

PREVALENCE OF CARDIAC ABNORMALITIES IN PATIENTS WITH HIV IN THANJAVUR MEDICAL COLLEGE AND HOSPITAL, THANJAVUR

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ABSTRACT

BACKGROUND

HIV infection has become a global pandemic with more than 36 million people infected throughout the world. HIV related cardiac involvement has been reported with increasing frequency in recent years. The above study was undertaken to study the prevalence of cardiac abnormalities in HIV infected individuals and to correlate the cardiac abnormalities with stage of infection.

MATERIALS AND METHODS

We have conducted a cross-sectional study in the Department of Internal Medicine, Thanjavur Medical College and Hospital on the prevalence of cardiac manifestations among the parents living with HIV/ AIDS on ART. The duration of study was for a period of 6 months, August 2016 to January 2017.

A total of 100 patients who were seropositive and who fit the inclusion criteria were chosen and an attempt was made out to find the prevalence of cardiac manifestations among them. All patients diagnosed to have HIV infection/ AIDS after ELISA test being positive were included in the study.

RESULTS

In our study among 100 patients, 30 patients (32.60%) had cardiac abnormalities either in the form of ECG or Echocardiography abnormality. It is observed that 1 patient out of 13 patients (7.69%) in Stage I, 7 patients out of 27 (25.92%) patients in Stage II, 11 patients out of 33 (33.33%) patients in Stage III and 11 patients out of 27 (40.74%) patients in Stage IV had cardiac abnormalities. There was a statistically significant correlation between cardiac abnormalities and CD4 count (P value was 0.02). As the stage of infection increases, the cardiac abnormalities increase proportionally. Cardiac abnormalities are directly proportional to the stage of infection.

CONCLUSION

Prevalence of cardiac abnormalities was 32.60% in our study. Diastolic dysfunction was the most common echocardiographic abnormality. Poor progression of R waves was the most common electrocardiographic abnormality. Cardiac abnormalities specifically correlated with stage of infection.

People with cardiac abnormalities did not necessarily have cardiac symptoms and the frequency of cardiac symptoms did not correlate with the stage of infection in this study. Cardiac symptoms in HIV infected individuals are likely to be attributed to other concurrent illnesses and the cardiac abnormalities remain undiagnosed further contributing to the morbidity and mortality of HIV patients. Cardiac abnormalities correlated with the increase in the duration of infection and the decline in CD4 count.

KEYWORDS

HIV, Cardiac Abnormalities.

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BACKGROUND

HIV infection has become a global pandemic with more than 36 million people infected throughout the world. By the end

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of 2009, India is ultimate in having 51 million infected individual. The prevalence in India is 0.26 in 2015. In Tamilnadu, the prevalence is 0.26% with 143 lakhs.

AIDS is characterised by HIV an acquired, profound, irreversible, immune suppression that predisposes the patient to multiple opportunistic infections, malignant neoplasms and a progressive dysfunction of multiple organ systems. With the availability of a large armamentarium of anti-retroviral drugs recent advances in diagnosis, treatment and monitoring of persons living with HIV and AIDS there has been visible improved survival of such patients.

Patients with HIV infection can have a variety of cardiovascular manifestations. However, certain cardiac disorders have been reported with greater frequency among HIV infected patients compared with the general population, the specific type of cardiac disease varies by setting. The introduction of combination antiretroviral therapy has substantially decreased mortality from opportunistic infections among the HIV infected population.

In these settings, cardiovascular diseases has become a leading cause of morbidity and mortality compared with the general population. The advent of HAART (Highly Active Anti-Retroviral Therapy) has changed the pattern of disease in developed countries where premature coronary artery disease and other manifestations of atherosclerosis are now the most common cardiovascular disorder. This is partly

caused by HAART-induced metabolic problems, particularly insulin resistance and hyperlipidaemia, but also reflects a high prevalence of conventional risk factors such as smoking and alcoholism.

In HIV infected patients, the atherosclerotic burden is not the only cardiovascular risk factor. The interplay of other mechanisms such as chronic inflammation, effect of ART, immune activation after initiation of ART may predispose to cardiovascular manifestations in these patients. Treatment is available today to reduce the cardiovascular diseases in risk patients and therefore early detection is important. The prevalence of cardiac involvement in AIDS patients have been reported to range between 28% and 34%.

