

## The Echocardiographic Abnormalities in 52 Iraqi Patients with Rheumatoid Arthritis

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### ABSTRACT:

#### OBJECTIVE:

To study the prevalence of echocardiographic findings in unselected population of patients with rheumatoid arthritis (RA)

#### METHODS:

Fifty two RA patients and fifty two normal healthy people assessed clinically, Echo Cardiographically, ECG, pulmonary function tests and laboratory investigations.

#### RESULTS:

Two-dimensional echocardiography demonstrated significant cardiac disease in (59%) of patients in form of right ventricular dilatation (25%), left ventricular dilatation (11.5%), left atrial dilatation (3.8%), mitral valve abnormalities (11.5%)(M.V.regurgitation, M.V.thickening, M.V.prolapsed, M.V.stenosis), septal hypertrophy(5.8%), diastolic pressure dysfunction(5.8%), thick aortic calcified cusps(3.8%), aortic regurgitation(5.8%), mild pericardial effusion(13.5%), tricuspid Regurgitation (11.5%) and raised pulmonary artery pressure above 30 mmHg (3.8%).The normal healthy people had only two people one had M.V.regurgitation and the other had mild M.V.prolapse and there were no other abnormalities in (ECG) of (PFT).

#### CONCLUSION:

Wide and frequent varieties of echocardiographic cardiac abnormalities were found in an unselected population of patients with RA, using Doppler echocardiography giving different grades of severity of cardiac manifestation.

**KEYWORDS:** Echocardiogram. Rheumatoid arthritis. IRAO.

### INTRODUCTION:

Rheumatoid arthritis (RA) is a systemic inflammatory disease predominantly manifests in the synovial membrane of diarthroidal joint. The inflammation develops in a genetically predisposed host; exogenous events that precipitate disease development have not been identified. It is relatively common condition affecting 1% of the Iraqi population and over 5% of people over the age of 65 year <sup>(1, 2)</sup>. The prevalence is about 2.5 times higher in women than in men. Amongst many other extra articular features, several forms of cardiac involvement have been described in RA, most commonly pericardial effusion <sup>(2)</sup>. Pulmonary hypertension has also been described in RA patients. This is usually a result of RA associated lung disease <sup>(2)</sup>. Secondary pulmonary hypertension progresses slowly. Treatment initially needs to be directed at underlying cause. The presence of pulmonary hypertension secondary to lung disease implies a poor prognosis.

Doppler echocardiography has been proven to be a reliable non-invasive method for detecting Tricuspid regurgitation jet in chronic lung disease <sup>(3,4)</sup>, systemic sclerosis <sup>(7)</sup> and cardiac disease due to increased L+ a trial pressure due to L+ ventricular dysfunction and EF < 50%.

**Aim of the study:** To determine the prevalence of Echocardiographic changes in patients with

### PATIENTS AND METHODS:

Fifty two consecutive patients attending the rheumatology outpatient unit in Baghdad Teaching Hospital-Medical city with an established diagnosis of RA as defined by the A.C.R (1987), the revised criteria for the classification of RA were enrolled in this study. All patients which included pulmonary function test, chest radiography routine blood test including creative protein, lipid profile and fasting blood sugar. All patients underwent Echo, and ECG. Patients were excluded if they were smoking, diabetic, or hypertensive at the beginning of the study. We have taken across-section of routinely reviewed outpatient unit in Baghdad Teaching Hospital Medical City of RA patients, and have screened them for cardiac and lung disease. The AR patient were carefully assessed for lung disease as this is thought to be the most common cause of pulmonary hypertension in RA.

#### List of abbreviation

ACR	American college of Rheumatology
CXR	Chest X Ray
CHQ	Chloroquin
DAS 28	Disease activity score
HAQ	Health assessment questionnaire

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**Clinical Assessment:** Questionnaire on each patient was filled including:- Name , age, gender, occupation, duration of disease, duration of treatment, type of treatment (NSAID-corticosteroid-DMARD), assessment of disease activity by using of DAS28 which is measured by calculating the number of swollen and tender joint were both assessed by 28 joint count. For this a mannequin, consisting of a stick figure drawing a person with each joint indicated by a circle, was used. The circle is marked for the tender or swollen joints by ticking the appropriate circle (range 0-28). Blood samples taken to determine the westergren erythrocyte sedimentation rate (ESR) and to measure C-reactive protein (CRP). Patient global assessment of disease activity from (1-100)%<sup>(5)</sup>. The result of the DAS28 score may vary from 0 to 9.3, where a DAS28 score  $\leq 3.2$  is Considered to reflect low disease activity, or if  $< 2.6$  it is remission but if  $> 5.1$  it is high disease activity, and from 3.2-5.1 it is moderate disease activity<sup>(5)</sup>, also patients asked if There is previous chest disease ( cough, dyspnea, sputum production, chest pain, weight loss), and risk factors for respiratory disease (smoking, medications, domestic pets, and occupation) all these should be excluded from the study.

