



To Study the Cardiac Abnormalities in HIV Infected Patients-A Prospective Study

KEYWORDS

AIDS,HIV , Pulmonary, Gastrointestinal, Valvular, Cardiac.

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ABSTRACT **AIMS AND OBJECTIVES:-**To study the cardiac abnormalities in HIV infected patients. **MATERIAL AND METHODS:-**Present prospective study included 100 HIV patients. These patients were admitted in medicine ward in GMC Jammu. **INCLUSION CRITERIA-1.**The patients above the age of 18 years with diagnosed HIV infection/AIDS after ELISA test being **positive** **EXCLUSION CRITERIA** Patients under the age of 18 years, Patients with congenital heart disease, Patients with preexisting valvular heart disease, Patients with preexisting hypertension and Patients with preexisting diabetes mellitus. **RESULTS AND CONCLUSION;-**HIV affects all the systems of the body. These manifestations may be due to HIV infection itself or due to opportunistic infections or malignancies. The clinical and pathologic findings in various organ systems including the pulmonary, gastrointestinal, hematologic and neurologic systems have been well described. Cardiac involvement is common in HIV infected patients but clinical cardiac involvement is less common. With the advent of HAART the incidence of coronary artery disease is increasing among HIV infected patients.

INTRODUCTION

HIV/AIDS is a global pandemic. As of 2012, approximately 35.3 million people are living with HIV globally and approximately 17.2 million are men, 16.8 million are women and 3.4 million are less than 15 years old. There were about 1.6 million deaths from AIDS in 2012, down from 2.3 million in 2005. South & South East Asia (a region with about 2 billion people as of 2010, over 30% of global population) has an estimated 4 million cases (12% of all people living with HIV) with about 250,000 deaths in 2012. Based on HIV estimation 2012 India has almost demonstrated an overall reduction of 57% in annual new HIV infections (among adult population) from 2.74 lakhs in 2000 to 1.16 lakhs in 2011 reflecting the impact of various interventional and scaled up prevention strategies under the National AIDS control programme. The adult HIV prevalence has decreased from 0.41% in 2001 to 0.27% in 2011. Also estimated number of people living with HIV has decreased from 24.1 Lakhs in 2000 to 20.9 Lakhs in 2011. Wider access to ART has resulted in 29% reduction of estimated annual deaths due to AIDS related causes between 2007 and 2011. Patients with HIV infection can have a variety of cardiovascular manifestations. Most of the abnormalities have been asymptomatic. The types of cardiovascular manifestations that have been described in various clinical studies are: pericarditis, myocarditis, cardiomyopathy, pulmonary vascular disease and pulmonary hypertension, and valvular disease and an increased incidence of vascular disease including coronary artery disease. The prevalence of cardiac involvement in AIDS patients has been reported to range between 28% and 73% (Lewis W. 1989)^{8,9} The cardiac diseases include pericardial effusion, myocarditis, dilated cardiomyopathy, endocarditis, pulmonary hypertension, malignant neoplasm, coronary artery disease, left ventricular dysfunction, and drug related cardiotoxicity. Cardiac involvement in AIDS/HIV infected persons occurs frequently but may be quiescent clinically and may be a direct cause of death. When patients are examined by

echocardiography, cardiac abnormalities are detected more often than would be expected from clinical symptoms and physical examination.

MATERIAL AND METHODS

The study was conducted in patients admitted in the Department of General Medicine of GMC Jammu, during the period from 1/11/2014 to 31/10/2015. Our study was a clinical, observational and cross-sectional study. Cases of seropositivity of HIV patient diagnosed by Elisa technique were selected for the study. A 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 obtained for all the patients. All patients were subjected to cardiovascular investigation like ECG, ECHO and chest x-ray. All relevant findings of echocardiography like of LV internal dimension in systole (LVIDs) LV internal dimension in diastole [LVIDd] interventricular septal thickness in systole and diastole, and ejection fraction [EF] were studied.

All patients were evaluated for their CD4 counts and were analyzed for various cardiac dysfunctions.

The complete data was collected in a specially designed Case Recording form.

The data collected was transferred in to a Master Chart, which was then subjected for statistical analysis. Patients were selected with the following inclusion/exclusion criteria.