Cardiac Manifestations of HIV/AIDS

Pericardial effusion	. Idiopathic . Infections (viral, bacterial and fungal) . Neoplastic (Kaposi's sarcoma and Non Hodgkins Lymphoma)
Heart muscle disease	. Myocarditis (idiopathic / lymphocytic, infections, toxins) . Dilated cardiomyopathy & Left Ventricular dysfunction
Endocarditis	. Marantic (nonbacterial thrombotic endocarditis) . Infective
Tumors	. Kaposi's sarcoma . Lymphoma
Right ventricular dysfunction & Pulmonary hypertension	. Primary . Secondary (recurrent chest infections, thromboembolism)
Premature atherosclerosis and Coronary artery disease	. Protease inhibitors, chronic inflammation,
Autonomic dysfunction	. CNS disease, drugs, prolonged immunodeficiency, malnutrition
Arrythmias	. Drugs, autonomic dysfunction, acidosis, electrolyte abnormalities
Vasculitis	. Antibiotics and antivirals
Adverse drug effects	. Hyperlipidemia . Proarrhythmia

Echocardiography is a very useful tool used in early detection of the cardiac dysfunction in the HIV patients at an early stage. The most common sign of cardiac involvement is the impairment of the LV function. This is explained by reduction of cardiac contractility. Early diagnosis and prompt treatment is therefore very important to prevent significant morbidity from cardiac involvement.

Aim of the Study

1. To study the prevalence of cardiac abnormalities in HIV infected individuals.

2. To correlate the cardiac abnormalities with stage of infection.

MATERIALS AND METHODS

We have conducted a cross-sectional study in the Department of Internal Medicine, Thanjavur Medical College and Hospital on the prevalence of cardinal manifestations among the parents living with HIV/ AIDS. The duration of study was for a period of 6 months from August 2016 to January 2017.

A total of 100 patients who were seropositive and who fit the inclusion criteria were chosen and an attempt was made out to find the prevalence of cardiac manifestations among them.

Inclusion Criteria

All patients diagnosed to have HIV infection/ AIDS after ELISA test being positive were included in the study.

Exclusion Criteria

Patients with pre-existing,

- 1) Congenital heart disease,
- 2) Rheumatic heart disease,
- 3) Hypertension,
- 4) Diabetes,
- 5) Family history of heart diseases,
- 6) Dyslipidaemia.

Risk Factor Assessment Questionnaire

All HIV infected individuals who were included in this study were subjected to a questionnaire to assess the risks of acquiring HIV, risk factors for cardiac disease and symptomatology of cardiac illness.

To assess the risk of acquiring HIV, history regarding their sexual exposures, use of intravenous drugs and history of blood transfusion were asked. The individual's occupation, marital status, extramarital and premarital sexual exposures, history of past and present sexually transmitted infections were also noted. The ART regimen of the individual is currently taken and the duration of treatment was also noted.

To assess the risk factors for cardiac disease, questions regarding duration and amount of smoking and alcohol consumption were asked.

To assess the symptoms of cardiac disease questions regarding presence of chest pain, breathlessness, palpitation, pedal oedema and fatigue were asked. Duration of each symptom was also noted.

Clinical Examination

All patients were meticulously examined for the presence of anaemia, cyanosis, clubbing, pedal oedema, dyspnoea, jaundice, generalised lymphadenopathy and skin and mucous membrane lesions. Respiratory rate, pulse rate, jugular venous pressure, blood pressure (both in supine and erect posture) were also recorded. A thorough clinical examination of the cardiovascular system, respiratory system, abdomen and central nervous system was done.

Laboratory Investigations

All of them were subjected to the following investigations. Complete blood count, blood urea and sugar, serum creatinine and electrolytes, liver function tests (serum bilirubin, alanine transaminase and alkaline phosphatase) and serum lipid profile were done for all patients.

A standard 12-lead resting electrocardiogram was taken for all individuals in this study.

CD4 Count Assay

The standard method for enumerating CD4 T cells uses a flow cytometer. Computer calculates the number of CD4 T cells by analysing the size of the cell and which of the antibodies it has been tagged with. The overall process is called Fluorescence-Activated Cell Sorting (FACS).

IMAGING

Chest Skiagram

An erect X-ray of the chest on deep inspiration in the postero-anterior view was taken for all patients.

Echocardiography

Two dimensional Echocardiography was done for all patients included in this study in Department of Cardiology, Thanjavur Medical College Hospital, Thanjavur.

Chi-square test was applied for significance. "P" value less than 0.05 was considered as significant.

