever are presented in tables (4,5). They were 17 males and 13 females. Their ages ranged from 6-15 years.

Arthritis was manifested in 19 cases (63.3%), carditis manifested in 20 cases (66.7%), chorea was the presrnting symptom in 4 cases (13.3%). Subcutaneous nodules and erythema maginatum was not seen in any case.

Table (4)

Clinical data of the 30 studied patients

serial	Age	Sex	Arthritis	Carditis	Chorea
1	7	M	+ve	+ve	-ve
2	8	M	+ve	+ve	-ve
3	9	M	+ve	+ve	-ve
4	12	M	+ve	+ve	-ve
5	12	M	+ve	+ve	-ve
6	14	M	+ve	+ve	-ve
7	7	F	+ve	+ve	-ve
8	13	M	-ve	+ve	-ve
9	9	F	-ve	+ve	-ve
10	11	F	-ve	+ve	+ve
11	12	M	+ve	+ve	-ve
12	6	F	-ve	+ve	-ve
13	11	M	+ve	+ve	-ve
14	8	M	-ve	+ve	-ve
15	7	M	+ve	+ve	-ve
16	15	F	-ve	+ve	-ve
17	13	F	-ve	+ve	-ve
18	15	F	+ve	+ve	-ve
19	7	M	-ve	+ve	-ve
20	14	F	-ve	+ve	+ve
21	9	M	+ve	-ve	-ve
22	6	M	+ve	-ve	-ve
23	10	F	+ve	-ve	-ve
24	6	F	-ve	-ve	+ve
25	6	M	+ve	-ve	-ve
26	8	F	+ve	-ve	-ve
27	11	M	+ve	-ve	-ve
28	15	F	-ve	-ve	+ve
29	10	M	+ve	-ve	-ve
30	8	F	+ve	-ve	-ve

Table (5)

Clinical data of the 30 studied cases with ARF

Variable	No.	%
Sex		
Male	17	56.7%
Female	13	43.3%
Arthritis		
Positive	19	63.3%
Negative	11	36.7%
Carditis		
Positive	20	66.7%
Negative	10	33.3%
Chorea		
Positive	4	13.3%
Negative	26	86.7%
Murmur		
Positive	17	56.7%
Negative	13	43.3%

Laboratory investigations of the studied cases are shown in table (6). ESR was significantly elevated in all cases except cases no. 10, 28 who presented with chorea as the solo manifestation. The mean value of ESR was (78.23±26.78). CRP(C-Reactive protein) was positive in all studied cases.

ASO Titre ranged from 110-1250 Todd unit (642.5 ± 350.9). It was significantly elevated in all cases except cases no. 10, 20, 24, 28 who had normal values.

Table (6)

Laboratory investigations of the 30 studied cases

No.	ESR	CRP	ASOT
1	80	++ve	833
2	90	+ve	850
3	75	+ve	620
4	110	+ve	950
5	95	++ve	1250
6	97	+ve	500
7	90	+ve	1100
8	60	+ve	650
9	55	+ve	625
10	20	+ve	130
11	100	++ve	762
12	80	+++ve	833
13	75	+++ve	266
14	40	+ve	260
15	80	+ve	300
16	120	+++ve	1250
17	130	+ve	600
18	65	+ve	650
19	88	++ve	400
20	80	+ve	166
21	75	++ve	325
22	70	+ve	1100
23	50	+ve	500
24	40	+ve	160
25	90	+ve	833
26	119	++ve	700
27	80	+++ve	333
28	18	+ve	110
29	90	+ve	1150
30	85	+ve	1070

Tables (7,8) show the echocardiographic findings of the 30 studied cases: Left ventricular end diastolic dimension (LVED) ranged from 2.8-6.8 with a mean value of 4.57±0.92 cm, Left ventricular end systolic dimension (LVES) ranged from 1.7- 4.1 with a mean value of 2.94±0.57cm. Fractional shortening (FS) which used in our study as an index of systolic performance ranged from 28-45% (34.9±5.4%). It is to be mentioned that FS was normal in all cases except 5 cases only (16.7%), these are no. 3, 8, 12, 13, 16 who had mildly depressed systolic performance, and all of them had mild valvular regurgitation.

AO root dimensions ranged from 1.4-2.9 (2.06±0.37), and LA dimensions ranged from 2-6.7 (3.4±1.2).

2-D echocardiographic study showed that mitral valve thickening was evident in 14 cases (46.7%) of the 30 studied cases. This finding was present in 11of 20 cases with clinical carditis (55%) and in 3 of 10 cases with no clinical carditis (30%). Mitral valve prolapse was present in 4 cases of the 30 studied cases (13.3%) of whom all cases had clinical carditis.

Doppler study showed the presence of mitral regurge (MR) in 15 cases of the 30 studied cases (50%). This finding was present in 11of 20 cases with clinical carditis (55%) and in 4 of 10 cases with no clinical carditis (40%). MR was classified as mild, moderate or severe according to the extent of regurge jet into the LA, and it was mild in all 15 cases.

Aortic regurge was present in 5 cases of the 30 studied cases (16.7%) of whom all cases had clinical carditis, and it was mild in all 5 cases.

Table (7)

