Electrocardiograph and Echocardiograph Findings of Patients with Long Standing Rheumatoid Arthritis in Baghdad Teaching Hospital

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ABSTRACT:

BACKGROUND:

Rheumatoid arthritis (RA) is a systemic autoimmune disease with characteristic feature of persistant inflammatory synovitis in symmetrical distribution; it has a higher incidence of fatal and non-fatal cardiovascular events which account for half of all death in RA patients.

OBJECTIVE:

To study the cardiac involvement in long standing rheumatoid arthritis patients in comparison to healthy persons by electrocardiograph and echocardiograph.

PATIENTS AND METHODS:

A sample of 100 Iraqi patients with long standing rheumatoid arthritis and 100 healthy individuals who served as control group matched for sex and age were selected after exclusion of risk factors (hypertension, diabetes mellitus, smoking and previous cardiac problems), both groups were studied by electrocardiograph and echocardiograph under supervision of a cardiologist.

RESULTS:

There were a significant number of patients with rheumatoid arthritis having abnormal electrocardiographic findings 21(21%) in comparison to healthy persons 7(7%) (P-value 0.004), also there were significant number of rheumatoid arthritis patients with abnormal echocardiographic findings 36(36%) in comparison to healthy individuals 11(11%) (P-value o.ooo).while there were no significant association between disease duration and type of medications with cardiac abnormalities reported in this study.

CONCLUSION:

There is an increase of asymptomatic cardiac structural abnormalities in chronic rheumatoid arthritis patients in comparison to normal healthy individuals as detected by electrocardiograph and echocardiograph.

KEYWORDS: Echocardiograph, Electrocardiograph, Rheumatoid Arthritis, IRAQ.

INTRODUCTION:

Rheumatoid Arthritis (RA):

Is the most common systemic autoimmune disease of unknown etiology, it affects up to 1-1.5% of world population, the characteristic feature of classic rheumatoid arthritis is persistent inflammatory synovitis which usually involves peripheral joints in symmetric distribution with intermittent exacerbations and remissions [(1)].

Rheumatoid arthritis is a potentially crippling disease that shortens survival and most importantly significantly compromises quality of life in most affected patients [(2)].

Cardiac involvement in rheumatoid arthritis:

Cardiovascular disease is being recognized as the major cause of excess mortality in rheumatoid arthritis [(6, 7)], also cardiovascular morbidity is enhanced and there is an increased prevalence at all stages of atherogensis from endothelial dysfunction to fatal and non-fatal myocardial infarction and stroke [(8-11)] moreover, the excess cardiovascular burden persists after adjustment for traditional cardiovascular risk factor [(6,12)].

Rheumatoid arthritis patients have a 1.5 to 3 fold increase risk for cardiovascular events compared with non rheumatoid control, in addition to that silent cardiac ischemia and fatal cardiovascular presentation may be more common in rheumatoid arthritis than in non rheumatoid arthritis subjects [(6,13,14)]. Pericarditis is the most common manifestation of rheumatoid arthritis and is generally asymptomatic.

Cardiovascular diseases account for about half of all deaths in rheumatoid arthritis patients [(3)(4)],

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and this presumably due to accelerated atherosclerosis from chronic systemic and/or vascular inflammation [5].

AIM OF STUDY:

To assess the cardiac involvement in chronic rheumatoid arthritis patients by electrocardiogram and echocardiogram.

PATIENTS AND METHODS:

Patients and control individuals selection:

A cross sectional study was performed on hundred patients with rheumatoid arthritis admitted to rheumatology wards in Baghdad Teaching Hospital from September 2010 to March 2011 all 100 rheumatoid arthritis patients studied as well as randomly selected sample of hundred healthy individuals matched for age and sex served as a control group. Informations about individuals studied included: name, age, sex, disease duration (≥4 years), and medications taken by patients, Electrocardiograph and echocardiograph studies were done on all individuals under supervision of a cardiologist.

Exclusion was done in this study for individuals with risk factors for cardiac diseases (previous cardiac problems, previous valvular problems hypertension, diabetes mellitus and smoking).

METHOD:

All patients and control individuals underwent tests by electrocardiogram and echocardiogram (type kretz –voluson 530D), the echocardiogram studies assessing cardiac chambers, mitral valve, aortic valve, tricuspid valve status, ejection fraction percentage, and septal thickness.

Statistical Analysis:

Statistical Package for Social Sciences version 17 (SPSSv17) was used for data input and analysis. Discrete variables were presented as numbers and percentages and continuous variables were presented as mean ± standard deviations (SD). Chi square test for goodness of fit was used to test the significance of observed distributions. Chi square test for independence and Fisher exact test was used to test the association between discrete variables as appropriate. Findings with P value less than 0.05 were considered significant.

RESULTS:

The demographic distribution of both rheumatoid arthritis patients and control individuals are shown in table 1.