RESULTS

1. A total of 100 patients were studied, of which 8 patients were excluded from the study. Their stage of infection was noted and divided accordingly into four groups.
2. There were 13 HIV seropositive patients in Stage I, 27 patients in Stage II, 33 patients in Stage III and 19 patients in Stage IV.
3. The mean CD4 count of study population was 500.07 ± 334.37 .
(Stage I- 690.38 ± 464.62
Stage II- 614.67 ± 304.60
Stage III- 346.63 ± 252.68
Stage IV- 516.06 ± 292.62)
4. Out of 92 patients, 58 (63%) were males (Stage I- 10, Stage II- 16, Stage III- 17, Stage IV- 15) and 34 (37%) were females (Stage I- 3, Stage II- 11, Stage III- 16, Stage IV- 4).
5. Mean age of study group was 43 ± 11 (Stage I- 40 ± 11 , Stage II- 44 ± 11 , Stage III- 42 ± 12 , Stage IV- 44 ± 12).
6. Unskilled labourers and housewives constituted the majority of the study population, about 34.8% and 22.8% respectively.
7. Heterosexual route was the most common mode of transmission of HIV infection, about 96.7%.
8. Mean duration of HIV infection was 3.53 ± 2.30 years. (Stage I- 3.31 ± 2.25 years, Stage II- 3.71 ± 2.34 years, Stage III- 3.46 ± 2.43 years, Stage IV- 3.55 ± 2.22 years).
9. Smokers and alcoholics constituted 20.6% (19 patients) and 48.91% (45 patients) of the study population respectively.
10. Most patients were asymptomatic. Cardiac symptoms were found in 6 patients (6.52%).
(Stage I- 0
Stage II- 1
Stage III- 2
Stage IV- 3)

11. Cardiac abnormalities either in the form of Electrocardiography or Echocardiography abnormality was found in 30 patients (32.60%).

- (Stage I- 1
- Stage II- 7
- Stage III- 11
- Stage IV- 11)

12. Twenty patients (21.73%) had Electrocardiographic abnormalities.

- (Stage I- 1
- Stage II- 3
- Stage III- 8
- Stage IV- 8)

13. Echocardiography abnormality was seen in 18 (19.56%) patients.

- (Stage I- 0
- Stage II- 4
- Stage III- 5
- Stage IV- 9)

14. Out of the 92 patients, 83 patients were on ZLN regimen and 9 patients were on TLE regimen.

15. Significant correlation was found between stage of infection, CD4 count and duration of HIV infection with cardiac abnormalities.

16. Significant correlation was found between stage of infection, CD4 count and duration of HIV infection with cardiac abnormalities.

17. There was no significant correlation between age, sex, cardiac symptoms, type of HAART regimen, smoking and alcohol with cardiac abnormalities.

Stage of Infection	No. of Patients	Percentage (100%)
I	13	14.1
II	27	29.3
III	33	35.9
IV	19	20.7

Table 1. Stage of Infection

Stage I included 14.1% of patients.
 Stage II included 29.3% of patients.

Age in Years	Stage I			Stage II			Stage III			Stage IV		
	Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities		
	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total
20-25	1 (7.7%)	0	1 (7.7%)	0	0	0	0	1 (3.0%)	1 (3.0%)	0	1 (5.2%)	1 (5.2%)
26-30	0	1 (7.7%)	1 (7.7%)	2 (7.4%)	1 (3.7%)	3 (11.1%)	4	3 (9.0%)	7 (21.2%)	2 (10.5%)	1 (5.2%)	3 (15.8%)
31-35	0	2 (15.4%)	2 (15.4%)	1 (3.7%)	3 (11.1%)	4 (14.8%)	1 (3.0%)	3 (9.0%)	4 (12.1%)	0	2 (10.5%)	2 (10.5%)
36-40	0	4 (30.8%)	4 (30.8%)	2 (7.4%)	4 (14.8%)	6 (22.2%)	1 (3.0%)	2 (6.0%)	3 (9.0%)	2 (10.5%)	0	2 (10.5%)
≥41	0	5 (38.5%)	5 (38.5%)	2 (7.4%)	12 (44.4%)	14 (51.9%)	5 (15.1%)	13 (13.4%)	18 (54.6%)	7 (21.2%)	4 (21.0%)	11 (57.9%)
Total	1 (7.7%)	12 (92.3%)	13 (100%)	7 (25.9%)	20 (74.0%)	27 (100%)	11 (33.3%)	22 (66.7%)	33 (100%)	11 (57.9%)	8 (42.1%)	19 (100%)

Table 5. Age in Relation to Cardiac Abnormalities and Stage of Infection

There was no statistically significant correlation noted between age and cardiac abnormalities in HIV patients (Table 5).

Stage III and Stage IV included 35.9% and 20.7% of patients respectively (Table 1).

Cardiac Abnormalities	Number of Patients
Present	30 (32.60%)
Absent	62 (67.40%)
Total	92

Table 2. Cardiac Abnormalities

Cardiac abnormalities either in the form of electrocardiography or echocardiography abnormality were found in 30 patients out of the total 92 patients. The prevalence of cardiac abnormalities was 32.60% (Table 2).