Echo Doppler findings of the 30 studied cases

Serial	LVED	LVES	AO	LA	FS	Mitral thickening	Mitral prolapse	Mitral regurge	Aortic regurge
1	4.5	3	1.5	3	33	+ve	-ve	+ve	-ve
2	4.4	2.8	2.2	2.7	37	+ve	+ve	-ve	-ve
3	6.1	3.7	2.5	5.3	29	+ve	-ve	+ve	+ve
4	4.2	2.6	2	2.4	38	-ve	-ve	+ve	-ve
5	4.5	3.2	1.7	2.9	39	-ve	-ve	-ve	-ve
6	4.5	2.9	2.9	2.9	35	-ve	-ve	-ve	-ve
7	3.1	1.7	2	2	45	+ve	+ve	-ve	+ve
8	6.8	4.1	2.9	5.9	28	+ve	-ve	+ve	+ve
9	4.2	3	2.1	3.1	38	-ve	-ve	-ve	-ve
10	5.3	2.9	2.1	4.2	45	-ve	+ve	-ve	-ve
11	5.6	3.8	2.3	4.2	32	+ve	-ve	+ve	+ve
12	4.9	2.7	2.2	4.1	29	-ve	-ve	-ve	-ve
13	4.5	3.6	2.1	3.5	26	+ve	-ve	+ve	-ve
14	6.1	3.9	1.7	4.5	37	-ve	-ve	-ve	-ve
15	4.5	3	1.5	2	33	+ve	-ve	+ve	-ve
16	5.3	3.8	1.4	6.7	28	+ve	-ve	+ve	-ve
17	5	3.2	1.8	3.5	36	-ve	+ve	+ve	-ve
18	4.9	2.7	2.3	5.9	44	+ve	-ve	+ve	+ve
19	5.9	2.9	2.5	4.1	34	-ve	-ve	-ve	-ve
20	4.8	3.2	1.8	4	33	+ve	-ve	+ve	-ve
21	3.8	2.7	2	2.2	37	-ve	-ve	-ve	-ve
22	3.8	2.5	2.1	2.4	35	+ve	-ve	+ve	-ve
23	2.8	1.8	1.9	2.7	35	-ve	-ve	-ve	-ve
24	3.6	2.5	2	2.5	30	-ve	-ve	-ve	-ve
25	3.6	2.2	1.8	2	38	+ve	-ve	+ve	-ve
26	3.8	2.7	2	2.2	37	-ve	-ve	-ve	-ve
27	4.6	2.7	2.6	3.6	40	-ve	-ve	+ve	-ve
28	4.5	3.2	1.7	2.9	37	-ve	-ve	-ve	-ve
29	3.8	2.7	2	2.2	30	+ve	-ve	+ve	-ve
30	3.8	2.5	2.1	2.3	35	-ve	-ve	-ve	-ve

Table (8)

Echo Doppler data of the 30 studied cases

Variable	All cases (n=30)		Cases with clinical carditis (n=20)		Cases without clinical carditis (n=10)	
Mitral thickening						
Positive	14	46.7%	11	55%	3	30%
Negative	16	53.3%	9	45%	7	70%
Mitral prolapse						
Positive	4	13.3%	4	20%	0	0.0%
Negative	26	86.7%	16	80%	10	100%
Mitral regurge						
Positive	15	50%	11	55%	4	40%
Negative	15	50%	9	45%	6	60%
Aortic regurge						
Positive	5	16.7%	5	25%	0	0.0%
Negative	25	83.3%	15	75%	10	100%

Tables (9,10) show factors correlating with diastolic function in 20 cases with ARF with clinical carditis and 10 cases without clinical carditis.

-E velocity was correlated significantly with age of the patients with clinical carditis, $P<0.05$.

-E/A ratio was correlated significantly with age of the patients with clinical carditis, $P<0.05$.

-E velocity was correlated significantly with (FS) of the patients without clinical carditis, $P<0.01$.

Table (9)

Correlation between diastolic function variables and clinical, lab.,and echo findings in 20 patients having ARF with Carditis.

	E velocity	**A velocity**	**E/A ratio**	**DT**	**IVRT**
Age	0.497*	-0.095	0.490*	-0.107	0.053
ESR	0.172	-0.248	0.180	-0.180	-0.059
ASOT	-0.005	0.016	-0.075	-0.381	-0.003
LVED	0.008	-0.088	0.077	0.301	-0.318
LVES	-0.011	-0.076	-0.001	-0.066	-0.239
AO	0.157	-0.195	0.364	0.214	0.019
LA	0.207	0.056	0.170	0.309	-0.269
FS	0.004	-0.060	0.213	0.213	0.055

*p<0.05 **p<0.01 ***p<0.001

Table (10)

Correlation between diastolic function variables and clinical, lab.,and echo findings in 10 patients having ARF without Carditis.

	E velocity	**A velocity**	**E/A ratio**	**DT**	**IVRT**
Age	0.243	-0.168	0.266	-0.319	0.095
ESR	-0.379	-0.344	0.153	-0.213	0.291
ASOT	-0.290	-0.160	0.006	0.086	0.010
LVED	-0.034	0.102	-0.214	-0.079	0.574
LVES	0.377	0.034	0.165	-0.309	0.548
AO	-0.601	-0.470	-0.115	0.142	0.447
LA	-0.237	-0.161	-0.177	0.108	0.055
FS	-0.767**	-0.431	-0.073	0.085	0.421

*p<0.05 **p<0.01 ***p<0.001

Table (11) shows comparison between patients having ARF with carditis and control group of children with quiscent RHD as regard clinical, lab and echocardiographic findings.

-There was no significant difference between patient and control group as regard age and sex ($P > 0.05$).

-ESR,CRP and ASOT was significantly higher in patient group ($P < 0.001$).

-There was no significant difference between patient and control group as regard arthritis and chorea ($P > 0.05$).

-There was no significant difference between patient and control group as regard systolic function (FS) and other echo findings ($P > 0.05$).

Table (11): comparison between patients with carditis and children with quiscent RHD as regard clinical, lab and echo findings

	Carditis (n=20)	**Quiescent (n=10)**	**Statistics**	**p-value**
Age	10.5±3.0	12.3±2.1	t=1.69	>0.05
Sex Male Female	 12(60.0%) 8(40.0%)	 6(60.0%) 4(40.0%)	 Fisher	 >0.05
ESR	81.5±25.8	14.0±5.5	t=11.21	<0.001*
ASOT	20(100.0%)	0(0.0%)	Fisher	<0.001*
CRP - + ++ +++	 0(0.0%) 13(65.0%) 4(20.0%) 3(15.0%)	 10(100%) 0(0.0%) 0(0.0%) 0(0.0%)	 χ^2=30.00	 <0.001*
LVED	4.9±0.8	5.1±0.4	t=0.37	>0.05
LVES	3.5±0.6	3.7±0.4	t=0.95	>0.05
AO	2.5±0.4	2.7±0.3	t=1.39	>0.05
LA	3.8±1.3	3.3±0.4	t=1.66	>0.05
FS	34.7±6.2	33.1±5.97	t=0.65	>0.05
Arthritis	11(55.0%)	3(30.0%)	Fisher	>0.05
Chorea	2(10.0%)	0(0.0%)	Fisher	>0.05
Mitral thickness	11(55.0%)	6(60.0%)	Fisher	>0.05
Mitral prolapse	4(20.0%)	4(40.0%)	Fisher	>0.05
MR	11(55.0%)	6(60.0%)	Fisher	>0.05
AR	5(25.0%)	2(20.0%)	Fisher	>0.05

Fisher=Fisher exact test *Significant

Table (12) shows comparison between patients having ARF without carditis and control group of normal children as regard clinical, lab and echocardiographic findings.

