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A Study of Cardiac Manifestations of HIV/AIDS.

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ABSTRACT

Background: Cardiovascular involvement is common in HIV reactive patients, although are clinically quiescent. Echocardiography in HIV reactive patients is important tool in recognizing these cardiac abnormalities. **Methods:** The study was conducted in 150 HIV reactive patients attending antiretroviral therapy centre and wards of the hospital. Echocardiography was done using GE Vivid 3 Milwaukee using 2.5 MHz variable frequency transducer and CD4+ count was measured by FACS (Flourescent Activator Cell Sorter). Patients with age <15 years, congenital heart disease, pre-existing valvular heart disease, hypertension and diabetes mellitus were excluded from study. Patients were divided into three groups according to CD4+ counts: group 1 with CD4+ count <200, group 2 with 201-350 and group 3 with > 350 CD4+ cells. Data so collected was statistically analysed and correlation with CD4+ count was studied. **Results:** Out of 150 patients, echocardiographic involvement was shown in 62 (41.3 %) patients. Most common echocardiographic abnormality was diastolic dysfunction in 26 % (most of the patients had grade 1 diastolic dysfunction), followed by pericardial effusion in 8.6 %. 6.7% had systolic dysfunction and 5.3% had features of dilated cardiomyopathy. The mean CD4+ count in patients with grade 1 diastolic dysfunction and systolic dysfunction was significantly lower than in patients without diastolic dysfunction and systolic dysfunction (166.9 versus 210.65). Same was true with patients having pericardial effusion and dilated cardiomyopathy. Pulmonary hypertension was seen in 5.8 % of patients. **Conclusion:** The prevalence of echocardiographic manifestations in HIV reactive patients was quiet high. High index of clinical suspicion of cardiac involvement and its recognition in HIV patients at all stages help in early diagnosis and treatment which in turn will decrease morbidity and mortality.

Keywords: AIDS, HIV, Cardiac.

INTRODUCTION

HIV infection is a global pandemic with cases reported from virtually every country. About 2.5 million people in India are living with HIV according to National AIDS Control Organization Report.HIV is a retrovirus that primarily infects components of human immune system such as CD4+T cells, macrophages and dendritic cells. It directly and indirectly destroys CD4+ Tcells. HIV infection is a multisystem disease. Cardiac complications of HIV infection tend to occur late in the disease. Interestingly, an increase in CAD has occurred in the post- HAART era.[1] Before the advent of HAART, the cardiac manifestations in patients with HIV included mainly cardiomyopathy, pancarditis, and pulmonary hypertension leading to heart failure, conduction system abnormalities and neoplastic infiltration.[2,3] Becoming more prevalent in our society as therapy and longevity improve.[4,5] The prevalence of cardiac involvement in AIDS patients has been reported to range between 28% and 73%.[5] The cardiac diseases include pericardial effusion, myocarditis, dilated cardiomyopathy, endocarditis, pulmonary hypertension, malignant neoplasm, coronary artery disease, left ventricular dysfunction, and drug related cardiotoxicity.[2]

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Pericardial effusion is one of the most common forms of cardiovascular involvement in HIV infection. It may be a marker of end-stage HIV infection because it is associated with low CD4 cell count and is often caused by opportunistic infections (tuberculosis) and malignant neoplasms seen in the advanced stage of AIDS.[6] Myocarditis and HIV-1 myocardial infection are still the most studied causes of dilated cardiomyopathy in HIV disease. HIV-1 virions appear to infect myocardial cells in patchy distributions without a clear direct association between HIV-1 and cardiac myocyte dysfunction. It is unclear how HIV-1 may enter CD4-receptor-negative cells such as myocytes. Dilated cardiomyopathy may be related either to a direct action of HIV on the myocardial tissue,[14] antimyocyte antibodies associated with HIV infection, opportunistic infections, viral infections

(coxsackievirus B3, CMV, and Epstein-Barr virus), autoimmune response to viral infection, cardiotoxicity from illicit drugs such as cocaine, nutritional deficiencies, hypothyroidism, and possibly drug toxicity. The prevalence of infective endocarditis in HIV-infected patients is similar to that in patients of other risk groups, such as intravenous drug users.[1] Right-sided valves are predominantly affected, and the most frequent agents are Staphylococcus aureus(75% of cases), Streptococcus pneumoniae, Haemophilus influenzae, Candida albicans, Aspergillus fumigatus, and Cryptococcus neoformans. Primary pulmonary hypertension has been reported in HIV infected patients without evidence of thromboembolic disease, intravenous drug use, right sided endocarditis or pulmonary infection the pathogenesis is multifactorial and poorly understood. Acute coronary syndromes may be observed with increasing frequency among HIV patients receiving therapy with protease inhibitors as part of HAART regimens.

