IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 2 Ver. 9 February. (2018), PP 54-58
www.iosrjournals.org

Study of Cardiovascular Manifestations of Rheumatoid Arthritis and Correlation with Disease Duration and Severity

Dr. Raminderpal Singh[1],Dr. Chamanjot Kaur[2] ,Dr. Preetkanwal Sibia[3] ,
Dr. Baldeep Singh[4] ,Dr. Ankur Chaudhary[5]
[1]*Professor, Department of Medicine, GMC, Patiala*
[2]*Junior Resident, Department of Medicine, GMC, Patiala*
[3]*Associate Professor, Department of Gynaecology and Obstetrics, GMC, Patiala*
[4]*Senior Resident, Department of Medicine, GMC, Patiala*
[5]*Junior Resident, Department of Medicine, GMC, Patiala*
Correspondence address: Dr. PreetkanwalSibia

Abstract
Aims and objectives*: Rheumatoid arthritis is a systemic chronic inflammatory disorder of unknown etiology that primarily involves synovial joint, and secondarily involves various organ systems. Involvement of cardiovascular system is well known but the disease is mainly subclinical. The study was conducted to see the prevalence of various cardiovascular manifestations in rheumatoid arthritis and correlate them with disease duration and severity.*
Material and methods:*In this cross-sectional study, 60 patients of rheumatoid arthritis attending outpatient and inpatient department at Rajindra Hospital and Government Medical College, Patiala were included. They were thoroughly investigated for cardiovascular abnormalities.*
Results:*The mean age of the patients was 45.37 ± 10.96 years. Females outnumbered the males in this study. The mean duration of the disease was 4.62±2.49 years. Of all patients with cardiovascular abnormalities, 40% patients (24 cases) had echocardiographic abnormality, 40% had hypertension and 11.67% had ECG abnormality. The most common echocardiographic abnormality was LV diastolic dysfunction, followed by pericardial effusion.There was significant correlation of these manifestations with disease duration and severity.*
Conclusion: *The cardiovascular abnormalities showed a direct relationship with the increasing duration as well as severity of the disease. Hence, it is important to screen the patients of rheumatoid arthritis for these abnormalities so that early identification and treatment can be provided.*
Key words: *Echocardiography, ECG, Pericarditis, RA*

Date of Submission: 05-02-2018 Date of acceptance: 23-02-2018

I. Introduction

Rheumatoid arthritis is the most common autoimmune inflammatory arthritis in adults.[1] The disease is three times more frequent in women than men but sex difference diminishes in older age groups.[2]It primarily involves synovial joint, typically symmetrical in nature. The major clinical manifestations of RA are divided into, articular and extra-articular manifestations. Extra articular manifestations occur in about 40 percent of patients over a lifetime of disease.[3]The relationship between RA and cardiovascular disease has become a particular focus of attention because of the increased recognition of role of inflammation in the pathogenesis of atherosclerosis.[4]The various cardiovascular manifestations are pericarditis, myocarditis, coronary artery disease, heart failure, atrial fibrillation, arteritis and hypertension. Out of all, the most common cardiac complication of RA is pericarditis. It is found in 30–50% of autopsy casesand in up to 30% by echocardiography. Less than 10 percent of patients have a clinical episode of pericarditis.[5,6]

Subclinical myocardial disease is relatively common in patients of RA, despite the rarity of clinical myocarditis and infrequency of asymptomatic left ventricular dysfunction.[7,8]The RA-associated cardiomyopathy may be the result of focal non-specific, diffuse necrotizing or granulomatous myocarditis. These entities are histological diagnoses, which may be found in 3–30% of RA patients in postmortem studies.[9]They are usually associated with active articular disease and with other nonarticular manifestations.[10] It has been found that left ventricular diastolic dysfunction and pulmonary hypertension was more common in patients with rheumatoid arthritis.[11,12]Hypertension is an important cardiovascular risk factor in RA. The reported prevalence of HT among patients with RA varies from 3.8% to 73%. Several studies have demonstrated that it associates with subclinical atherosclerosis.[13,14]Chronic inflammation promotes the endothelial dysfunction, leading to decreased

blood vessel compliance and atheroma formation. Patients with RA who are positive for anti-cyclic citrullinated peptide antibodies (anti-CCP) have higher subclinical atherosclerosis than those who are not.[15]Markers of systemic inflammation confer a statistically significant additional risk for cardiovascular death among patients with RA, even after controlling for traditional CV risk factors and comorbidities.[16,17]The C-reactive protein concentration at baseline is an important predictor of subsequent death from cardiovascular events in patients with new onset inflammatory polyarthritis, and is independent of other factors of disease severity.[18]Since sub-clinical manifestations occur many years before their clinical presentation, hence the need for early recognition and more aggressive management of the disease, with a view to prevent the aforementioned complications is very important. The study was conducted to see the cardiovascular manifestations in rheumatoid arthritis and correlate them with the disease duration and severity.