There were 100 (74 female: 26 male) patients with rheumatoid arthritis and 100 (73 female: 27 male) control individuals, both groups were highly matched regarding the gender with female to male ratio 3:1.

The age of both groups was also matched and the majority of patients and control individuals were between 40- 59 years old.

The number of patients with rheumatoid arthritis having abnormal electrocardiograph were [21(21%)], compared to [7(7%)] among controls, which is highly significant (p-value 0.004), specific ECG abnormalities as (left ventricular hypertrophy (appendix 2), ventricular ectopic, st-depression, st-flattening, t-inversion and pulses bigemene) showed no significant differences between patients and controls as shown in table 2

Table3 shows highly significant differences (p-value 0.000) in number of patients with rheumatoid arthritis [36(36%)] having abnormal echocardiogram findings compared to controls [11(11%)], while on categorizing these structural abnormalities into 12 subgroups only 6 of them showed significant differences between the two groups.

On reviewing these results it was noted that some patients may have more than one echocardiograph findings and this will explain the difference in number of individuals with abnormal echocardiographs and the number of findings.

Table 4 represent the distribution of patients with rheumatoid arthritis into two subgroups the first with disease duration (4-10 years), the second with disease duration (>10 years) in relation to electrocardiogram and echocardiogram findings to both subgroups and this reveals an increase in electrocardiogram abnormal findings from [13(18.1%)] for those with disease duration (4-10 years) to [8(28.6%)](p-value 0.246) for those with disease duration more than ten years, and an increase in abnormal echocardiogram findings from [24(33.3%)] in disease duration (4-10 years) to [12(42.9%)](p-value 0.373) in those with disease duration of more than ten years; but these differences were insignificant .

In table 5 the rheumatoid arthritis patients taken in study were divided according to uses of DMARD´s {89(89%) are on DMARD´s and 11(11%) are not}; for each division correlation with number of abnormal electrocardiogram and echocardiogram was done and showed no significant differences between the two subgroups.

Table 1: Demographic distribution of 100 patients with rheumatoid arthritis and 100 healthy individuals according to gender and age.

Demographic variables	Patients N=100(%)	Control N=100(%)	X^2	P-value
Gender				
Male	26(26.0)	27(27.0)	0.026	0.873(ns)
Female	74(74.0)	73(73.0)		
Age Group (year)				
20-29	2(2.0)	3(3.0)		
30-39	16(16.0)	15(15.0)		
40-49	33(33.0)	32(32.0)	0.264	0.992(ns)
50-59	31(31.0)	32(32.0)		
≥ 60	18(18.0)	18(18.0)		
N; number, %; percent, X^2; chi square, ns; not significant.				

Table 2: Distribution of abnormal ECG in patients and control groups.

	Patients N=100(%)	control N=100(%)	p-value
No. of individuals having abnormal ECG	21(21.0)	7(7.0)	0.004*
Features suggestive of left ventricular hypertrophy	8 (8.0)	3 (3.0)	0.120(ns)
Ventricular ectopic	2 (2.0)	1 (1.0)	0.560(ns)
ST depression	6 (6.0)	2 (2.0)	0.149(ns)
ST flattening	1 (1.0)	0 (0.0)	0.316(ns)
T inversion	3 (3.0)	1 (1.0)	0.120(ns)
Pulses Bigemene	1 (1.0)	0 (0.0)	0.316(ns)

Table 3: Structural findings found on Echocardiogram in Rheumatoid arthritis patients and control group.

	Case	Control	Total		
Investigation	N=100 (100%)	N=100 (100%)	N=200 (100%)	X^2	P-VALUE
No. of individuals having abnormal ECHO	36(36.0)	11(11.0)	47(47.0)	17.380	0.000*
Echo Findings					
LVH	21(21.0)	4(4.0)	25(12.5)	13.211	0.000*
DD	19(19.0)	4(4.0)	23(11.5)	11.054	0.001*
PE	6(6.0)	1(1.0)	7(3.5)	3.701	0.054
AVR	3(3.0)	0(0.0)	3(1.5)	3.046	0.081
AVS	7(7.0)	0(0.0)	7(3.5)	7.254	0.007*
AVC	2(2.0)	0(0.0)	2(1.0)	2.020	0.155
MVR	4(4.0)	0(0.0)	4(2.0)	4.082	0.043*
MVP	4(4.0)	1(1.0)	5(2.5)	1.846	0.174
MVC	3(3.0)	0(0.0)	3(1.5)	3.046	0.081
DLA	7(7.0)	1(1.0)	8(4.0)	4.688	0.030*
TH	9(9.0)	4(4.0)	13(13.0)	2.057	0.152
EF ≤ 50	10(10.0)	1(1.0)	11(5.5)	7.792	0.005*
No; number, %; percent, X2; chi square, LVH; left ventricular hypertrophy, DD; diastolic dysfunction, PE; pericardial effusion, AVR; aortic valve regurgitation, AVS; aortic valve sclerosis, AVC; aortic valve calcification, MVR; mitral valve regurgitation, MVP; mitral valve prolapsed, MVC; mitral valve calcification, DLA; dilatation of left atrium, TH; thickened septum, EF; ejection fraction,echo;echocardiogram,*:p-value<0.05.					