MATERIALS AND METHODS

The study was conducted on 150 HIV positive patients admitted in the Department of General Medicine of Rajindra Hospital, Patiala and also patients visiting ART Centre Rajindra hospital, Patiala. INCLUSION CRITERIA: The patients aged> 15years, and Patients diagnosed with HIV infection / AIDS. EXCLUSION CRITERIA :Patients <15 years were excluded, Patients with congenital heart disease, Patients with preexisting valvular heart disease, Patients with preexisting hypertension, and Patients with preexisting diabetes mellitus. Detailed clinical profile including detailed history, general physical examination and systemic examination was done for each patient with special emphasis on cardiovascular system. Routine line of investigation was obtained for all the patients. All patients were subjected to cardiovascular investigations like ECG, ECHO, and chest x-ray. Standard electrocardiographic criteria were used to detect abnormalities in ECG. A GE Vivid 3 Milwaukee using 2.5 MHz variable frequency transducer was used for M-mode and B-mode echocardiographic and cardiac Doppler examinations. M-mode measurements were performed according to the recommendations of the American Association of Echocardiography.[8,5] All relevant findings of echocardiography like LV end dimension in systole [LVEDs], LV end dimension in diastole [LVEDd], interventricular septal thickness in systole and diastole, fractional shortening [FS] and ejection fraction [EF] were studied. Using Doppler evaluation for early mitral flow and late mitral flow and their ratio, isovolumetric relaxation time and declaration time, systolic and diastolic function were analysed.

RESULTS

In our study 86% of patients are in the age group in 15-49 and only 21% above 50 years of age.

Table 1: Age distribution of patients studied.

Age In Years	Number	% Age
15-49	129	86
>50	21	14
Total	150	100

66% of the patients were male and 34% were females. 102(68%) had CD4 count less than 200, 38 (25.3%) had CD4 count between 201-350 and 10 (6.7%) CD4 count more than 350.

Table 2: Mean CD4 count in the study population.

CD4 counts	Total no. of patients	% age of patients
1-200	102	68
201-350	38	25.3
>350	10	6.7
Total	150	100

140 patients (93.3%) are on Anti-Retroviral Therapy and 10 patients (6.7%) were not ART. Cardiac involvement were detected in 62 patients (41.3%), 88 patients (58.7%) had no cardiac involvement. Cardiac symptoms were present in only 11 (7.3%) of the patients.51 (82.2%) are asymptomatic out of 62 cardiac patients, 6(9.7%) patients had dyspnea on exertion .3(4.8%) patients had chest pain, 2(3.2%) patients had palpitation. So mostly patients were asymptomatic while dyspnea was the most common symptoms among patients, who were symptomatic.

Table 3: Prevalence of cardiac involvement in patients studied.

Cardiac disorder	Present in no of patient	Percentage
Systolic dysfunction	9	6.7
Diastolic dysfunction	39	26
Mitral regurgitation	4	2.6
Pericardial effusion	13	8.6
Dilated Cardiomyopathy	8	5.3
Vegetation	1	1.5
Pulmonary hypertension	8	5.3
Clot	1	1.5

77.3% of our patients had normal ECG, 18% patients had tachycardia, 0.7% had low voltage ECG, 2% had LBBB, 0.7% had Features of LVH, and 0.7 had atrial fibrillation and 0.7% had symmetrical T wave inversion.

Table 4: ECG Findings.

ECG finding	Number (n=150)	Percentage
Normal	116	77.3
Sinus Tachycardia	27	18
Low voltage ECG	1	0.7
LBBB	3	2
Features of LVH	1	0.7
Atrial Fibrillation	1	0.7
Symmetrical T wave inversion	I	0.7

74.7% patients had normal chest X-ray and 20% had abnormalities in lung fields, 5.3% had cardiomegaly. Patients with CD4 count between 1-200 had 50.95% of cardiac disorders and patients between CD4 counts 201-350 had 26.3% cardiac disorders. No cardiac abnormality found in CD4 count more than 350. So Patients with cardiac disorders have significantly low CD4 count.

Table 5: Comparison of CD4 count and the cardiac disorder.

CD4 counts	No. of patients	Cardiac disorders	Percentage
1-200	102	52	50.9
201-350	38	10	26.3
>350	10	0	0
Total	150	62	41.3
Inference	Lower CD4 counts is significantly associated with cardiac disorders with p value < 0.0001		

In present study total 10 patients had systolic dysfunction, out of total patients 9 had CD4 counts less than 200 only 1 patient had CD4 counts more than 200.

Table 6: Relation of systolic dysfunction with CD4 count.

CD4 count	No of ptient	percentage
<200	9	90
>200	1	10
total	10	100

9.8 % patients had pericardial effusion which were having CD4 count < 200 and 7.8% patients had pericardial effusion which were having CD4 count >200. So Low CD4 count is significantly associated with pericardial effusion.

Table 7: Correlation of CD4 counts with pericardial effusion.