II. Aims And Objectives

1) To study cardiovascular manifestations of rheumatoid arthritis.
2) To correlate cardiovascular manifestations with duration and severity of rheumatoid arthritis.

III. Materials And Methods

In this cross-sectional study, 60 cases of rheumatoid arthritis both from outpatient and inpatient department at Government Medical College and Rajindra Hospital, Patiala were included.

Inclusion criteria:

Patients more than 18 years of age who fulfilled the revised ACR/EULAR criteria for RA were included in the study.

Exclusion criteria:

1. Patients with age <18 years.
2. Patients suffering from congenital heart disease, ischaemic heart disease, valvular heart disease with rheumatic etiology, hypertension, pregnant females.
3. Patients with serum creatinine> 3.0 mg/dl or creatinine clearance < 30 ml/minute.
4. Patients with any immunosuppressive conditions or active infection.

Rheumatoid arthritis was diagnosed by using 2010 American College of Rheumatology/ European League Against Rheumatism Criteria.[19]Severity of the disease was assessed according to American College of Rheumatology revised criteria for classification of functional status in rheumatoid arthrititis. [20]

Various investigations like hemoglobin, total leukocyte count, differential leukocyte count, random blood sugar, urine examination, renal function tests, ESR, CRP, RA factor, X-ray of hands, Chest X-ray, ECG and echocardiography were done in the patients.ECG was examined specifically for the presence of ST-T changes, QT interval, prolonged PR interval, atrial fibrillation, right bundle branch block, Sinus Tachycardia and Sinus bradycardia. Transthoracicechocardiography was performed according to a standardized protocol and scan planes including the 4-chamber apical view, 2-chamber apical view, left parasternal long-axis view, and left parasternal short-axis view, recording the four cardiac valves, the great vessels, the cardiac chambers, and the interventricular and interatrial septa. It was done to look specifically for the presence of left ventricular diastolic dysfunction, pericardial effusion, mitral regurgitation, tricuspid regurgitation, pulmonary hypertension, and rheumatoid nodules. Any other abnormality when present was also taken into account.

IV. Results

In the present study, the range of age was 21-70 years with the mean age of 45.37 ± 10.96 years. Majority of the cases were in the age group of 41-50 years. Out of 60 patients, 50 were females constituting 83.33% of all. Males comprised of 16.67% of cases. The mean duration of the disease was 4.62±2.49 years. 30% of patients (18 cases) had duration of RA in the range of 5-10years. The mean number of large joints involved was 1.42±1.19. Average number of small joints involved was 21.97±6.19. Majority of the patients 46.67% (28 cases) had class 2 functional status, whereas 17 patients (28.33%) had class 1 functional status. 25% of the patients had class 3 functional status.

ECG changes were present in 11.66% patients (7 cases), of which non-specific ST-T changes were present in majority (5 cases) of the patients, followed by right bundle branch block which was present in 3.33% of patients. 53 patients (88.34%) had a normal ECG.

Table 1 shows distribution of cases on the basis of ECG findings

ECG	Number of cases (n=60)	Percentage (%)
RBBB	2	3.33%
Sinus Bradycardia	0	0%

Sinus Tachycardia	0	0%
First Degree Heart Block	0	0%
ST-T Changes	5	8.33%
Normal	53	88.34%
Total	60	100%

Echocardiography was normal in 32 (53.33%) cases. In rest of the patients the most common echocardiographic abnormality was Left Ventricular diastolic dysfunction, present in 15 (25%) patients, followed by pericardial effusion in 8 (13.33%) patients. Among the 8 cases with pericardial effusion, 2 had moderate pericardial effusion and 6 had minimal pericardial effusion. 1 patient had pulmonary hypertension.