INCLUSION CRITERIA:

1. The patients aged > 18 years.

2. Patients diagnosed to have HIV infection/AIDS after ELISA test being positive.

EXCLUSION CRITERIA:

- Patients < 18 years were excluded.
- Patients with congenital heart disease.
- Patients with preexisting valvular heart disease.
- Patients with preexisting hypertension.
- Patients with preexisting diabetes mellitus

All the patients included in the study were explained about the procedure in detail and issued Patient Information Sheet. Informed/written consent was taken in each case. All investigations were done under direct supervision and guidance of our guide.

Following investigations were required for our study:

1. Routine investigations
2. Blood HIV 1 and 2
3. CD4 count
4. ECG
5. Chest X-ray P/A view
6. Blood culture and sensitivity
7. Echocardiography

OBSERVATION AND RESULTS.

Table 1: Age distribution of the patients studied

Gender	Number	%age
1. Male	64	64%
2. Female	36	36%
Total	100	100%

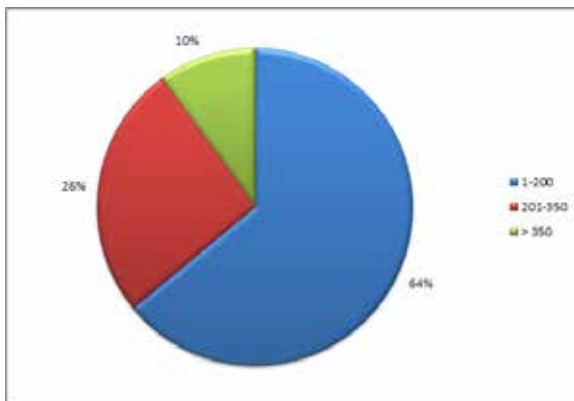
Table 2: Gender distribution of the patients studied

Age Group	Number	%age
1. 15-49	85	85%
2. > 50	15	15%
Total	100	100%

Table 3: Mean CD4 count in the study population

CD ₄ Count	Number	%age
1-200	64	64%
201-350	26	26%
> 350	10	10%
Total	100	100%

Fig. 1: Mean CD4 count in study population



64(64%) patients have CD4 count less than 200, 26% had CD4count Between 201-350 and 10% had CD4 count more than 350.

Table 4: Patients fulfilling the criteria for AIDS

Study Group	Number	%age
With AIDs	67	67%
Without AIDs	33	33%
Total	100	100%

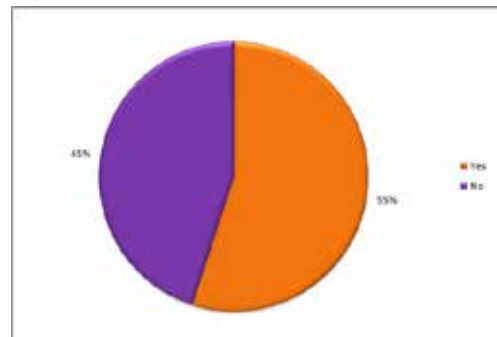
In the study group 67 patients had AIDS (64 patients with CDD4 count <200 and 3 patients with CD4 count >200

but with AIDS- defining opportunistic illnesses) and 33 patients did not had AIDS.

Table 5: Patients who received ART

On ART	Number	%age
Yes	45	45%
No	55	55%
Total	100	100%

Fig. 2: patients who received ART

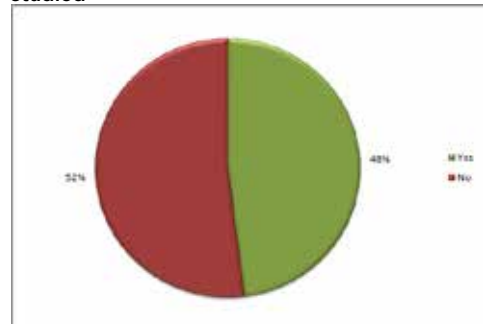


45 patients (45%) are on ART and 55 patients (55%) are not on ART

Table 6: Prevalence of cardiac disorder in the patients studied

Cardiac Disorder	Number	%age
Yes	48	48%
No	52	52%
Total	100	100%

Fig. 3: prevalence of cardiac disorder in the patients studied

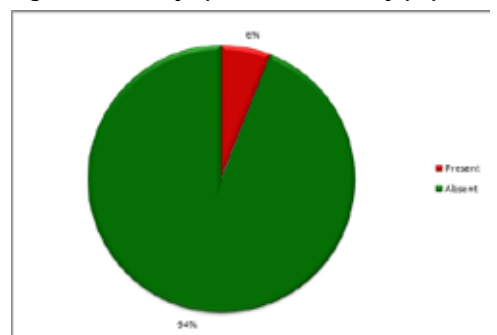


Cardiac disorders were detected in 48(48%)