Stage of Infection	Mean CD4 Count Cells/mm3
I	690.38 ± 464.62
II	614.67 ± 304.60
III	346.63 ± 252.68
IV	516.06 ± 292.62

Table 3. CD4 Counts in Various Stages

The mean CD4 count of study population was 500.07 ± 334.37 (Table 3).

Stage of Infection	Cardiac Abnormalities		Total
	Present	Absent	
I	1	12	13
II	7	20	27
III	11	22	33
IV	11	8	19
Total	30	62	92

Table 4. Stage of Infection and Cardiac Abnormalities

There was a statistically significant correlation observed between stage of infection and cardiac abnormalities. Prevalence of cardiac abnormalities increased with stage of infection. P value was 0.02 (< 0.05) (Table 4).

Sex	Stage I			Stage II			Stage III			Stage IV		
	Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities		
	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total
Male	1 (7.7%)	9 (69.2%)	10 (76.9%)	6 (22.2%)	10 (37.0%)	16 (59.2%)	3 (9.0%)	14 (42.4%)	17 (51.5%)	8 (42.1%)	7 (36.8%)	15 (78.9%)
Female	0	3 (23.0%)	3 (23.0%)	1 (3.7%)	10 (37.0%)	11 (40.7%)	8 (24.2%)	8 (24.2%)	16 (48.5%)	3 (15.8%)	1 (5.2%)	4 (21.0%)
Total	1 (7.7%)	12 (92.3%)	13 (100%)	7 (25.9%)	20 (74.0%)	27 (100%)	11 (33.3%)	22 (66.7%)	33 (100%)	11 (33.3%)	8 (42.1%)	19 (100%)

Table 6. Sex Distribution in Relation to Cardiac Abnormalities and Stage of Infection

There was no statistically significant correlation noted between sex and cardiac abnormalities (P > 0.5) (Table 6).

Stage of Infection	Mean Duration
I	3.52 ± 3.14
II	3.34 ± 2.22
III	3.41 ± 2.05
IV	3.66 ± 2.36

Table 7. Stage of Infection and Mean Duration

Mean duration of HIV infection in study population was 3.53 ± 2.30 years.

Mean duration of HIV infection in Stage I was 3.31 ± 2.25 years. Mean duration of HIV infection in Stage II was 3.71 ± 2.34 years.

Mean duration of HIV infection in Stage III was 3.46 ± 2.43 years.

Mean duration of HIV infection in Stage IV was 3.55 ± 2.22 years (Table 7).

Duration of HIV	Stage I			Stage II			Stage III			Stage IV		
	Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities		
	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total
< 1 year	0	2 (15.4%)	2 (15.4%)	0	3 (11.1%)	3 (11.1%)	1 (3.0%)	6 (18.1%)	7 (21.2%)	0	3 (15.8%)	3 (15.8%)
1 - 3 years	0	5 (38.5%)	5 (38.5%)	0	7 (25.9%)	7 (25.9%)	2 (6.0%)	8 (24.2%)	10 (30.3%)	3 (15.8%)	3 (15.8%)	6 (31.6%)
> 3 years	1 (7.7%)	5 (38.5%)	6 (46.1%)	7 (25.9%)	10 (37.0%)	17 (62.9%)	8 (24.2%)	8 (24.2%)	16 (48.5%)	8 (42.1%)	2 (10.5%)	10 (52.6%)
Total	1 (7.7%)	12	13 (100%)	7 (25.9%)	20 (74.0%)	27 (100%)	11	22 (66.7%)	33 (100%)	11 (57.9%)	8 (42.1%)	19 (100%)

Table 8. Cardiac Abnormalities in Relation to Duration and Stage of Infection

P value for Stage I was 0.53- statistically not significant

P value for Stage II was 0.04- statistically significant

P value for Stage III was 0.01- statistically significant

P value for Stage IV was 0.04- statistically significant

There was a statistically significant correlation between duration of infection and cardiac abnormalities in Stage II, Stage III and Stage IV in contrast to Stage I (Table 8).