#### **PULMONARY FUNCTION TESTS:**

Pulmonary function tests comprised spirometry, static lung volume, gas transfer factor, and flow loops. They were performed in the cardio respiratory unit at Baghdad Teaching Hospital-Medical city by one senior technician. In all cases the pulmonary function tests were performed on the same day as the echocardiogram.

#### **ECHOCARDIOGRAPHY:**

M-mode and B-mode echocardiography were performed with the patient in the left Lateral position. Using a Kretz machine, one senior physician performed the echocardiography.

This physician who was blinded to clinical details recorded the structural change.

Tricuspid regurgitation was identified in continuous wave mode at the apical view (four chambers view), the peak instantaneous drop in systolic pressure from the right Ventricle to the atrium was calculated from the peak signal velocity of the tricuspid Regurgitant signal by the simplified Bernoulli equation ( $\Delta p = 4v^2$ ) where  $\Delta p$  is the trans-tricuspid gradient and  $v$  is the peak velocity measured<sup>(6)</sup>.

Also the ejection fraction was estimated in the study. According to the following equation

$$\frac{\text{Left ventricle diastolic volume} - \text{Left ventricle systolic volume}}{\text{Left ventricle diastolic volume}} \times 100$$

Clinical and laboratory characteristics of patients, included in the study were shown in table 1.

#### **Control group:**

Echocardiography findings was recorded in 52 person in whom the following conditions were excluded:- Hypertension, Diabetes mellitus, any cardiac or lung disease and they had no RA and no family history of RA.

#### **STATISTICAL ANALYSIS:**

This study used statistical package for social science (S.P.S.S) for finding the all frequencies (age, gender, duration of disease, duration of treatment, type of treatment and the DAS28 score) and the p- value for the all parameters to find their significance.

#### **RESULTS:**

(Table 1) shows that 1.9% of the patients received NSAID-steroid, 53.8% received MTX + CHQ, 13.5% received NSAID, 11.5% received MTX + CHQ + steroid, 1.9% MTX only, 5.8% received CHQ only, 1.9% pencilamine, 3.8% received MTX+ CHQ + steroid + NSAID and 5.8% received MTX + NSAID. Patients gender were 43 female (82.7%) and 9 male (17.3%) (Table 1). The patient's ages were 25 year to 68 year, (Table 1). The duration of disease between 6 months to 25 years, the duration of treatment between 1 month to 14 years ( Table 1). The activity of disease had been done by DAS28 and found that 28.8% had high disease activity, 46.2% had moderate disease activity, 3.8% had mild disease activity, 21.2% were in remission, (Table 1).

The echocardiographic abnormalities were shown in (Table 2). The ECG findings were shown in (Table 3). The chest- x-ray finding were shown in (Table 4). The Echo finding in this study compared to Abdulla TAS et al showed in (Table 5).

The Echo finding in this study compared to Dawson et al study showed in (Table 6).

#### **RA with raised pulmonary artery pressure:**

The normal healthy people ages range from 20 to 60 years and there were no raise in pulmonary artery pressure, there were only two people one had M V regurgitation and the other had M V prolapsed and there were no chest radiographic abnormalities or other abnormalities in (E C G) or ( P F T ).

**Table 1: Clinical details of the 52(RA) patients study.**

1-	Age(yr)	Range 25-68, SD 11.37, mean 47.
2-	Gender	43(82. 7%) female, 9(17.3%) male.
3-	Disease duration(yr)	Range 0.5-25, SD 66.51,mean 7.1
4-	Duration of treatments (Months)	Range 1-168, SD 41.6, mean46.2.
5-	Type of treatments NO. (%)	NSAID 7(13%). Steroid 2(3.8%). One DMARD (MTX or CHQ or Penicillamin) 5(9.6%). Combinations :- (MTX+CHQ+steroid) 6(11.5%). (MTX+CHQ)28(53.8%). (NSAID+steroid) 1(1.9%). (MTX+NSAID) 3(5.8%). (MTX+CHQ+NSAID+steroid) 2(3.8%).
6-	Disease activity score 28(DAS28)	Remission, NO=11, range 1.13-2.50, SD 0.50, mean 1.92. Mild, NO= 2, range 3.08-3.10, SD 0.01, mean 3.09. Moderate, NO=24, range 3.21- 5.10, SD 0.51, mean 4.29. High, NO=15, range 5.20-6.60, SD 0.46, mean 5.78.