Table 2 shows distribution of cases on the basis of echocardiographic findings

Echo findings	Number of cases (n=60)	Percentage (%)
Normal	32	53.33%
LV Diastolic Dysfunction	15	25%
Pericardial Effusion	8	13.33%
Pulmonary Hypertension	1	1.67%
Valvular abnormality	0	0%
Total	60	100%

Majority of the patients with ECG and echocardiographic abnormalities were in the age group of 41-50 years, of which majority were females 26.67% and 3.33% were males. 24 patients out of 60 had hypertension accounting for 40% of the patients.

Among all patients with cardiovascular involvement, 40% patients (24 cases) had echocardiographic abnormality. Hypertension was present in 24 cases, whereas ECG abnormality was present in 11.67% (7 cases) patients.

Table 3 shows distribution of cases on the basis of cardiovascular involvement

Cardiovascular involvement	Number of cases	Percentage
Echo abnormality	24	40%
HTN	24	40%
ECG abnormality	7	11.67%

The mean systolic and diastolic blood pressure in the patients was 138.07mmHg and 87.83mmHg, respectively. The mean value of different variables of echocardiography was depicted. The mean ejection fraction was 65.95% and the mean E/A ratio was 1.07.

Table 4 showsdistribution of clinical and echo variables in patients of RA

		RANGE	MINIMUM	MAXIMUM	MEAN±SD
Systolic Blood Pressure	SBP	<140	122.00	152.00	138.07±8.60
Diastolic Blood Pressure	DBP	<90	80.00	98.00	87.83±5.74
Left Atrial Diameter	LAD	2-4	2.20	3.90	3.15±0.39
Aortic Root Diameter	Aortic Root Diameter	2-3.7	2.30	4.30	2.99±0.40
Left Ventricle Internal Diameter in Diastole	LVIDDd	3.5-5.5	3.40	5.20	4.23±0.40
Left Ventricle Internal Diameter in systole	LVIDs	2.4-4.2	2.20	4.10	3.37±0.49
Inter Ventricular Septum Thickness	IVST	0.7-1.1	.50	1.10	0.84±0.14
Left Ventricular Posterior Wall Diameter	LVPWD	0.7-1.0	.60	1.30	0.81±0.18
Ejection Fraction	EF%	62-80%	54.00	84.00	65.95±7.01
E-M- Mode Measurement of Peak Early Flow	E	0.6-1.3	.48	1.18	0.66±0.11
A- M- Mode Measurement of Peak Early Flow Due to Atrial Contraction	A	0.6-1.3	.36	1.18	0.65±0.19
E/A	E/A		.53	1.70	1.07±0.31

Statistical analysis showed a significant (p=0.029) correlation of echocardiographic findings with duration of disease as well as with severity of the disease(p=0.032). The current study also showed a significant (p <0.05) correlation of ECG abnormalities with the duration of the disease and severity of the disease

(p=0.037). The mean duration of disease in patients with echocardiographic abnormalities was 6.42±2.19 whereas in patients without echo abnormality was 3.42±1.90, which was statistically highly significant(p=0.001). Statistical analysis showed that the mean functional stage, mean systolic and diastolic blood pressure was statistically highly significant (p=0.001) in patients with echo abnormalities as compared to patients without echo abnormality. Various variables of echocardiography were compared in patients with and withoutabnormalities. The only variable that was found to be statistically significant was E/A ratio (p=0.001), the mean of which was 0.91±0.3 in patients with echo abnormalities and 1.19±0.26 in patients without echo abnormalities.

V. Discussion

The present study was undertaken to study various cardiovascular manifestations in the patients of rheumatoid arthritis who attended outdoor or were admitted in the Department of Medicine, Rajindra Hospital, Patiala. They were evaluated clinically, along with relevant investigations. The mean age of the study participants was 45.37±10.96 years which was comparable to study conducted by Masooleh SI et al[21] i.e. 49.7±11.56. In the studies conducted by Vizzardiet al[22], Liang KP et al[23] and Raof RM et al[24], the mean age was 60.4±12.2, 60.5 and 53.31 ±2.14, respectively. The male: female ratio in the present study was 1: 5. The sex ratio in the studies conducted by Masooleh SI et al[21], Vizzardi E et al[22], Raof RM et al[24], and Guedes et al[25] was 1:3.34, 1:3.4, 1:6.8, and 1:6.5, respectively. The mean duration of disease was 4.62±2.49 years. The mean disease duration in studies conducted by Vizzardi E et al[22], Guedes et al[25] and Dawson et al[26] was found to be 10.6±7.1, 11±8.7, and 12.7±7.99 respectively. The number of hypertensive patients in the current study was found out to be 40% which is comparable to study conducted by Vizzardi E et al[22] in which it was 51%. The study conducted by Raof RM et al[24]showed lesser number of hypertensive patients, accounting 20% of all.