CD4 Count cells/cu.mm	Stage I			Stage II			Stage III			Stage IV		
	Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities		
	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total
< 200	0	1 (7.7%)	1 (7.7%)	1 (3.7%)	1 (3.7%)	2 (7.4%)	7 (21.3%)	6 (18.1%)	13 (39.3%)	4 (21.0%)	0	4 (21.4%)
>= 200	1 (7.7%)	11 (84.6%)	12 (92.3%)	6 (22.2%)	19 (70.3%)	25 (92.5%)	4 (12.1)	16 (48.4%)	20 (60.6%)	7 (36.8%)	8 (42.1%)	15 (78.9%)
Total	1 (7.7%)	12 (92.3%)	13 (100%)	7 (25.9%)	20 (74.0%)	27 (100%)	11 (33.3%)	22 (66.7%)	33 (100%)	11 (58.9%)	8 (42.1%)	19 (100%)

Table 9. Cardiac Abnormalities in Relation to CD4 Count and Stage of Infection

P value for Stage I was 0.76- statistically not significant
 P value for Stage II was 0.41- statistically not significant
 P value for Stage III was 0.04- statistically significant
 P value for Stage IV was 0.04- statistically significant

There was a statistically significant correlation between CD4 count and cardiac abnormalities in Stage III and Stage IV in contrast to Stage I and Stage II (Table 9).

Cardiac Symptoms	Stage I			Stage II			Stage III			Stage IV		
	Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities		
	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total
Present	0	0	0	0	1 (3.7%)	1 (3.7%)	0	2 (12.1%)	2 (12.1%)	2 (10.5%)	1 (5.2%)	3 (15.8%)
Absent	1 (7.7%)	12 (92.3%)	13 (100%)	7 (25.9%)	19 (70.3%)	26 (96.2%)	11 (33.3%)	20 (60.6%)	31 (93.9%)	9 (47%.3%)	7 (36.8%)	16 (84.2%)
Total	1 (7.7%)	12 (92.3%)	13 (100%)	7 (25.9%)	20 (74.0%)	27 (100%)	11 (33.3%)	20 (60.6%)	33 (100%)	11 (57.9%)	8 (42.1%)	19 (100%)

Table 10. Cardiac Abnormalities in Relation to Smoking and Stage of Infection

There was no statistically significant correlation noted between smoking and cardiac abnormalities (p value > 0.05) (Table 10).

Alcohol	Stage I			Stage II			Stage III			Stage IV		
	Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities		
	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total
Present	1 (7.7%)	7 (53.8%)	8 (61.5%)	6 (22.2%)	9 (33.3%)	15 (55.6%)	2 (6.0%)	9 (27.3%)	11 (33.3%)	7 (36.8%)	4 (21.0%)	11 (57.9%)
Absent	0	5 (38.4%)	5 (38.4%)	1 (3.7%)	11 (40.7%)	12 (44.4%)	9 (27.2)	13 (39.4%)	22 (66.7%)	4 (21.0%)	4 (21.0%)	8 (42.1%)
Total	1 (7.7%)	12 (92.3%)	13 (100%)	7 (25.9%)	20 (74.0%)	27 (100%)	11 (33.3%)	22 (66.7%)	33 (100%)	11 (57.9%)	8 (42.1%)	19 (100%)

Table 11. Cardiac Abnormalities in Relation to Alcohol and Stage of Infection

There was no statistically significant correlation noted between alcohol and cardiac abnormalities (P > 0.05) (Table 11).

Alcohol	Stage I			Stage II			Stage III			Stage IV		
	Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities		
	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total
Present	1 (7.7%)	7 (53.8%)	8 (61.5%)	6 (22.2%)	9 (33.3%)	15 (55.6%)	2 (6.0%)	9 (27.2%)	11 (33.3%)	7 (36.8%)	4% (21.0%)	11 (57.9%)
Absent	0	5 (38.5%)	5 (38.5%)	1 (3.7%)	11 (40.7%)	12 (44.4%)	9 (27.2%)	13 (39.3%)	22 (66.7%)	4 (21.0%)	4 (21.0%)	8 (42.1%)
Total	1 (7.7%)	12 (92.3%)	13 (100)	7 (25.9%)	20 (74.0%)	27 (100%)	11 (33.3%)	22 (66.7%)	33 (100%)	11 (57.9%)	8 (42.1%)	19 (100%)

Table 12. Cardiac Abnormalities in Relation to Cardiac Symptoms and Stage of Infection

There was no statistically significant correlation found between cardiac symptoms and cardiac abnormalities (p value > 0.05) (Table 12).

ECG Abnormalities	Stage I	Stage II	Stage III	Stage IV	Total
Sinus tachycardia	1 (5%)	0	0	1 (5%)	2
Conduction abnormalities	0	1 (5%)	1 (5%)	0	2
Atrial ectopic	0	1 (5%)	1 (5%)	1 (5%)	3
Ventricular ectopic	0	0	1 (5%)	0	1
Poor progression of R wave	0	0	3 (15%)	2 (10%)	5
Low voltage	0	0	0	3 (15%)	3
ST/ T wave abnormality	0	1 (5%)	2 (10%)	1 (5%)	4
Total	1	3	8	8	20

Table 13. Analysis of Electrocardiogram

Out of 92 patients, 20 patients had ECG abnormalities (Table 13).