**Table 2: Structural findings by Echocardiography of both patients with RA.and control group.**

Finding	RA patients	NO (%)	Control NO (%)	P-value
R.V.Dilated	13	25.0%	0	0.000 <sup>(s)</sup>
L.v.Dilated	6	11.5%	0	0.012 <sup>(s)</sup>
L.A.Dilated	2	3.8%	0	0.153 <sup>(ns)</sup>
M.V.Regurgitation	3	5.8%	1	0.308 <sup>(ns)</sup>
M.V.Thickening	1	1.9%	0	0.997 <sup>(ns)</sup>
M.V.Prolaps	1	1.9%	1	1.000 <sup>(ns)</sup>
M.V.Stenosis	1	1.9%	0	0.997 <sup>(ns)</sup>
Septal hypertrophy	3	5.8%	0	0.079 <sup>(ns)</sup>
Diastolic Dysfunction	3	5.8%	0	0.079 <sup>(ns)</sup>
Thick Aortic Calcified	2	3.8%	0	0.153 <sup>(ns)</sup>
Aortic Regurgitation	3	5.8%	0	0.079 <sup>(ns)</sup>
Mild Pericardial effusion	7	13.5%	0	0.006 <sup>(s)</sup>
Normal ECHO	27	51.9%	50	0.000 <sup>(s)</sup>
T.C.Regurgitation	6	11.5%	0	0.012 <sup>(s)</sup>

(ns) Not significant.

(s) Significant.

**Table 3 : ECG finding in this study and Abdulla TAS et al (19).**

ECG FINDING	RA CASES(N=52)		RA CASES(N=50)		P-value
	NO (%)	This study	NO(%)	Abdulla TAS et al	
P-Pulmonale	1	1.9%	0	0%	0.999 <sup>(ns)</sup>
R.B.B.B	6	11.5%	0	0%	0.013 <sup>(s)</sup>
L.A.D.	4	7.6%	2	4%	0.428 <sup>(ns)</sup>
L.V.Hypertrophy	1	1.9%	0	0%	0.999 <sup>(ns)</sup>
R.A.D	1	1.9%	0	0%	0.999 <sup>(ns)</sup>
Total	13	25%	2	0%	0.003 <sup>(s)</sup>

(ns)Not significant

(s) Significant

**Table 4 : X-ray finding in this study and Abdulla TAS et al (19).**

C-X-R Positive findings	RA CASES (N=52)		RA CASES (N=50)		P- value
	This study NO. %		Abdulla TAS et al study NO. %		
Cardiomegaly	9	17.3%	1	2%	0.009 <sup>(s)</sup>
Right ventricular hypertrophy	2	3.8%	2	4%	0.968 <sup>(ns)</sup>
Pericardial effusion	1	1.9%	0	0%	0.999 <sup>(ns)</sup>
Emphysematous chest	1	1.9%	0	0%	0.999 <sup>(ns)</sup>
Bilateral plural effusion	3	5.7%	0	0%	0.085 <sup>(ns)</sup>
Left sided plural effusion	1	1.9%	0	0%	0.999 <sup>(ns)</sup>
Left ventricular hypertrophy	2	3.8%	0	0%	0.990 <sup>(ns)</sup>

(ns) Not significant

(s) Significant

**Table 5 : Echocardiographic findings in this study and Abdulla TAS et al study (19).**

ECHO findings	52 patients		50 patients		P- value
	This study no	(%)	Abdulla TAS no	(%)	
Pericardial effusion	7	13.5%	15	30%	0.042 <sup>(s)</sup>
M.V.Thickening	1	1.9%	2	4%	0.535 <sup>(ns)</sup>
M.V. Prolaps	1	1.9%	10	20%	0.003 <sup>(s)</sup>
M.V.Regurgitation	2	3.8%	4	8%	0.373 <sup>(ns)</sup>
Aortic calcified	2	3.8%	2	4%	0.968 <sup>(ns)</sup>
R.V.Dilated	13	25.0%	7	14%	0.162 <sup>(ns)</sup>
L.V.Dilated	2	3.8%	4	8%	0.373 <sup>(ns)</sup>
Ventricular Diastolic Dysfunction	3	5.8%	5	10%	0.427 <sup>(ns)</sup>
Abnormality in heart	31	59.0%	28	56%	0.712 <sup>(ns)</sup>

