International Journal of Research in Medical Sciences
Kumar SKK et al. Int J Res Med Sci. 2016 Dec;4(12):5149-5153
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20164018

Original Research Article

A study of clinical profile of cardiac dysfunction in patients with HIV infection

Sarosh Kumar K. K.[1]*, Jayakumar B.[2], Baiju R.[3]

[1]Department of Medicine, Academy of Medical Sciences, Pariyaram, Kannur, Kerala, India
[2]Department of Medicine, SUT Academy of Medical Sciences, Vattapara, Thiruvananthapuram, Kerala, India
[3]Department of Cardiology, Medical College Thiruvananthapuram, Kerala, India

Received: 19 October 2016
Accepted: 28 October 2016

***Correspondence:**
Dr. Sarosh Kumar K. K.,
E-mail: kksarosh@yahoo.com

ABSTRACT

Background: HIV infection is a major health problem across the entire world including India. The introduction of anti-retroviral therapy (ART) have led to a significant reduction in opportunistic infections and hence increased life expectancy of HIV-infected individuals. This resulted in an increase in prevalence of cardiovascular diseases among these individuals. Aim was to study the clinical profile of cardiac dysfunction in patients with HIV infection and to find whether CD-4 influence on the disease pattern and severity.
Methods: This study was a cross sectional study conducted in Sixty HIV infected patients who attended Anti-Retroviral Therapy Centre, Government Medical College, Thiruvananthapuram, Kerala, India during a period of fifteen months. Patients underwent a thorough clinical examination and other relevant investigations including CD-4 count, ECG and transthoracic echocardiography.
Results: In our study it was found that cardiac involvement is common even in asymptomatic HIV infected patients. Cardiac manifestations observed were left ventricular diastolic dysfunction (25%), left ventricular hypertrophy (15%), dilated cardiomyopathy (15%), pericardial effusion (13.3%) and mild pulmonary artery hypertension (10%). Cardiac involvement is more common in those with low CD-4 count. Among these conditions Concentric Left Ventricular Hypertrophy had a statistically significant correlation with CD-4 count.
Conclusions: We observed that some form of cardiac involvement was common even in asymptomatic HIV infected patients and cardiac involvement was inversely associated with CD-4 Count of the patient. Transthoracic echocardiography is a good non-invasive tool for the early detection of cardiac abnormalities. Cardiac involvement can be easily overlooked in these patients as symptoms can be attributed to associated co morbid illnesses, so every HIV infected patients should undergo a thorough clinical examination and relevant cardiac evaluation at the time of diagnosis and periodically to decrease cardiac associated morbidity and mortality.

Keywords: ART, CD-4 count, DCM, HIV, LVH

INTRODUCTION

HIV infection is a major health problem in the entire world including India and globally 36.7 million [34.0 million–39.8 million] people were living with HIV at the end of 2015.[1] As per the NACO, India HIV Estimation 2015 report, National adult (15-49) years HIV prevalence in India is estimated at 0.26% in 2015 with 0.30% among males and 0.22% among females. The total number of people living with HIV in India is estimated at 21.17 lakhs (17.11 lakhs-26.49 lakhs) in 2015.[2] The use of highly active antiretroviral therapy (HAART) has resulted in marked and sustained reductions in AIDS-related mortality and opportunistic diseases among

treated persons.[3] This resulted in an increase in cardiovascular diseases among these individuals. The prevalence of cardiac involvement in AIDS patients have been reported to range between 28% and 73%.[4] The aetiology of cardiovascular manifestations associated with HIV is still not well established. It may be attributed to virus itself, the effects of anti-retroviral medications; or altered immune mechanisms associated with the infection. The cardiac diseases in HIV infections include pericardial effusion, left ventricular dysfunction, myocarditis, dilated cardiomyopathy, endocarditis, pulmonary hypertension, malignant neoplasm, coronary artery disease and drug related cardio toxicity.[5] CD-4 count is the most robust surrogate marker for immune competence and its decline results in the development of opportunistic infections and disease progression. We conducted this study since there were only relatively few studies from our country in this regard.

Aims

- To study the clinical profile of cardiac dysfunction in patients with HIV infection
- To find out whether CD-4 count influences on the disease pattern and severity.