-ESR,CRP and ASOT was significantly higher in patient group ($P<0.001$).

-Arthritis was significantly higher in patient group ($P<0.001$).

-There was no significant difference between patient and control group as regard age, sex and echo findings ($P >0.05$).

Table (13) shows the diastolic indices in 10 children with acute rheumatic fever without clinical carditis. The mean value of E velocity was 82.80 ±14.49 cm/sec. The mean of A velocity was 43.00±9.68 cm/sec. E/A ratio was 1.99±0.44. Deceleration time (DT) was 111.10±31.41 ms., and Isovolumic relaxation time (IVRT) was 72.60±6.93 ms.

Table (14) shows the diastolic indices of the 10 normal control group. The mean of E velocity was 87.90±15.49 cm/sec, the mean of A velocity was 52.20±12.35 cm/sec, the mean of E/A ratio was 1.73±0.35, (DT) was 111.20±19.55 ms, and (IVRT) was 55.30±15.43 ms.

Table (15) shows comparison between patients having ARF without carditis and control group of normal children regarding various diastolic indices. There was no significant difference in all parameters ($P>0.05$) except (IVRT) which was significantly longer in patient group ($P<0.05$).

Table (12): comparison between patients without carditis and normal control group as regard clinical, lab and echo findings

	No Carditis n=10	**Normal n=10**	**Statistics**	**p-value**
Age	8.9±2.8	8.9±2.6	t=0.00	>0.05
Sex				
Male	5(50.0%)	4(40.0%)	Fisher	>0.05
Female	5(50.0%)	6(60.0%)		
ESR	71.7±28.9	14.9±5.5	t=6.10	<0.001*
ASOT	10(100.0%)	0(0.0%)	Fisher	<0.001*
CRP				
-	0(0.0%)	10(100%)	χ^2=20.00	<0.001*
+	7(70.0%)	0(0.0%)		
++	2(20.0%)	0(0.0%)		
+++	1(10.0%)	0(0.0%)		
LVED	3.8±0.5	4.3±0.6	t=1.75	>0.05
LVES	2.6±0.4	2.6±0.4	t=0.17	>0.05
AO	2.0±0.2	2.2±0.3	t=1.43	>0.05
LA	2.5±0.5	2.9±0.6	t=1.59	>0.05
FS	35.3±3.4	37.7±6.5	t=1.03	>0.05
Arthritis	8(80.0%)	0(0.0%)	Fisher	<0.001*
Chorea	2(20.0%)	0(0.0%)	Fisher	>0.05
Mitral thickness	3(30.0%)	0(0.0%)	Fisher	>0.05
Mitral prolapse	0(0.0%)	0(0.0%)	Fisher	>0.05
MR	4(40.0%)	0(0.0%)	Fisher	>0.05
AR	0(0.0%)	0(0.0%)	Fisher	>0.05

Fisher=Fisher exact test *Significant

Table (13)

Diastolic functions of 10 patients having acute rheumatic fever without carditis

Serial	E velocity	A velocity	E/A ratio	DT	IVRT
1	77	34	2.25	123	84
2	68	41	1.69	178	72
3	79	35	2.25	120	60
4	103	53	1.95	100	70
5	72	62	1.16	130	70
6	92	36	2.56	70	70
7	60	37	1.63	120	80
8	103	53	1.95	100	70
9	92	36	2.56	70	80
10	82	43	1.92	100	70

Table (14)

Diastolic functions of 10 normal children

Serial	E velocity	A velocity	E/A ratio	DT	IVRT
1	95	60	1.6	90	85
2	113	44	2.6	115	70
3	88	45	2	95	55
4	70	49	1.4	100	60
5	110	78	1.4	140	65
6	90	65	1.4	112	45
7	72	38	1.89	120	50
8	84	52	1.62	130	46
9	89	51	1.75	80	30
10	68	40	1.7	130	47

Table (15)

comparison between patients without carditis and normal control group as regard diastolic function (n=20)

Diastolic functions	ARF without carditis group (n=10)	Normal control group (n=10)	t(unpaired)	p-value
E velocity	82.80±14.49	87.90±15.49	0.76	>0.05
A velocity	43.00±9.68	52.20±12.35	1.85	>0.05
E/A ratio	1.99±0.44	1.73±0.35	1.45	>0.05
DT	111.10±31.41	111.20±19.55	0.01	>0.05
IVRT	72.60±6.93	55.30±15.43	3.23	<0.01*

*Significant

Table (16) shows diastolic indices in the 20 children with acute rheumatic fever and clinical carditis. The mean value of E velocity was 88.71 ±30.85 cm/sec. The mean of A velocity was 68.47±22.24 cm/sec. E/A ratio was 1.43±0.67. Deceleration time (DT) was 133.35±32.79 ms., and Isovolumic relaxation time (IVRT) was 90.60±28.34 ms.

Table (17) shows diastolic function indices of the 10 control group with quiscent RHD. The mean value of E velocity was 120.10±29.35 cm/sec, the mean of A velocity was 62.80±16.51 cm/sec, the mean of E/A ratio was 2.00±0.59, (DT) was 100.00±28.28 ms, and (IVRT) was 49.25±12.12 ms.

Table (18) shows comparison between patients with clinical active carditis and control group of children with quiscent RHD regarding diastolic function indices.

-E velocity was significantly less in patients group ($P<0.05$).