Table 4: Distribution of RA group according to disease duration with Electrocardiogram & Echocardiogram findings.

	Duration of RA (years)				
	4-10	> 10	Total		
Investigation	N=72 (100%)	N=28 (100%)	N=100 (100%)	X^2	P-VALUE
N. of patients having abnormal ECG	13(18.1)	8(28.6)	21(21.0)	1.344	0.246
N. of patients having abnormal ECHO	24(33.3)	12(42.9)	36(36.0)	0.794	0.373

RA; rheumatoid arthritis, , N; number, %; percent, X2; chi square

Table 5: Correlation between rheumatoid arthritis patients on disease modifying anti-rheumatic drugs with Electrocardiogram & Echocardiogram.

	On DMARD				
	Yes	No	Total		
Investigations	N=89 (100%)	N=11 (100%)	N=100 (100%)	X^2	P-value
N. of Patients Having abnormal ECG Findings	20 (22.5)	1 (9.1)	21(21.0)	1.057	0.304
N. of Patients Having abnormal Echo Findings	34 (38.2)	2 (18.2)	36(36.0)	1.703	0.192
DMARD; Disease modifying anti-rheumatic drugs, N; number, %; percent, X2; chi square, ECG; Electrocardiogram. Echo; Echocardiogram					

DISCUSSION:

Our study revealed significant differences in cardiovascular abnormalities between patients with rheumatoid arthritis and controls.

The possible explanation is that the disease itself can be considered as a risk factor for cardiovascular problems through causing accelerated atherosclerosis from chronic systemic and/or vascular inflammation [(5)].

In order to be more accurate a matched sample of patients and control group regarding the gender and the age and the same number of cases and control group (1:1) ratio has been taken.

Using results of electrocardiograph and echocardiograph as an accurate data tool for identifying a number of structural abnormalities in rheumatoid arthritis population [(15-17)],and according to our study revealed that the patients having abnormal electrocardiograph findings were 21(21%) patients in comparison to controls 7(7%), which is significant(p-value0.004) and this agree with previous study done in our department by Saeed et al [(18)] which is done on a similar sample but less number of patients ·the highest abnormality was in the presence of left ventricular hypertrophy (8% in patients ,3% in control) and this explained by secondary myocardial fibrosis in RA[(23)], followed by st-depression (6% in patients ,2% in control) then the t-inversion (3% in patients ,1% in control) ,whilst regarding patients having an abnormal echocardiography findings were 36(36%)(42%-59% in previous studies) in patients group, compared to 11(11%) in controls ; which is highly significant(p-value 0.000) and this agree with previous studies by Saeed et al[(18)] and Maione et al[(23)] and this explained by that RA itself may considered as a risk factor in cardiovascular disorder[(24)].Rheumatoid arthritis have been found to have an increased prevalence of pericardial effusion, mitral valve abnormalities and impaired left ventricular size and function by Corro et al [(20)] and Wislowska et al [(21)].

In our study structural abnormalities detected by echocardiogram include left ventricular hypertrophy 21(21%) ,pericardial effusion 6(6%)(13.5%in previous study)[(18)] ,aortic valve abnormalities 12(12%)(9.6%in previous study)[(18)], mitral valve abnormalities 11(11%)(11.5%in previous study)[(18)], ejection fraction 10(10%), these all agrees with previous studies by Dawson et al [(17)] and Saeed et al[(18)] and Mody et al[(19)]. The echocardiograph findings which were highly significant in this study were the left ventricular hypertrophy, diastolic dysfunction, aortic valve sclerosis, mitral valve regurgitation, dilatation of left atrium and ejection friction and this support the idea that even in absence of symptoms of cardiac problem there may be serious cardiac structural abnormalities.

The relation between the duration of the disease and electrocardiogram and echocardiogram changes detected, were not significancant; although there were some increase in cardiac

structural abnormalities, but this finding is not in agreement with previous study by Udayakumar et al [22]. This may be explained by the limited number of patients with disease duration more than 10 years (28%) in comparison with patients having disease duration less than 10 years (72%). Regarding the changes detected by ECG and ECHO according to the use of DMARD´s (the patients divided into those on DMARD´s and those not), there were no significant association between the two groups and this agree with previous study by Udayakumar et al [22], and this explained by that DMARD`s especially methoterxate may reduce the rate of cardiovascular events but it needs additives like aspirin and antihyperlipidemia [24].

CONCLUSION:

- Asymptomatic cardiac structural abnormalities increased in frequency in rheumatoid arthritis patients compared to healthy individuals matched by gender and age.
- There is no association between treatments by DMARD´s with incidence of cardiac abnormalities.
- Electrocardiogram and echocardiogram represent a good method for detect of early asymptomatic cardiac changes.

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