METHODS

This study was a hospital based cross sectional study conducted in those HIV positive patients who attended the ART Centre Government Medical College, Thiruvananthapuram, Kerala, India. Sixty adult patients were studied during a period of fifteen months from January 2006. Both newly diagnosed cases and patients on follow up care were included. Patients on both ART (anti-retroviral therapy) and not yet started on ART were included. Patients with pre-existing acquired valvular, congenital heart diseases and systemic hypertension were excluded. The study was conducted after obtaining permission from the Institutional ethics committee and the identity of the patients were not revealed.

The selected patients were thoroughly examined and were evaluated with ECG, Echocardiography, CD-4 count and other relevant investigations. Data were analyzed using computer software, Statistical Package for Social Sciences (SPSS). Data are expressed in its frequency and percentage. To elucidate the associations and comparisons between different parameters, Chi square (χ^2) test was used as non-parametric test. Analysis of variance (One Way ANOVA) was performed as parametric test to compare different variables. For all statistical evaluations, a two-tailed probability of value, <0.05 was considered significant.

RESULTS

The age of patients varied from 23 to 50 years and 46 out of 60 were below 40 years; among them 38 were male (63.3%) and 22 were female (36.7%) (Table 1). Fifty patients were taking anti-retroviral treatment (ART) and ten were not on ART. All were heterosexuals infected with HIV-1 virus. No intra venous drug abusers were present.

Table 1: Age distribution.

Age	Frequency	Percentage
21-30	14	23.3
31-40	32	53.3
41-50	14	23.3

One patient had a CD-4 count above 500, 24 (40%) between 200-500, 22 (36%) between 50-200 and 13 (21.7%) below 50. Thirty five patients had a CD-4 count below 200 (Table 2).

Table 2: CD-4 count.

CD-4 count	Frequency	Percentage
<50	13	21.7
50-200	22	36.7
200-500	24	40
≥500	1	1.7

Twenty patients (33.3%) had mild symptoms. Most common symptom was fatigue present in 11 patients (18.3%). Eight patients (13.3 %) had class II exertional dyspnoea, seven patients (11.7%) had class II exertional palpitation and 3 patients (5 %) had class II effort angina. All patients were ambulant with no restriction for their daily activities.

General examination were normal in majority, except for three (5%) with a BMI less than 18.5, six (10 %) with pallor, 14 (23.3 %) with oral thrush and 19 (31.7 %) patients with lymphadenopathy. ECG abnormalities were identified in 18 of 60 patients (30%). These included Sinus tachycardia in 3 patients, Left atrial overload (LAO) in 4 patients, Bundle branch block pattern in 4 patients (2 with RBBB and 2 with LBBB), LVH in 2 patients and 9 patients with ST-T wave abnormalities (Table 3).

Table 3: ECG.

ECG	Frequency	Percentage
NSR	42	70
Sinus tachycardia	1	1.7
LAO	1	1.7
RBBB	2	3.3
LBBB	2	3.3
ST_T wave changes	2	3.3
Tachycardia + ST_T wave	2	3.3
LAO + ST_T wave	3	5
LVH + ST_T wave	2	3.3

Echocardiographic abnormalities were identified in 35 of 60 patients (58.3%). These included left atrial enlargement in 8 patients, left ventricular dilatation in 23 patients, concentric LVH in 9 patients, LV diastolic dysfunction in 15 patients, DCM in 9 patients, small pericardial effusion in 8 patients and mild PAH in 6 patients (Table 4).

Table 4: Echo cardiographic abnormalities.

Echo cardiographic abnormalities	%age
Left atrial enlargement	13.3%
Left ventricular dilatation	38%
Left ventricular diastolic dysfunction	25%
Left ventricular hypertrophy	15%
Dilated cardiomyopathy	15%
Pericardial effusion	13.3%
Pulmonary artery hypertension	10%

Cardiac dysfunction and CD- 4 correlations

Among the 20 symptomatic patients; 15 had a CD- 4 Count below 200 and 5 had a CD 4 above 200.Even though symptoms were common in patients with CD- 4 Count below 200 there was no statistically significant correlation. Among the 18 patients with ECG abnormalities; 11 (61%) had a CD 4 count below 200 and 7 (39%) had a CD 4 count above 200 with no statistically significant correlation. Among the 35 patients with echocardiographic abnormalities; 26 patients had a CD 4 Count below 200 and 9 patients had a CD 4 Count above 200, which was statistically significant (P<0.01) (Table 5).

Table 5: Echo and CD-4 count.