-There was no significant difference beween patient and control group in A velocity ($P>0.05$).

-E/A ratio was significantly lower in patient group ($P<0.05$).

-DT and IVRT were significantly prolonged in patient group compared with control group ($P<0.05$).

Table (16)

Diastolic functions of 20 patients having acute rheumatic fever with carditis

Serial	E velocity	A velocity	E/A ratio	DT	IVRT
1	75	81	0.93	145	96
2	62	83	0.75	90	110
3	77	34	2.25	136	48
4	145	68.9	2.1	85	127
5	89.1	44.6	2	85	60
6	102	70	1.46	126	112
7	61	68.9	0.88	137	96
8	67	87	0.77	164	136
9	33	57	0.58	99	115
10	91	115	0.79	123	112
11	128	44	2.91	112	36
12	116	91	1.28	196	96
13	110	75	1.47	117	96
14	75	30	2.53	135	60
15	43	52	0.83	138	120
16	81	89	0.9	100	96
17	81	27	3	155	96
18	145	70	2.07	177	72
19	75	44	1.7	168	48
20	118	95	1.25	179	80

Table (18)

comparison between patients with carditis and quiscent RHD as regard diastolic function (n=30)

Diastolic functions	ARF with carditis group (n=20)	Quiescent RHD group (n=10)	t(unpaired)	p-value
E velocity	88.71±30.85	120.10±29.35	2.67	<0.05*
A velocity	68.47±22.24	62.80±16.51	0.71	>0.05
E/A ratio	1.43±0.67	2.00±0.59	2.27	<0.05*
DT	133.35±32.79	100.00±28.28	2.74	<0.05*
IVRT	90.60±28.34	49.25±12.12	5.58	<0.001*

*Significant

Table (19) shows comparison between patients with acute rheumatic fever but without mitral regurge, and those having mitral regurge, regarding diastolic function indices.

It revealed insignificant difference in the means of all the items.

Table (20) shows comparison between patients with acute rheumatic fever but without aortic regurge, and those having aortic regurge, regarding diastolic function indices.

All indices showed insignificant difference ($P>0.05$).

Table (19)

comparison between patients with mitral regurge, and those without as regard diastolic functions.

Diastolic functions	Patients with MR(n=15)	Patients without MR(n=15)	t(unpaired)	p-value
E velocity	90.80±31.26	82.67±20.77	0.84	>0.05
A velocity	62.79±20.86	57.17±24.26	0.68	>0.05
E/A ratio	1.58±0.67	1.65±0.66	0.32	>0.05
DT	133.73±33.73	118.13±32.58	1.29	>0.05
IVRT	87.00±27.28	82.20±22.76	0.52	>0.05

Table (20)

comparison between patients with aortic regurge, and those without as regard diastolic functions

Diastolic functions	Patients with AR (n=5)	Patients without AR (n=25)	t(unpaired)	p-value
E velocity	100.02±35.28	84.08±24.30	1.24	>0.05
A velocity	52.30±16.22	61.52±23.42	0.84	>0.05
E/A ratio	2.03±0.73	1.53±0.62	1.57	>0.05
DT	129.40±34.06	125.24±34.10	0.25	>0.05
IVRT	62.40±23.08	89.04±23.06	2.36	<0.05*

*Significant

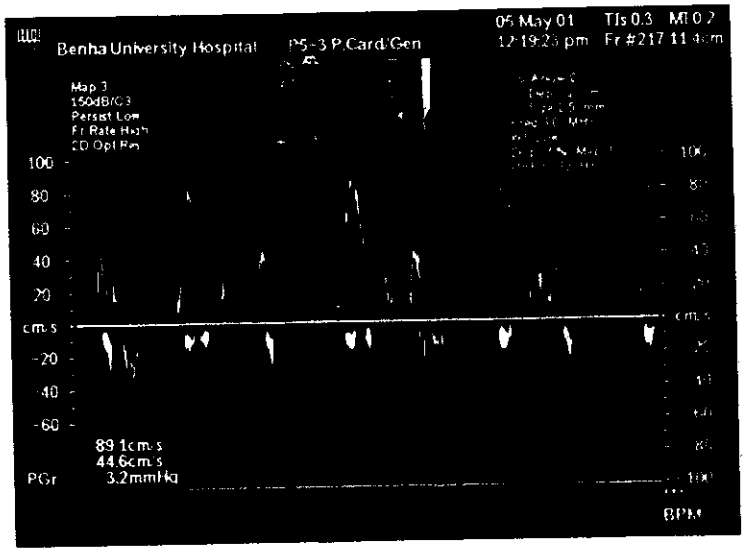

Plate (1): Mitral flow by pulsed Doppler. It shows normal E/A ratio.

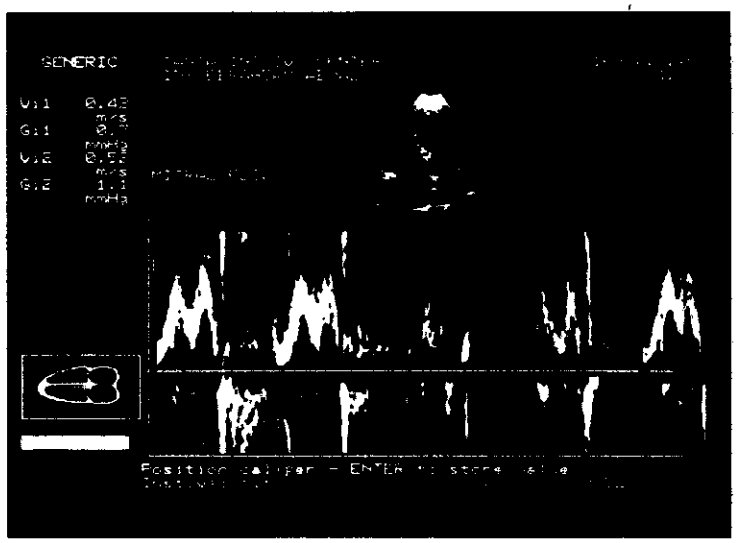

Plate (2): Mitral flow by pulsed Doppler. It shows reversed E/A ratio (diastolic dysfunction) and moderate mitral regurge.