Electrocardiography	Stage I	Stage II	Stage III	Stage IV	Total
Normal	12	24	25	11	72
Abnormal	1	3	8	8	20
Total	13	27	33	19	92

Table 14. Electrocardiographic Changes in Relation to Stage of Infection

There was statistically significant correlation noted regarding electrocardiographic abnormalities (P value was 0.04). Prevalence of electrocardiographic abnormalities increased with stage of infection (Table 14).

Echocardiography	Stage I	Stage II	Stage III	Stage IV	Total
Pericardial Effusion	0	0	0	1 (5.6%)	1
Dilated Cardiomyopathy	0	0	2 (11.1%)	1 (5.6%)	3
Hypokinesia and diastolic dysfunction	0	0	2 (11.1%)	2 (11.1%)	4
Infective Endocarditis	0	0	0	1 (5.6%)	1
Diastolic Dysfunction	0	2 (11.1%)	0	4 (22.2%)	8
PHT	0	0	1 (5.6%)	0	1
Total	0	2	5	9	18

Table 15. Echocardiographic Changes in Relation to Stage of Infection

Out of 92 patients, 16 patients had echocardiographic findings.

There was a statistically significant difference noted regarding echocardiographic abnormalities (P value was 0.00). Prevalence of echocardiographic abnormalities increased with stage of infection (Table 15).

HAART Regimen	Stage I			Stage II			Stage III			Stage IV		
	Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities			Cardiac Abnormalities		
	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total
ZLN	0	13	13	7	20	27	8	19	27	11	6	17
TLE	0	0	0	0	0	0	3	3	6	0	2	2
Total	0	13	13	7	20	27	11	21	33	11	8	19

Table 16. Cardiac Abnormalities in Relation to Type of HAART Regimen and Stage of Infection

Of the 92 patients 8 patients were on TLE regimen, while the remaining 84 patients were on ZLN regimen. Of the 84 patients on ZLN 7 patients in Stage II, 8 patients in Stage III and 11 patients in Stage IV had cardiac abnormalities. Three patients out of the 8 patients on TLE regimen had cardiac abnormalities either in the form of ECG or echocardiographic findings. P value was more than 0.05 and there was no statistically significant correlation noted between the type of regimen and cardiac abnormalities (Table 16).

DISCUSSION

Cardiovascular manifestations of HIV infection have not attracted much attention in the Indian sub-continent. This is partly because of the clinical picture of HIV infection still dominated by opportunistic infections and symptoms of breathlessness, fatigue and poor exercise intolerance are frequently ascribed to other conditions associated with HIV infection. With the greater access to anti-retroviral medications more patients may live longer enough to present with end organ disorders. Our study throws light into various unsuspected cardiac abnormalities in various groups of HIV infected patients and its relationship to CD4 count.

A study conducted by Kannagai et al at CMC Vellore in 2008 has shown that majority of the HIV infected individuals in South India with CD4 counts of 200 - 350 cells/ mm³ had higher viral load than that suggested by International AIDS Society.

Age Distribution

Our study population consisted of 100 patients. The mean age of our study group was mean age in study population was 43 ± 11 years. Mean age in Stage I, Stage II, Stage III and Stage IV was 40 ± 11 years, 44 ± 11 years, 42 ± 12 and 44 ± 12 respectively with the age group ranging from 22 to 75 years (Table 5). In a study conducted by Joshi et al¹ at Mumbai, the age group ranged from 17 to 52 years with the mean age of 29.8 years.

Correlation between age, stage of infection and cardiac abnormalities was attempted. In Stage I, only one patient had cardiac abnormality and presented in the 20 - 25 years' age group. In Stage II, out of 7 patients with cardiac abnormalities 0 patient was in 20 - 25 years' age group, two patients each in 26 - 30 years' group and 36 - 40 years' age group and ≥ 41 age group and 1 patient in 31 - 35 years' age group. In Stage III out of 11 patients with cardiac

abnormalities, 0 patient was in 20 - 25 years' age group, 4 patients were 26 - 30 years' age group, 1 patient was in 31 - 35 years' age group, 1 patient was in 36 - 40 years' age group and 5 patients were in more than 40 years' age group. In Stage IV out of 7 patients with cardiac abnormalities 0 patient was in 20 - 25 years' age group, 2 patients were 26 - 30 years' age group, 0 patient was in 31 - 35 years' age group, 2 patients were in 36 - 40 years' age group and 7 patients were in more than 40 years' age group (Table 5).