Echo	CD 4 count		Total
	≤200	>200	
Nil	9	16	25
	25.70%	64.00%	41.70%
Present	26	9	35
	74.30%	36.00%	58.30%

Chi square: 8.795; p <0.01

Left ventricular diastolic dysfunction

In present study 15 patients (25%) had Diastolic dysfunction, 10 were male and 5 were female and 13 patients were on ART. Among the 15 patients with LV Diastolic dysfunction, eleven patients had a CD 4 Count below 200 and 4 patients had a CD-4 Count above 200 and correlation was not statistically significant.

Dilated cardiomyopathy

In present study DCM was present in 9 patients (15%) and eight patients were on ART. Among them seven patients had a CD 4 Count below 200 and two patients had a CD 4 Count above 200. No statistically significant correlation was noted between DCM and CD-4 count.

Concentric left ventricular hypertrophy (LVH)

Concentric LVH was present in 9 (15%) patients, 5 were male patients and 4 were female patients and all were on ART. Among the 9 patients with concentric LVH, 8 patients had a CD 4 Count below 200 and only 1 had a CD 4 Count above 200, which was statistically significant (Table 6).

Table 6: Concentric LVH and CD 4 count.

Concentric LVH	CD 4 count		Total
	≤200	>200	
Nil	27	24	51
	77.10%	96.00%	85.00%
Present	8	1	9
	22.90%	4.00%	15.00%

Chi square: 4.067; p <0.05

Pericardial effusion

Small pericardial effusions were present in 8 (13.3%) patients on echocardiographic examination, 5 were female and 3 were male and seven were taking ART. Pericardial effusion was present in 4 patients with a CD 4 Count below 200 and 4 with a CD 4 Count above 200, with no statistically significant correlation.

Pulmonary artery hypertension (PAH)

Six patients (10%) had mild pulmonary artery hypertension. Among them 4 were male and 2 were female and five were on ART. No statistically significant correlation was noted between PAH and CD-4 count.

DISCUSSION

Cardiac involvement in AIDS was first reported in 1983 by Autran et al, who noted kaposi's sarcoma of myocardium at autopsy.[6] In present study we evaluated sixty HIV positive hetero sexual patients. Among them all were below fifty years and majority (76.6%) were below forty years, indicating the general transmission trend in India and 63.3% were male and 36.7% were female with a male: female ratio of 1.7:1.These data were in concordance with the recent NACO, HIV estimation report 2015. All patients were ambulant with majority (66.7%) having no significant symptoms and minimal symptoms in 33.3%. Nineteen (31.7%) patients had abnormal signs on cardio vascular examination.

Electrocardiographic abnormalities were identified in 18 patients (30%). These included Sinus tachycardia, Left atrial enlargement (LAE), Bundle branch block pattern, LVH and ST-T wave abnormalities. Warren S. Levy et al studied sixty consecutive patients with HIV infection

using echocardiography and ambulatory ECG. ECG abnormalities were present in 22 of 50 patients (44%).[7] Soliman EZ et al studied the prevalence and prognostic significance of ECG abnormalities in HIV-infected patients; more than half of the participants (n = 2325, or 51.5%) had either minor or major ECG abnormalities. Minor ECG abnormalities (48.6%) were more common than major ECG abnormalities (7.7%).[8]

Echocardiographic abnormalities were identified in 35 of 60 patients(58.3%).These included left atrial enlargement (13.3%), left ventricular dilatation (38%), concentric left ventricular hypertrophy (15%), LV diastolic dysfunction (25%), dilated cardiomyopathy (15%), small pericardial effusion(13.3%), isolated LV systolic dysfunction and mild PAH (10%) .

In present study even though DCM and left ventricular systolic and diastolic dysfunctions were common in patients with low CD-4 Count, statistically significant correlation were not present. Left ventricular concentric hypertrophy had an inverse relation with CD-4Count and it was statistically significant. Though chamber hypertrophy was mentioned in HIV infection, a statistically significant correlation with CD-4 Count was not described in the previous studies we analyzed. In our study 10 patients had reduction in ejection fraction and nine out of this ten had chamber dilatation accounting to DCM and one had isolated systolic dysfunction.

No patient had clinical or echocardiographic evidence of infective endocarditis. This may be due to absence of intravenous drug abusers in present study population. Himelman RB, et al studied 70 consecutive patients with HIV infection using two dimensional Doppler echocardiography and abnormalities detected were almost similar to present study with DCM in 8 patients (11%), pericardial effusion in 7 patients (10%), mediastinal mass in one patient.[9] Basavaraj Anita et al, B.J. Medical College, Pune studied cardiac dysfunction associated with HIV infection; in forty HIV infected cases; 22 (55%) cases were found to have cardiac abnormalities. Twenty-one cases (55%) had X-ray abnormalities, 45% had ECG changes, eighteen (68%) patients had echocardiographic evidence of pericardial effusion and twelve cases had LV dysfunction.