Fig. (6,7) and Fig. (10,11) show that:

- E velocity and E/A ratio were lower in patients having ARF with carditis group than in quiscent RHD group.

-There is slight non significant difference in E velocity and E/A ratio between patients without carditis and normal control group.

Fig. (8,9) show slight non significant difference in A velocity between patients with carditis and quiscent RHD group, and also between patients without carditis and normal control group.

Fig. (12,13) show that: DT was longer in patients with carditis than in quiscent RHD group, while there is slight non significant difference between patients without carditis and normal control group.

Fig. (14,15) show that: IVRT was longer in patients with carditis than in quiscent RHD group,and also longer in patients without carditis than in normal control group.

Fig.(6):E velocity in carditis and quiescent groups.

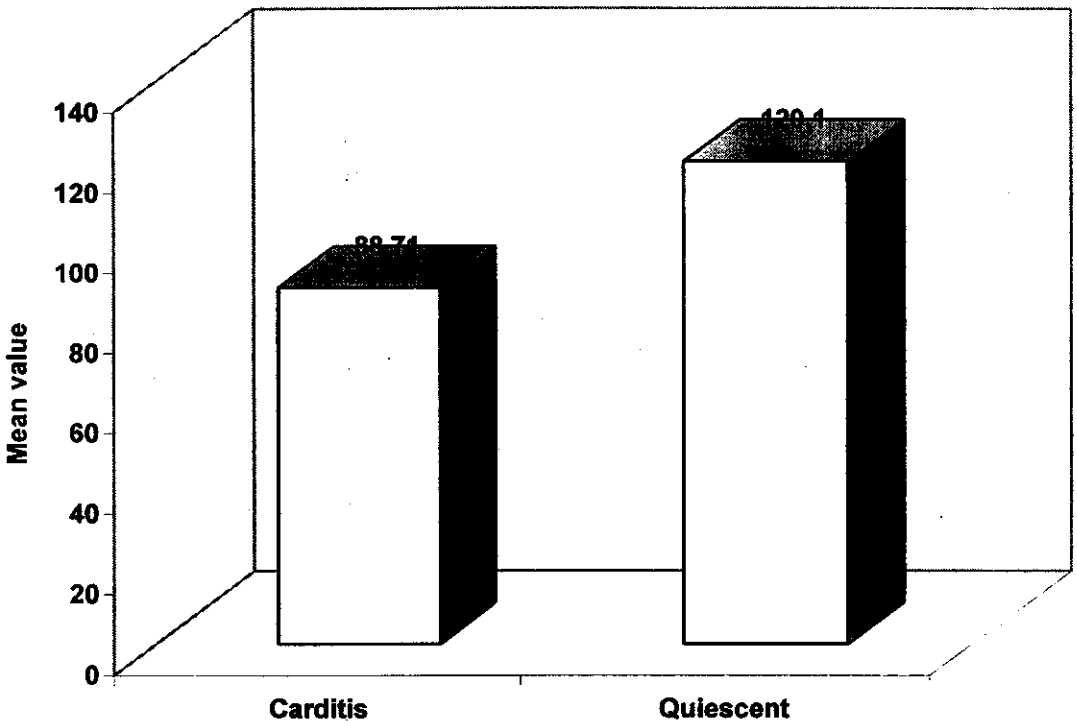

Fig.(7):E velocity in no carditis and normal groups.

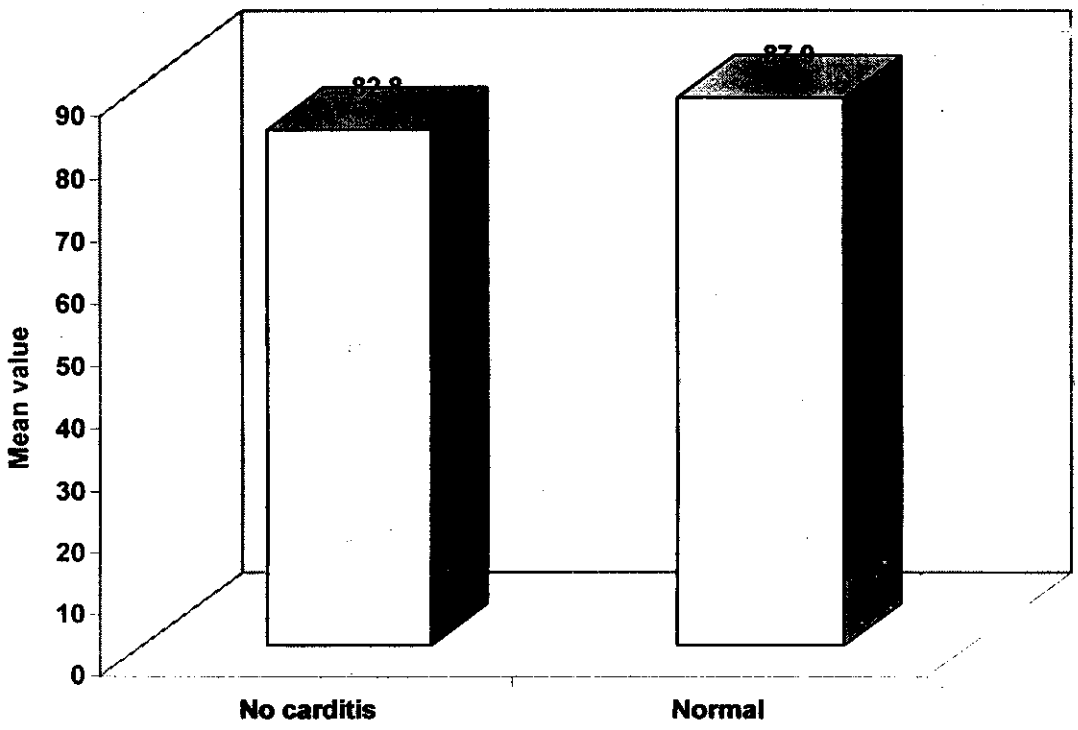

Fig.(8):A velocity in carditis and quiescent groups.