P values of all the groups was > 0.05 , which was statistically insignificant. There was no correlation between age and cardiac abnormalities in this study similar to the study conducted by Caggese et al.²

Gender Distribution

The gender distribution demonstrated a majority of 58 (63%) of males compared to 34 (37%) of females. In a study conducted by Joshi et al, male and female ratio was 5.7: 1 (63 males and 11 females). In P Kannan et al³ study, males were 120 and females were 80. In El Hattoui et al⁴ study, males and females were 88 and 70 respectively.

Sex distribution in relation to cardiac abnormalities and stage of infection was seen. In Stage I, 10 males and 3 females had cardiac abnormalities. In Stage II, 16 males and 11 females had cardiac abnormalities. In Stage III, 17 males and 16 females had cardiac abnormalities. In Stage IV, 15 males and 4 females had cardiac abnormalities. Sex did not play a significant role in cardiac abnormalities in HIV patients (Table 6).

Occupation

In our study group unskilled labourers and housewives constituted majority of the population, about 34.8% and 22.8% respectively. Skilled labourers were 16 (17.4%), 4.3% were lorry drivers, 19.6% were office workers and 1.1% were commercial sex workers.

Route of Transmission

Most of the study population had heterosexual behaviour (96.7), remaining were homosexual (2.2%), IV drug users (1.1%). In a study by Joshi et al among 74 patients 58.1% were heterosexuals, 4.05% blood transfusion related, 2.7% IV drug users, 1.35% bisexuals and 20.27% had multiple risk factors.

Duration of HIV Infection

In this study, 30.43% of patients had duration of illness between 1 - 3 years; 16.30% had less than a year and 53.26% had duration of > 3 years. The duration of illness ranged from 2 months to 8.75 years. Mean duration of illness in study population was 3.53 ± 2.31 years.

Mean duration of illness in Stage I, Stage II, Stage III and Stage IV were 3.31 ± 2.25 years, 3.71 ± 2.34 years, 3.46 ± 2.43 years and 3.55 ± 2.22 years respectively. In a study by P Kannan et al, the duration of illness ranged from 6 months to 7 years.

In Stage I, the duration was more than 3 years for one patient who had cardiac abnormality. P value was 0.53,

statistically insignificant. In Stage II, among 7 patients with cardiac abnormalities all the 7 patients had a duration of > 3 years. P value was 0.04, statistically significant. In Stage III, among 11 patients with cardiac abnormalities 8 patients had a duration of > 3 years, 2 patients had a duration of 1 - 3 years and 1 patient had a duration of less than a year. In Stage IV, among 11 patients with cardiac abnormalities 8 patients had a duration of > 3 years and 3 patients had a duration of 1 - 3 years. There was a significant correlation between duration of HIV infection and cardiac abnormalities in Stage II, III and IV (Table 8).

CD4 Count

In our study, 21.73% of patients had CD4 count < 200 and 78.26% of patients had CD4 count > 200 . In Stage I, one patient had cardiac abnormality and had CD4 count > 200 ; in Stage II cardiac abnormalities were present in 1 patient with CD4 count < 200 and 6 patients with CD4 count > 200 ; in Stage III cardiac abnormalities were present in 7 patients with CD4 count < 200 and 4 patients with CD 4 count > 200 ; in Stage IV patients with cardiac abnormalities 4 patients had CD4 count < 200 and 7 patients had CD4 count > 200 (Table 9). There was significant correlation between cardiac abnormalities and CD4 count.

Risk Factors

In our study group, 20.65% were smokers and 48.91% were alcoholic.

In Stage I, 38.4% were smokers. In Stage II, 11.11% were smokers. In Stage III, 18.18% were smokers. In Stage IV, 26.31% were smokers. P values for all the four stages were statistically insignificant (Table 10).

In Stage I, 61.53% were alcoholics. In Stage II, 55.55% were alcoholics. In Stage III, 33.33% were alcoholics. In Stage IV, 57.89% were alcoholics. In a study by Smith CJ et al,⁵ among 394 patients 45% were smokers and 7% were alcoholics. There was no significant correlation between smoking and alcohol with cardiac abnormalities in our study (Table 11). This finding correlated well with the study by Caggese et al.

Symptoms

Most patients were asymptomatic. Only 6 patients had cardiac symptoms (Stage I - 0, Stage II - 1, Stage III - 2, Stage IV - 3). Among 26 patients with cardiac abnormalities, 6 patients had symptoms. The symptoms were dyspnoea (10.7%), palpitation (1.3%) and chest pain (0.7%) (Table 12).

There was no significant correlation found between cardiac abnormalities and cardiac symptoms. P values for all the stages were > 0.05 . In a study by Cardosa JS et al,⁶ 7.3% (10/ 137) of patients were symptomatic. In a study by Ewig S et al,⁷ nine out of 14 patients (64%) with cardiac abnormalities had symptoms.