(ns) Not significant

(s) Significant

**Table 6: Echocardiophic finding in this study and Dawson et al study (14).**

ECHO finding	52 patients This study		146 patients Dawson et al study		P-value
	No	(%)	No	(%)	
Aortic Regurgitation	3	5.8%	4	3%	0.310 <sup>(ns)</sup>
L.A.Dilated	2	3.8%	34	23%	0.002 <sup>(s)</sup>
M.V.Regurgitation	1	1.9%	6	4%	0.463 <sup>(ns)</sup>
Pericardial effusion	7	13.5%	2	1%	0.000 <sup>(s)</sup>
Left ventricular					
Function reduction	0	0%	13	9%	0.026 <sup>(s)</sup>
T.C.Regurgitation	6	11.5%	112	77%	0.000 <sup>(s)</sup>
Normal ECHO	27	51.9%	Not mentioned		

(ns) Not significant

(s) Significant

**DISCUSSION:**

The echocardiographic abnormalities were tricuspid regurgitation in 6 patients (11.5). No patient had visible elevated jugular venous pressure. Mitral valve stenosis was found only in 1 patient (1.9%). There were 13 patients (25%) with right ventricular dilatation but there was no right ventricular hypertrophy. The other structural findings were presented in table (2).

Echocardiography identified in this study a number of structural abnormalities in RA patients, with at least one cardiac abnormality in 59% of RA patients compared to study done by Abdulla TAS et al<sup>(7)</sup>, which was 56% of RA patients. Previous studies of RA patients showed an increased prevalence of pericardial effusion, mitral valve abnormalities and impaired left ventricular function<sup>(20, 21)</sup>. Aortic root enlargement was found more frequently in patients with RA<sup>(8)</sup>. Although researchers agree on the structural cardiac changes that increase in RA, consistency between echocardiography studies in RA patients is not found<sup>(6)</sup>. In this study the pericardial effusion was 13.5%, but it was found the reported prevalence of pericardial effusion ranges from 4 %<sup>(9)</sup> to 44 %<sup>(10)</sup>. This study found mitral valve abnormalities in 11.5% (Mitral valve regurgitation 5.8%, M.V. stenosis 1.9% M.V.prolapsed 1.9%, and M.V.

thickening 1.9%). In other studies the mitral valve abnormalities were 6%<sup>(11)</sup> to 30 %<sup>(12)</sup>. In this study 11.5% of patients have tricuspid regurgitation compared to a study done by Dawson et al who found that 77% of patients with RA had tricuspid regurgitation, this is due to the difference between the mean age and mean duration of RA and number of patients between two studies. This study had the mean age 47.4 years and duration of disease 7.1 years, whereas the mean age in Dawson's et al study was 56.9 years and duration of disease 11.2 years. In this study smoking, Hypertension, and Diabetes Mellitus were excluded, Dawson et al study didn't exclude smoking, Hypertension and Diabetes Mellitus. In this study aortic regurgitation was 5.8%, in Dawson et al study aortic regurgitation was 3% which seem to be nearly the same. RA in Iraqi patients appears to be mild and less destructive<sup>(12)</sup>, also there is difference in use of score for estimating the activity of disease. In Dawson et al study use of HAQ and they were 39% current smokers, 32% never smoked and the rest were moderate smokers (less than 20 cigarettes/day), while in this study DAS28 score was used and non of the patients was a smoker. In this study all smokers were excluded. There were differences in gender in both studies. This study included

82.7% female and 17.3% male, the Dawson et al study included 69% female 31% male. The types of treatments were different in both studies, while the mean duration of disease in this study was 10 years, in Dawson et al<sup>(14)</sup> study was 11.2 years, nearly equal for both studies. This study show P-wave changes (1.9%) but no right sided strain patterns, compared to Bacon PA et al study who found P-wave changes in 20% of RA patients with pulmonary hypertension. and there were 70% with right sided strain patterns<sup>(11)</sup>. In this study ECG frequently showed left bundle branch block pattern masking the typical changes of right sided heart strain predominance. It has been noted recently that RA patients have an increased number of abnormalities related to the function of the left ventricle<sup>(9-13)</sup>. The frequency of these abnormalities is significantly higher than that in control populations when Hypertension, Diabetes Mellitus, and smoking were excluded. Impairment of left ventricular function can cause elevation of pressure on the left atrium and raise pulmonary artery pressure. It would seem unlikely that this is the cause of the raised pulmonary artery pressure, as patients with reduced left ventricular ejection fraction have been excluded. In this study of RA patients showed mild Tricuspid Jet with no significant signs and symptoms, ECG or structural echocardiographic changes. Of course, this may be, because of detecting the disease at an early stage.

#### CONCLUSION:

Variation of results in this study from other international studies is probably due to the racial, duration of disease and its mildness in IRAQI patients.

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