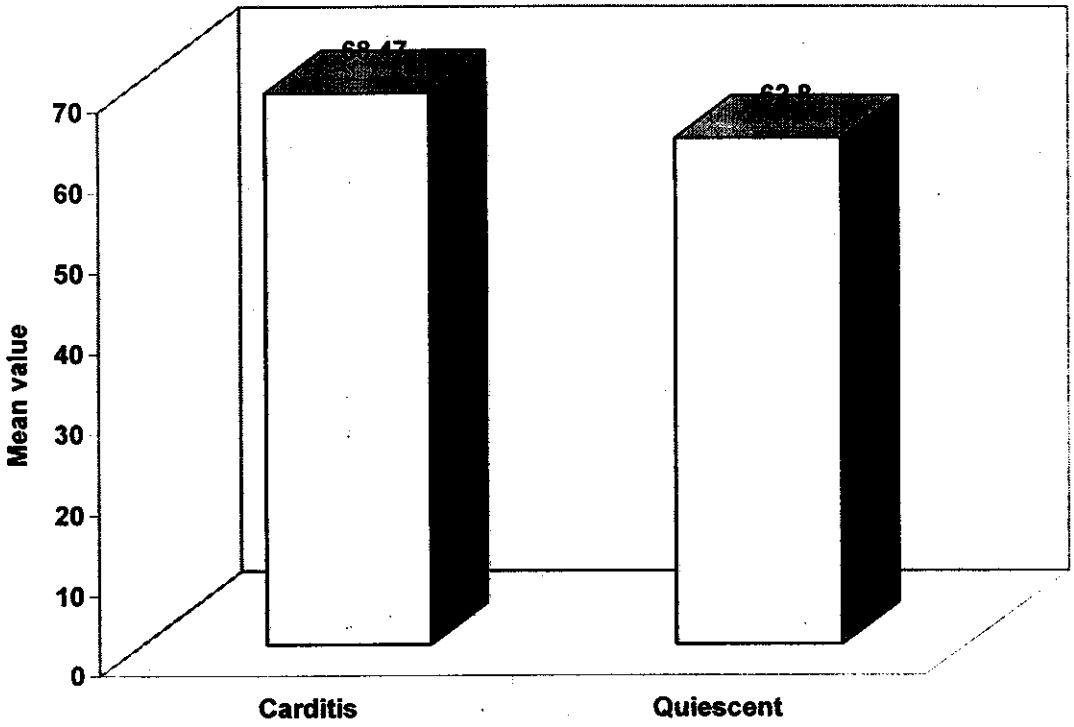

Fig.(9):A velocity in no carditis and normal groups.

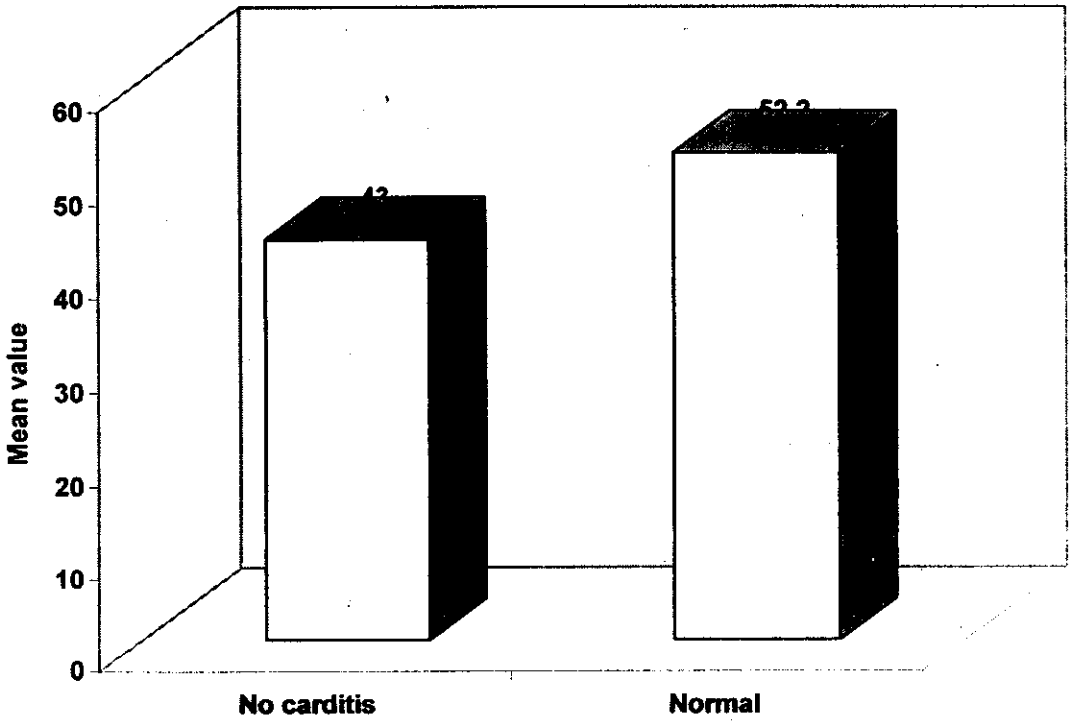

Fig.(10):E/A ratio in carditis and quiescent groups.