Table 7: Cardiac symptoms in the study population

Cardiac Symptoms	Number	%age
Present	6	6%
Absent	94	94%
Total	100	100%

Fig. 4: Cardiac symptoms in the study population



Cardiac symptoms were present in only 6% of the patients

Table 8: Components of Cardiac Manifestations

Cardiac Disorder	Classically Detected	Detected by Investigations	Total	%age
1. Systolic Dysfunction	3	9	9	9%
2. Diastolic Dysfunction	0	32	32	32%
3. MR	2	4	4	4%
4. Pericardial Effusion	1	12	12	12%
5. Dilated Cardiomyopathy	3	6	6	6%
6. Hypertrophic Cardiomyopathy	0	0	0	0%
7. Pulmonary Hypertension	0	8	8	8%
8. Clot	0	0	0	0%
Total	100			100%

Of the cardiac disorders 12% patients had pericardial effusion, 9% patients had systolic dysfunction, 8% had pulmonary hypertension 6% had dilated cardiomyopathy, 32% had diastolic dysfunction, 4% had mitral regurgitation.

Table 9: ECG findings

ECG Finding	Number	%age
1. Normal	80	80%
2. Sinus Tachycardia	16	16%
3. Low Voltage Complex	1	1%
4. Features of IHD	2	2%
5. Features of LVH	1	1%
Total		100%

80% of our patients had normal ECG. Commonest abnormalities were sinus tachycardia (16%), low voltage complexes (1%), IHD changes (3%), LVH(1%).

Table 10: X-ray findings

X-Ray Finding	Number	%age
1. Normal	76	76%
2. Abnormality in Lung Fields	18	18%
3. Cardiomegaly	6	6%
Total		100%

76(76%) patients had normal chest x-ray. Abnormalities in lung fields were present in 18% patients and cardiomegaly was detected in 6% patients.

Table 11: Types of Abnormality in Lung Fields

Abnormality	Number	%age
1. Cavity of Infiltrates	9	50%
2. Pleural Effusion	3	16.7%
3. Pneumonia (Lobar / Bronchopneumonia)	5	27.8%
4. Bilateral Extensive Reticulonodular Shadow	1	5.5%
Total	18	

Of the patients with abnormalities in lung fields, 50% had cavity and infiltrates, 16.7% had pleural effusion, 27.8% had pneumonia and 5.5% had bilateral extensive reticulonodular shadows.

Table 12: Comparison of Mean Distribution of Clinical and Biochemical Parameter in with / without Cardiac Disorder

Variable	Cardiac Disorder		P-Value
	Absent	Present	
1. Pulse Rate	80.32±10.27	83.59±13.22	0.062

2. Systolic BP	115.21±11.46	112.97±10.72	0.202
3. Diastolic BP	74.21±6	72.72±6.12	0.115
4. Respiratory Rate	18.1±3.27	18.43±3.28	0.515
5. Hb	9.55±2.08	8.71±1.89	0.009
6. TLC	5579.58±2328.38	6017.24±2472.1	0.238
7. Neutrophils	68.98±12.37	71.52±11.43	0.179
8. Lymphocytes	25.51±10.81	23.79±9.86	0.298
9. Monocytes	1.53±1.44	1.33±1.7	0.397
10. Eosinophils	3.71±3.09	3.4±3.12	0.515
11. Platelet Count	2.2±0.82	2.29±0.82	0.490
12. RBC	103.25±23.4	99.59±27.26	0.339

Of the clinical and biochemical parameters low hemoglobin level is significantly associated with presence of cardiac disorders.

Table 13: Comparison of CD₄ Count of Cardiac Disorder

CD ₄ Count	Symptomatic Cardiac Disorder (No.)	Asymptomatic Cardiac Disorder
< 200	5	23
> 200	0	15

Symptomatic cardiac disease was present in patients with AIDS (CD4 count less than 200).

Table 14: Correlation of CD₄ Count with Cardiac Disorder

CD ₄ Count	Total No. of Patients	Cardiac Disorder	
		Absent (%)	Present (%)
1-200	64	42 (65.6)	22 (34.40)
201-350	26	22 (84.62%)	4 (15.38%)
> 350	10	7 (7%)	3 (3%)
Total	100	71 (71%)	29 (29%)

Inference: Lower CD₄ count is significantly associated with presence of cardiac disorder with $\chi^2 = 6.035$; P value = 0.049.