Electrocardiographic Abnormalities

Electrocardiographic abnormalities were seen in 20 patients (21.73%) (Table 13). Twelve patients had ECG

abnormalities without echocardiographic abnormalities. Ten patients had normal ECG in spite of echocardiographic abnormality. In Stage I, one patient had ECG abnormality. In Stage II, 3 patients had ECG abnormalities. In Stage III and IV, 8 patients had cardiac abnormalities respectively. The ECG abnormalities observed were poor progression of R wave (25%), ST-T changes (20%), atrial ectopic (15%), low voltage complexes (15%), conduction abnormality (10%), sinus tachycardia (10%) and ventricular ectopic (5%). There was a significant correlation between CD4 count and ECG abnormalities (P value was 0.04) (Table 14). In a study by Herdy GV et al,⁸ out of 50 patients 18 patients had sinus tachycardia, 10 patients had ST-T changes, 5 patients had low-voltage complexes, 5 patients had ST segment elevation and 3 patients had extrasystole. In Mirri A et al⁹ study, ECG abnormalities unrelated to echocardiographic abnormalities or clinical problems were seen in 11 patients. In Joshi et al study, among patients 20.27% had ECG abnormalities.

Echocardiographic Abnormalities

Prevalence of cardiac abnormalities by echocardiography in our study was 19.56%; (22.22% in Stage II, 27.77% in Stage III and 50% in Stage IV) Echocardiographic findings were diastolic dysfunction (44.44%), hypokinesia and diastolic dysfunction (22.22%), dilated cardiomyopathy (16.66%), pericardial effusion (5.55%), pulmonary hypertension (5.55%) and infective endocarditis (5.55%). P value was 0.000, statistically significant (Table 15).

There was a significant correlation between CD4 count and echocardiographic abnormalities. In a study by Joshi et al, among 74 patients 10.6% had dilated cardiomyopathy, 8.5% had pericardial effusion, 4.2% had vegetations, 2.1% had constrictive pericarditis and 10.6% had incidental valvular, left ventricular hypertrophy, ischaemic heart disease. In a study by Mishra et al¹⁰ at AIIMS, 36.7% had diastolic dysfunction and 23.3% had systolic dysfunction. In P Kannan et al study, out of 200 patients 28 patients had left ventricular dysfunction, 20 patients had pericardial effusion, 6 patients had pulmonary hypertension and one patient had dilated cardiomyopathy. In Mirri A et al study, 17% had echocardiographic abnormalities.

Cardiac Abnormalities

In our study among 100 patients 30 patients (32.60%) had cardiac abnormalities, either in the form of ECG or Echocardiographic abnormality. It is observed that 1 patient out of 13 patients (7.69%) in Stage I, 7 patients out of 27 (25.92%) patients in Stage II, 11 patients out of 33 (33.33%) patients in Stage III and 11 patients out of 27 (40.74%) patients in Stage IV had cardiac abnormalities. There was a statistically significant correlation between cardiac abnormalities and CD4 count (P value was 0.02). As the stage of infection increases, the cardiac abnormalities increase proportionally. Cardiac abnormalities are directly proportional to the stage of infection.

CONCLUSION

The present study aimed at estimating the prevalence of cardiac abnormalities in HIV seropositive patients and also to find out its correlation with stage of infection. With rigid criteria, 100 HIV seropositive cases were selected. There were 58 males and 34 females in the study group. Prevalence of cardiac abnormalities was 32.60% in our study.

Diastolic dysfunction was the most common echocardiographic abnormality. Poor progression of R waves was the most common electrocardiographic abnormality. Cardiac abnormalities were specifically correlated with stage of infection. Present study recommends screening for cardiac abnormalities in HIV patients to identify early cardiac involvement and minimise cardiac complications by early intervention.

People with cardiac abnormalities did not necessarily have cardiac symptoms and the frequency of cardiac symptoms did not correlate with the stage of infection in this study. Cardiac symptoms in HIV infected individuals are likely to be attributed to other concurrent illnesses and the cardiac abnormalities remain undiagnosed further contributing to the morbidity and mortality of HIV patients.

Cardiac abnormalities correlated with the increase in the duration of infection and the decline in CD4 count.

Limitations

1. The mean duration of the disease in our patients were less. This could be the reason for the decreased prevalence of cardiac abnormalities in our patients.
2. Followup of cardiac abnormalities in patients with previous normal echocardiography as well as the natural history of who had cardiac abnormality could not be studied.
3. Since the critically ill patients were not included in the study, the entire spectrum of cardiac abnormalities could not be established. Viral load could not be estimated due to its constraints.

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