Previous studies have shown that HIV related cardiac manifestations are often seen in a state of severe immunosuppression with low CD4 Count (CD4<200).[10,11] In present study patients with CD4 count less than 200 had a high prevalence of some echocardiographic abnormalities than those with CD4 count more than 200 and the correlation was statistically significant. Studies agree that the most important factor in development of cardiac abnormalities is the level of immunosuppression and there is strong correlation between CD4 count and echocardiographic abnormalities, which was also observed in present study.[12]

CONCLUSION

In present study we observed that some form of cardiac involvement was common even in asymptomatic HIV infected patients. Cardiac involvement was inversely associated with CD-4 Count of the patient. Trans thoracic echocardiography is a good non-invasive tool for the early detection of cardiac abnormalities. Major echocardiographic abnormalities detected were Concentric Left Ventricular Hypertrophy, LV diastolic dysfunction, Dilated cardio myopathy and pericardial effusion. Cardiac involvement can be easily overlooked in these patients as symptoms can be attributed to associated co morbid illnesses, so every HIV infected patients should undergo a thorough clinical examination and relevant cardiac evaluation at the time of diagnosis and periodically to decrease cardiac associated morbidity and mortality.

ACKNOWLEDGEMENTS

Authors would like to thank Dr. Kurien Mathew Abraham MSc, M. Phil, PhD; Statistician who helped in analyzing the data.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Global Health Observatory (GHO) data. WHO/ UNAIDS Fact Sheet 2016.
2. National AIDS Control Organization (NACO), HIV Facts & Figures 2015.
3. Palella FJ Jr, Delaney KM, Moorman AC, Loveless MO, Fuhrer J, Satten GA, et al. Declining morbidity and mortality among patients with advanced HIV infection. HIV Outpatient Study Investigators. N Engl J Med. 1998;338(13):853-60.
4. Corallo S, Mutinelli MR, Moroni M, Lazzarin A, Celano V, Repossini A, et al. Echocardiography Detects - Myocardial Damage in AIDS. European Heart J. 1998;9(8):887-92.
5. Fauci AS, Lane HC. HIV Disease: AIDS and Related Disorders. Harrison's Principles of Internal Medicine, 18th Edition, McGraw Hill Company Inc., New York/Chicago/New Delhi. 2011:1506-87.
6. Autran B, Gorin I, Leibowitch M, Laroche L, Escande JP, Hewitt J, et al. AIDS in a Haitian woman with cardiac Kaposi's sarcoma and Whipple's disease. Lancet. 1983;1:767-8.
7. Levy WS, Simon GL, Rios JC, Ross AM. Prevalence of cardiac abnormalities in human immunodeficiency virus infection. Am J Cardiol. 1989;63(1):86-9.
8. Soliman EZ , Prineas RJ, Roediger MP, Duprez DA, Boccara F, Boesecke. Prevalence and prognostic

significance of ECG abnormalities in HIV-infected patients: J Electrocardiol. 2011;44(6):779-85.
9. Himelman RB, Chung WS, Chernoff DN, Schiller NB, Hollander H. Cardiac manifestations of human immunodeficiency virus infection: A two-dimensional echocardiographic study. J Am Coll Cardoil. 1989;13(5):1030-6.
10. Castro SD, Migliau G, Silvestri A, D'amati G, Giannantoni P, Cartoni D, et al. "Heart Involvement in AIDS: A Prospective Study during Various Stages of Diseases," European Heart J. 1992;13:1452-9.
11. Devi SB, Singh SD, Ningshen R. Cardovascular Manfestations of HIV infection/AIDS," Postgraduate Medicine, Association of Physicians of India, Mumbai. 2012;55:537-50.
12. Reinsch N, Kahlert P, Esser S, Sundermeyer A, Neuhaus K, Brockmeyer N. Till Neumann Echocardiographic Findings and Abnormalities in HIV Infected Patients: Results from a Large, Prospective, Multicenter HIV-Heart Study. Amer J Cardiovascular Dis. 2011;1(2):176-84.

Cite this article as: Kumar SKK, Jayakumar B, Baiju R. A study of clinical profile of cardiac dysfunction in patients with HIV infection. Int J Res Med Sci 2016;4:5149-53.