Patients with cardiac disorders have significantly low CD4 count as compared to patients without cardiac disease.

Table 15: Incidence of Pericardial Effusion

Pericardial Effusion	Number	%age
Absent	88	88%
Present	12	12%
Total	100	100%

Pericardial effusion was detected in 12% patients.

Table 16: Characteristic of Pericardial Effusion

Pericardial Effusion	Number	%age
Mild	10	83.33%
Moderate	1	8.33%
Large	1	8.33%

Of the patients with pericardial effusion 83.33% had mild effusion, 8.33% had moderate effusion, 8.33% had large pericardial, effusion.

Table 17: Correlation of CD₄ Count with Pericardial Effusion

CD ₄ Count	Total No. of Patients	Pericardial Effusion	
		Absent (%)	Present (%)
1-200	64 (64%)	54 (84.38%)	10 (15.62%)
201-350	26 (26%)	25 (96.16%)	1 (3.84%)
> 350	10 (10%)	9 (90%)	1 (10%)
Total	100 (100%)		

Inference: lower CD4 counts is significantly associated with presence of pericardial effusion with $\chi^2 = 6.317$; P value = 0.042

Low CD4 count is significantly associated with pericardial effusion.

Table 18: Correlation of CD₄ Count with Cardiomyopathy

CD ₄ Count	Total No. of Patients	Cardiomyopathy	
		Absent (%)	Present (%)
1-200	64	59 (92.2%)	5 (7.8%)
201-350	26	25 (96.16%)	1 (3.84%)
> 350	10	10 (100%)	0 (0%)
Total	100	94%	6%

Inference : CD4 count is not statistically correlated with cardiomyopathy with P-value=0.306.

Table 19: Correlation of Cardiomyopathy with ART Status

ART Status	Total No. of Patients	Cardiomyopathy	
		Absent (%)	Present (%)
On ART	55 (55%)	50 (91.91%)	5 (9.09%)
Not on ART	45 (45%)	44 (97.88%)	1 (2.22%)
Total	100 (100%)	94 (94%)	6 (6%)

Inference: ART Status is positively associated with presence of cardiomyopathy with P-value = 0.233

Table 20: Pulmonary Hypertension

Diagnosis	Number	%age
Pulmonary Infection	5	62.50%
CCF	1	12.5%
Non-Cardiopulmonary Lesion	2	25%
Total	8	100%

Of the patients with pulmonary hypertension 5(62.5%) had pulmonary infections like bacterial pneumonia, tuberculosis, 1(12.5%) had congestive cardiac failure 2(25%) had neither pulmonary or cardiac cause of pulmonary hypertension.

DISCUSSION

HIV infection has become pandemic and incidence and prevalence is increasing rapidly. All the systems of body are involved. Various studies have shown that the cardiac involvement in HIV is common though clinically it is irrelevant. Cardiac involvement in HIV infected individuals occur frequently and occurs quite early in the disease process. In the study population 85% of patients were below the age of 50 years and the male : female ratio was 1.7:1.

Sixty seven percent of the patients manifested with AIDS and 55% were on antiretroviral therapy.

Only 6% of the patients presented with symptomatic cardiac disease. Non invasive cardiac investigations revealed that 43% of the patients had cardiac involvement. This is in tune with the other studies (DeCastro S *et al.*, 1992; Estok L *et al.*, 1998)³ that have reported that symptomatic cardiac disease in HIV patients to be far less compared to the asymptomatic cardiac disease in HIV infected patients.

The cardiac disorders that were identified were pericardial effusion (12%), systolic dysfunction (9%), pulmonary hypertension (8%), dilated cardiomyopathy (6%), diastolic dysfunction (32%), mitral regurgitation (4%).

Of the study population only 20% of them had abnormal electrocardiogram, majority of them are in the form of si-

nus tachycardia. Sinus tachycardia. Sinus tachycardia may have been due to opportunistic infections and fever. Ischemic changes were seen only in 2% of the study population, this may be due to younger cohort and exclusion criteria of diabetes and hypertension. Patients on protease inhibitors (PI) have a higher incidence of IHD. None of the patients in the study were on PI. Features suggestive of pericardial effusion and chamber enlargement were seen in 1% each.

Patients with low hemoglobin also had a higher incidence of cardiac disease. This may be due to advanced HIV disease. Anemia will also worsen cardiac function.