In our study, a normal ECG was present in 88.34% cases. In the studies conducted by Masooleh et[21]and Asai K et al[27], a normal ECG was seen in 68% and 56.32% cases, respectively. The most common electrocardiographic abnormality detected in our study waswas non-specific ST-T changes, which was present in 8.33% cases which was comparable to Masooleh SI et al[21] in which 15% cases had ST-T changes. In the study by Asai K et al[27], 20.9% cases had the same change .Second most common finding in our study was right bundle branch block which was found in 2.33% cases compared to Masooleh SI et al[21], in which it was 4% cases.

In our study,echocardiographic abnormality was present in 40% cases. The most common abnormality was Left Ventricular diastolic dysfunction which was present in 25% cases, comparable to 14.54%in study conducted by Raof RM et al[24]. Second most common abnormality in our study was pericardial effusion which was found in 13.33% which was comparable to the study conducted by Selcuket al[28]in which it was 15% .High prevalence of this complication (47%) was found in study done by Masooleh SI et al[21]. Pulmonary hypertension was present in 1.67% cases in our study, whereas it was as high as 31% in the study by Dawson et al.[26]

VI. Conclusion

The present study unmasked some important and relevant information about the impact of rheumatoid arthritis on cardiovascular system. The study is in concordance with the previous studies done on similar subject. A positive correlation between ECG and echocardiography findings with the duration and the severity of the disease is found. Hence, it is advisable to screen the patients of rheumatoid arthritis for cardiovascular abnormalities so that early identification and treatment can provide a healthier life ahead.

References

[1]. Helmick CG, Felson DT, Lawrence RC, Gabriel S, Hirsch R, Kwoh CK et al Estimates of the prevalence of arthritis and other rheumatic conditions in the United States: part I. Arthritis Rheum 2008;58:15–25.
[2]. Scott D.F, Wolfe F and Huizinga T. W. J. "Rheumatoid arthritis," The Lancet, 2010;376(9746):1094-108.
[3]. Myasoedova E, Crowson CS, Turesson C Gabriel SE, Matteson EL, Incidence of extraarticular rheumatoid arthritis in Olmsted County, Minnesota, in 1995-2007 versus 1985-1994:a population based study. J Rheumatol 2011;38:983.
[4]. Ross R. Atherosclerosis--an inflammatory disease. N Engl J Med. 1999 Jan14;340(2):115-26.
[5]. William JM, Michael HC, John HK, Nathan JZ, Robert AO.Echocardiographic assessment of cardiac structure and function in rheumatoid arthritis. Am J Med 1977;63:890–6.
[6]. Travaglio A, Anaya J-M. Rheumatoid pericarditis: new immunopathological aspects. ClinExpRheumatol 1994;12:313–6.
[7]. Kobayashi Y, Giles JT, Hirano M, Jon T Giles, Hirano M, Yokoe I, et al. Assessment of myocardial abnormalities in rheumatoid arthritis using a comprehensive cardiac magnetic resonance approach: a pilot study. Arthritis Res Ther 2010; 12:R171.
[8]. Ntusi NA, Piechnik SK, Francis JM, Ferreira VM, Matthews PM, Robson MD et al. Diffuse myocardial fibrosis and inflammation in Rheumatoid Arthritis: Insight from CMR T1 Mapping. JACC Cardiovasc Imaging 2015;8:526-36.
[9]. Hurd ER. Extraarticular manifestations of rheumatoid arthritis. Sem Arthritis Rheum 1979;8:151-76.
[10]. Sigal LH, Friedman GD. Rheumatoid pancarditis in a patient with well controlled rheumatoid arthritis. J Rheumatol 1989;16:368-73.
[11]. Jaunatey CG, Testa A, Garcia-Castelo A, Garcia-Porrua C, Llorca J, Ollier WE. Echocardiographic and Doppler findings in long term treated rheumatoid arthritis patients without clinically evident cardiovascular disease. Semin Arthritis Rheum 2004; 33:231-38.