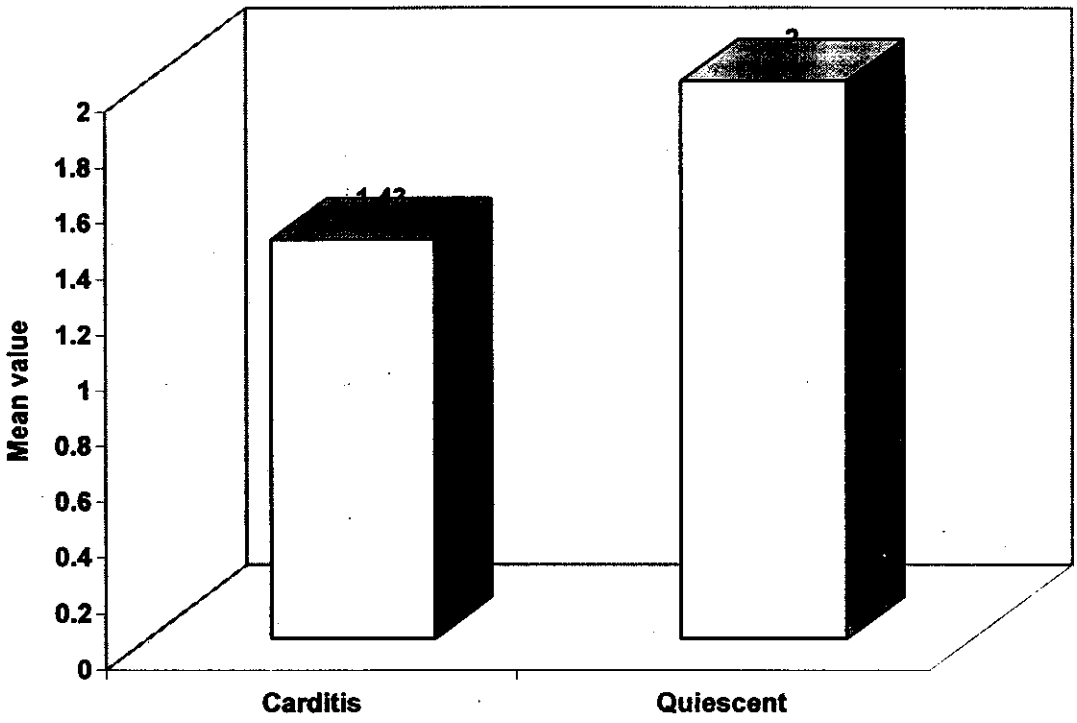

Fig.(11):E/A ratio in no carditis and normal groups.

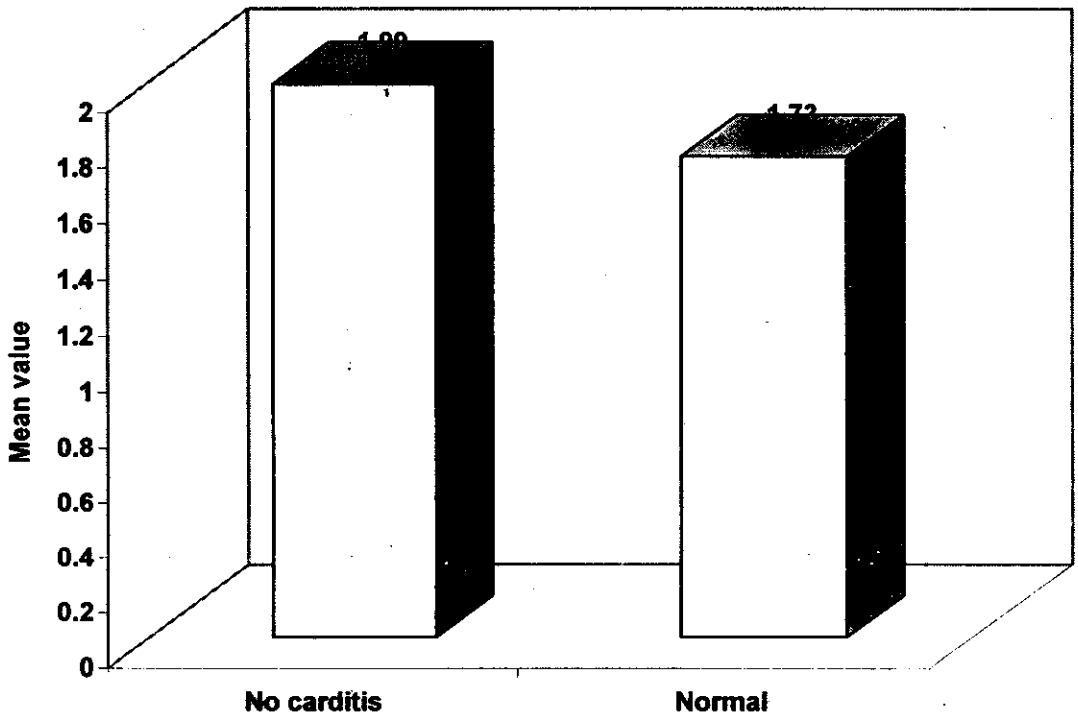

Fig.(12):DT in carditis and quiescent groups.

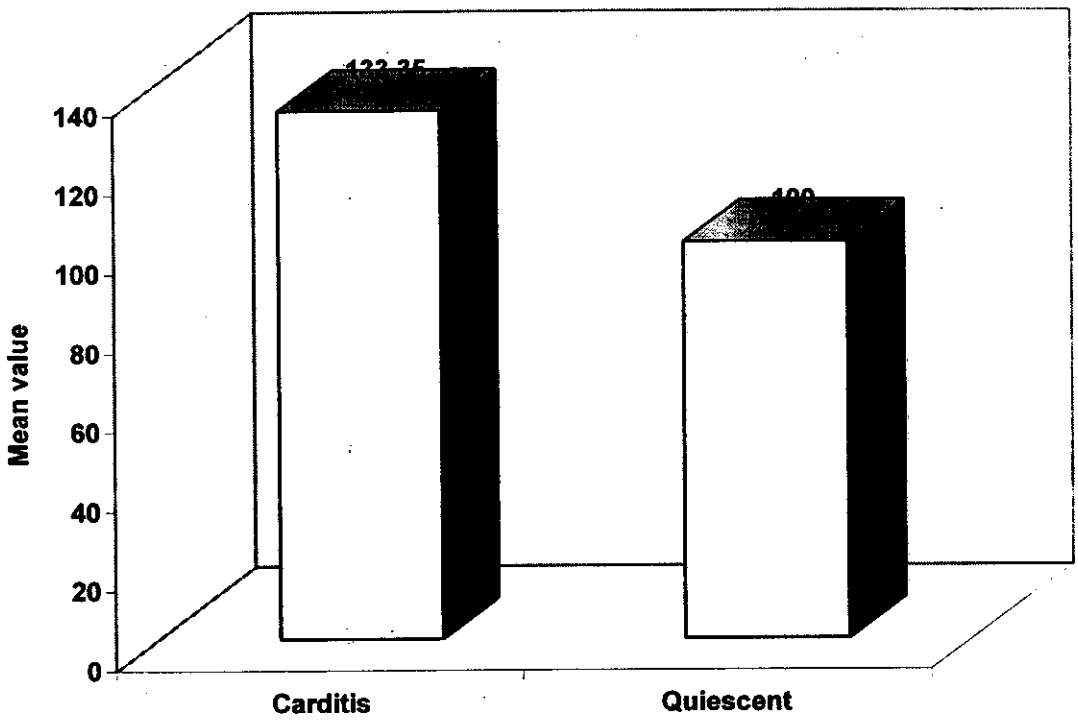

Fig.(13):DT in no carditis and normal groups.