PERICARDIAL EFFUSION

This study demonstrated a high prevalence and incidence of pericardial effusion in AIDS subjects. The prevalence of pericardial effusion was clearly related to the low CD4 count. This study is in agreement with echocardiographic (Himelman RB *et al.*, 1989; Levy W *et al.*, 1989)⁶ and autopsy investigations (Lewis W, 1989)^{8,9} that have noted an increased prevalence of pericardial effusion in patients with AIDS.

The large majority of the effusions were small (83.3%) and asymptomatic (87.5%). Only 1 patient developed large effusion and only 2 patients were treated with pericardial drainage. Recent prospective investigations (DeCastro S. *et al.*, 1992)³ have also found large, hemodynamically significant effusions to be less than small effusion.

CARDIOMYOPATHY In our study dilated cardiomyopathy was present in 6 patients (6%). The prevalence of dilated cardiomyopathy ranges from 10% to 30% by echocardiographic and autopsy studies (Cohen IS, 1986)². Studies by (Herskowitz A *et al.*, 1995; Jacob AJ *et al.*, 1992)⁵ demonstrated that dilated cardiomyopathy occurs late in the course of HIV infection and is usually associated with a significantly reduced CD4 cell count. In our study 5 of 6 patients with cardiomyopathy (83.33%) had CD4 count less than 200 which correlate with earlier studies.

Systolic dysfunction was detected in 9 patients (9%) in our study. In a study (Mittal CM, 2006)¹⁰ 23.3% patients were found to have systolic dysfunction.

In our study diastolic dysfunction was present in 32(32%) as compared to study done by (Cardoso JS, 1998)¹ which had 66% patients with diastolic dysfunction and study done by (Mittal CM, 2006)¹⁰ detected 36.7% patients with diastolic dysfunction.

Possible etiologies of cardiomyopathy are focal myocarditis due to opportunistic bacterial, fungal, and protozoan pathogens, direct HIV infection of the myocyte, cachexia and cardiotoxicity from therapeutic drugs like Zidovudine (Herskowitz A *et al.*, 1992)⁵.

PULMONARY HYPERTENSION

Pulmonary hypertension in HIV infected patients can be primary or secondary pulmonary. Secondary pulmonary hypertension can be due left sided heart disease, disorders of respiratory system or hypoxia, or chronic thrombotic or embolic disorders. Idiopathic pulmonary arterial hypertension occurs in HIV-infected patients due to hyperplasia of vascular smooth muscle cells in the small pulmonary arteries secondary to release of cytokines in HIV infection. Pulmonary hypertension was detected in 8 patients (8%) in our study as compared to the study done by (Reinsch N,

2008)¹¹ in which 4.7% were detected to have pulmonary hypertension. Of the patients with pulmonary hypertension 62.5% had pulmonary or cardiac pathology that could contribute to pulmonary hypertension. These patients might be having pulmonary hypertension secondary to HIV infection itself (Kim J, 1998)⁷.

The present study was carried out in Postgraduate Department of Internal Medicine, Government Medical College, Jammu from November 2014 to October 2015. The salient features of the study are as follows:

Male to Female ratio 1.7:1.

Most patients are in the younger age group. Only 1% of the patients were above 60 years.

Prevalence of cardiac involvement was 48%.

Only 6% patients were symptomatic.

Mean CD4 count is significantly lower in patients with cardiac disorder than in patients without cardiac disorder.

Lower CD4 count was significantly associated with presence of pericardial effusion.

45% of the patients were receiving ART and 55% were not receiving ART.

20% of the patients had ECG abnormalities commonest being sinus tachycardia 16%, IHD 2%, LVH and low voltage complex 0.5%.

Of the noninvasive investigations 24% had chest x-ray abnormalities commonest being pulmonary tuberculosis 10%, cardiomegaly 6%, pneumonia 5%, pleural effusion 3%.

The commonest cardiac disorder identified was diastolic dysfunction 32% followed by pericardial effusion 12%.

Cardiac disorders in HIV are common.

Only small percentage of the patients are symptomatic.

Non invasive investigations like echocardiography helps in early diagnosis of asymptomatic cardiac disorders.

CONCLUSION:

Cardiac abnormalities in HIV infected individuals is seen in younger patients. With the introduction of HAART clinical spectrum of disease seen in these patients has seen a huge rise over the last decade. CD4 counts is one of the important predictors of clinical disease expected in a particular patient. Now with the introduction of much effective screening programmes and knowledge of particular spectrum of disease effective cardiac patients a more effective management is expected for HIV infected individuals.

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