CD4 count	Total no of patient	PE Present	Percentage
<200	102	10	9.8
201-350	38	3	7.8
>350	10	0	0
Total	150	13	8.6

6.8 % patients had Cardiomyopathy which were having CD4 count < 200 and 2.6% patients had Cardiomyopathy which were having CD4 count >200. Low CD 4 count is associated with high risk of Cardiomyopathy.

Table 8: Correlation of CD4 counts with Dilated Cardiomyopathy.

CD4 count	No of Patient	Cardiomyopathy in	Percentage
1-200	102	7	6.8
201-350	38	1	2.6
>350	10	0	0
Total	150	8	5.3

Table 9: Percentage of abnormal ECHOs with relation to CD4 count.

CD4 Count	No of Patient	No of Abnormal ECHOs	%age of Patient with Abnormal ECHOs	%age of Abnormal ECHOs with Relation to CD4 count
1-200	102	52	50.9	83.9
201-350	38	10	26.3	16.1
>350	10	0	0	0
	150	62		100

In abnormal ECHOs cases mean CD4 count was164.95+56.12 but in normal ECHO cases mean CD4 count was262+113.22. Lower CD4 Count is related to high ECHO abnormality.

DISCUSSION

Cardiac involvement in HIV infected individuals occurs frequently and occurs quite early in the disease process. Out of 150, only eleven had cardiac symptoms. So 7.3% patients were symptomatic. Noninvasive cardiac investigations revealed that 62 patients out of 150 had cardiac involvement. So noninvasive investigations detected 41.3% cardiac ailments, this is in tune with other studies that have reported symptomatic cardiac disease in HIV patients to be far less compared to the asymptomatic cardiac disease in HIV infected patients.[2,3] In our study 8.6% patients had pericardial effusion in is comparable with other studies like incidence of pericardial effusion is stated by Marwandi et al was 14%, study by singh 2012 pericardial effusion was detected in 17.4% cases.[7-9] But in Olusegun-Joseph et al(2012) study it was 47%.[10] It is clear from the study that lower CD4 count related to more cases of pericardial effusion. In our study 5.3% patients has dilated cardiomyopathy that is comparable with other studies like study by Olusegun-Joseph et al (2012) in 2012 dilated cardiomyopathy incidence was 5%, study by singh et al in 2012 incidence was 8.5% and study did by Jain et al (2014) incidence was 17.6%.[10,12] The incidence of DCMP rise with fall in CD4 counts. Systolic dysfunction was detected in 6 patients ((4%) in our study.

In a study by Olusegun-Joseph et al (2012) had 30% systolic dysfunction, Werneck et al study had 31.5% systolic dysfunction.[11] In this study total 39 patients has diastolic dysfunction, 29(53%) has grade 1 that is called mild, 13 (33.3%) has grade 2 that is called pseudo normalization and 5 (12.8) has grade 3 that is called restricted type diastolic dysfunction. Diastolic dysfunction further compare with CD4 counts. Diastolic dysfunction worsens with decrease in CD4 counts, and all patients grade 3 diastolic dysfunction has CD4 counts less than 200.[13] In this study total 62(41.3) patients had abnormal ECHOs. It is similar to Singh et al (2012) in which 58% had abnormal ECHOs. However in Olusegun-Joseph et al (2012) study echo abnoralmilty was 78% and in Jain et al

(2014) study ECHO abnoralmilty was upto 67%.[12] In this study 5.3% patients has Pulmonary Hypertension, it is comparable with Singh et al (2012) in which incidence is 11.4%. In our study only one patient had vegetation on ECHO. He did not have any risk factors for infective endocarditis like intravenous drug abuse, prosthetic valve etc.

CONCLUSION

Male were predominantly involved, male to Female ratio was1.9: 1.Prevalence of cardiac involvement was 41.3%.Most of the patients were asymptomatic (92.7%). Mean CD4 count is significantly lower in patients with cardiac disorder than in patients without cardiac disorder. Lower CD4 count was significantly associated with the presence of pericardial effusion. Number of patients receiving ART was 81.3% and 18.7% were not receiving ART. Patients having ECG abnormalities were 32%. Commonest being sinus tachycardia 17.3%, LBBB 2%, LVH 0.7% ,AF0.7%, low voltage complex 0.7%and nonspecific IVCD 0.7%.Of the noninvasive investigations 25.6% had chest x-ray abnormalities, commonest being pulmonary tuberculosis. The commonest cardiac disorder identified was diastolic dysfunction 26%, followed by pericardial effusion 8.6%. Cardiac disorders in HIV infected patients are common. Only small percentages of the patients with cardiac disorders are symptomatic. Noninvasive investigations like echocardiography helps in early diagnosis of asymptomatic cardiac disorders. Screening of Cardiac involvement should be done at the time of diagnosis of HIV/AIDS.

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