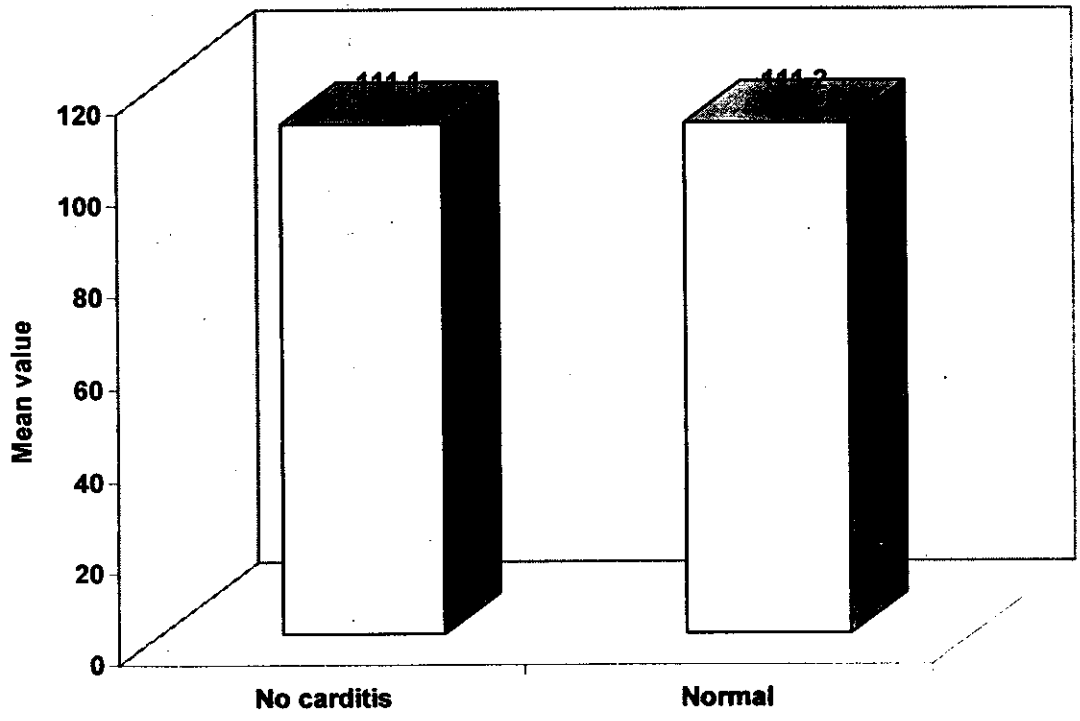

Fig.(14):IVRT in carditis and quiescent groups.

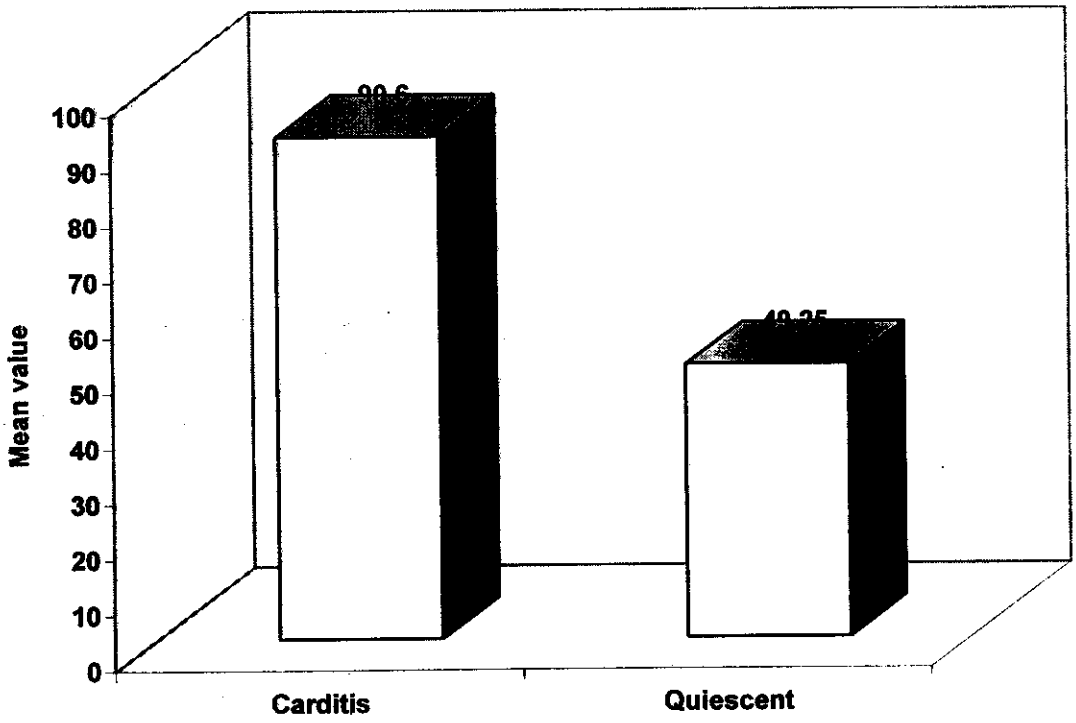

Fig.(15):IVRT in no carditis and normal groups.