[12]. Bonfiglio T, Atwater EC. Heart disease in patients with seropositive rheumatoid arthritis; a controlled autopsy study. Arch Intern Med 1969;124:714–9.
[13]. .Roman MJ, Moeller E, Davis A,Paget SA, Crow MK, Lockshin MD et al. Preclinical carotid atherosclerosis in patients with rheumatoid arthritis. Ann Intern Med 2006;144:249-56.
[14]. .Dessein PH, Tobias M, Veller MG. Metabolic syndrome and subclinical atherosclerosisin rheumatoid arthritis. Journal of Rheumatology 2006;33:2425-32.
[15]. Gerli R, Bartoloni BE, ShererY,et al. Association of anti-cyclic citrullinated peptide antibodies with subclinical atherosclerosis in patients with rheumatoid arthritis. Ann Rheum Dis. 2008 May;67(5):724–725.
[16]. Maradit-Kremers H, Nicola PJ, Crowson CS, Ballman KV, Gabriel SE. Cardiovascular death in rheumatoid arthritis: a population-based study. Arthritis Rheum. 2005 Mar;52(3):722–732.
[17]. Solomon DH, Curhan GC, Rimm EB, Cannuscio CC, Karlson EW.Cardiovascular risk factors in women with and without rheumatoid arthritis. Arthritis Rheum. 2004;50(11):3444–49.
[18]. Goodson NJ, Symmons DP, Scott DG, Bunn D, Lunt M, Silman AJ. Baseline levels of C-reactive protein and prediction of death from cardiovascular disease in patients with inflammatory polyarthritis: a ten-year followup study of a primary care-based inception cohort. Arthritis Rheum. 2005 Aug;52(8):2293–2299.
[19]. Aletaha D, Neogi T, Silman AJ, Raymond LN, David TF, AggarwalR, et al. 2010 Rheumatoid Arthritis Classification Criteria. An American College of Rheumatology/European League Against Rheumatism Collaborative Initiative Arthritis Rheum 2010; 62: 2569-2581.
[20]. Hochberg MC, Chang RW, Dwosh I, Lindsey S, Pincus T, Wolfe F. The American College of Rheumatology 1991 Revised Criteria for the classification of global functional status in rheumatoid arthritis. Arthritis and Rheumatism 1992;35(5):498-502.
[21]. Masooleh MI, Zayeni H, Haji-Abbasi A, Azarpira M, Hadian A, Hassankhani A, et al. Cardiac involvement in rheumatoid arthritis: A cross-sectional study in Iran. Indian Heart J.2016;68(3):332-5.
[22]. Vizzardi E, Cavazzana I, Bazzani C, Pezzali N, Ceribelli A, Bonadei I et al. Echocardiographic Evaluation of Asymptomatic Patients Affected by Rheumatoid Arthritis. Journal of investigative medicine. 2016;60:8.
[23]. Liang KP, Myasoedova E, Crowson CS, John MD III,Véronique LR, Barry LK,et al. Increased prevalence of diastolic dysfunction in rheumatoid arthritis. Annuals of rheumatic disease 2010;69:6.
[24]. Raof R. Merza. Cardiac Involvement in Rheumatoid Arthritis MMJ 2008; 7:27- 30.
[25]. Guedes C, Bianchi-FP, Cormier B, Barthelemy B, Rat AC, Boissier MC. Cardiac manifestations of rheumatoid arthritis: a case-control transesophageal echocardiography study in 30 patients. Arthritis Rheum 2001;45 (2):129-35.
[26]. Dawson JK, Goodson NG, Graham DR, Lynch MP. Raised pulmonary artery pressures measured with Doppler echocardiography in rheumatoid arthritis patients. Rheumatology (Oxford). 2000;39(12):1320-5.
[27]. Asai K. Electrocardiographic changes in rheumatoid arthritis. Japan heart journal 1965;6:4.
[28]. Coskun S, Ozoran K, Mermerci B, Aydogdu S, Keles T. Cardiac involvement in patients with rheumatoid arthritis. APLAR J Rheumatol. 2005;8:23–31.

Dr. Raminderpal Singh "Study of Cardiovascular Manifestations of Rheumatoid Arthritis and Correlation with Disease Duration and Severity. "IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), Volume 17, Issue 2 (2018), PP 54-58.