Cardiac manifestations in HIV/AIDS cases

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ABSTRACT

Objectives: The present study is undertaken to evaluate the cardiac manifestations in HIV/ AIDS cases & to determine type of cardiac involvement in HIV/AIDS cases.The correlation was made between CD4 + T cell count with pattern of cardiac involvement.

Methods: This cross sectional study was carried out at Acharya Vinobha Bhave Rural Hospital, Sawangi, Wardha, India, from August 2007 to July 2009 and included 100 cases. All cases were evaluated clinically for cardiac involvement. ECG,X ray chest, and 2D Echo and CD4 count were done in all cases.

Results: Out of 100 cases, 75 %(n=75) were male and 25 %(n=25) were females. Majority 38 %(n=38) belonged to 31-40 years age group. X ray chest was abnormal in 38% cases (n=38). Electrocardiography was abnormal in 28(28%) cases. CD4 count was <50 cells in 9 cases (9%). It was between 51-100 in 13 cases(13%),and between 101-150 in 19 cases (19%) & 26 cases(26%) had CD4 cell count between 151-200.It was >200 in 33 cases (33%). 2D ECHO was abnormal in 49%(N=49). LV diastolic dysfunction was seen in 28%(n=28),pericardial effusion in 14%(n=14) and restrictive cardiomyopathy was noted in 7%(n=7) cases. Correlation of CD4 cell count with 2D Echo findings showed that in 28 cases with LV diastolic dysfunction CD4 cell count was < 200 in 17 cases. In 14 cases of pericardial effusion, CD4 cell count was<150 and in all 7 cases of restrictive cardiomyopathy CD4 cell count was < 100.

Conclusion: Though asymptomatic for CVS involvement PLHIV can have cardiac involvement. Commonest observed abnormalities were LV diastolic dysfunction, pericardial effusion & restrictive cardiomyopathy.

INTRODUCTION

The infection with human immunodeficiency virus is a global pandemic, with cases reported from virtually every country. In Asia, an estimated 4.9 million people were living with HIV at the end of 2007. National prevalence of HIV/AIDS is highest in Southeast Asia, with wide variation in trends between different countries[1].

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The cardiovascular diseases in HIV/AIDS are becoming increasingly recognized in the developing world. Despite this, cardiac involvement can be overlooked in HIV-positive patients, because symptoms of breathlessness, fatigue, and poor exercise tolerance are frequently ascribed to other conditions associated with HIV infection. Echocardiographic assessment of HIV patients is therefore extremely useful and can be used to identify cardiac conditions common in HIV-positive patients. These condition include pericardial effusion, left ventricular (LV) systolic dysfunction/heart muscle disease, and intracardiac masses.[2]

MATERIAL AND METHODS

The present study entitled "cardiac manifestation in HIV/AIDS cases" was carried out in the department of Medicine Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha, during the period of 2 years from August 2007 to July 2009.

All patients of human immune deficiency virus (HIV) infection who are asymptomatic or symptomatic for cardiac involvement were included in the study.

Patients with established myocardial disease, valvular heart disease or congenital heart disease were excluded from the present study.

METHODS

The present study included 100 cases of HIV/AIDS. The cases were included irrespective of duration of illness and presence or absence of clinical symptoms of cardiac involvement.

All cases were examined in details to find out any evidence of cardiac failure, infective endocarditis or any other complication of cardiac involvement. The detailed systemic examination was carried out for cardiovascular, respiratory and abdominal examination. Cases showing any evidence of rheumatic valvular disease, congenital heart disease or ischemic heart disease were excluded from the study.

All the cases included in the study were then subjected for the investigations. The CD 4+ T cell count was estimated in all cases.

The cases were then subjected for investigation to suggest cardiac involvement. These included 12 lead ECG recording, X-ray chest PA view and 2 Dimensional echocardiography.

The occurrence of cardiac involvement in HIV/AIDS cases was then determined based on cardiac enzymes, ECG findings & 2D Echocardiography findings.

An attempt was made to correlate various cardiac finding with CD4 T cell count. The various grades of LV diastolic dysfunction & pericardial effusion were also correlated with CD4 T cell count.

The statistical analysis was done in all cases using chi-square test.

Observations

The present study entitled "cardiac manifestations in HIV/AIDS cases" was carried out in 100 cases of HIV/AIDS admitted in Medicine ward and community care centre (CCC) during the period of 2 years from August 2007 to July 2009.

The results are summarized below.

In the present study, out of 100 cases studied, 75(75%) cases were males, and 25 cases (25%) were females. Male to female ratio was 3:1.Mean age of patient was 32.2 years.

The common clinical symptoms were fever(68%), cough(44%),&exertional breathlessness (33%). Other symptoms observed were weight loss in 22(22%) cases, malaise in 21(21%)cases, loose motions in 20(20%)cases, headache in 18(18%) cases, vomiting in 18 (18%) cases & palpitation in 11(11%) cases.

The findings on general examination were pallor (44%), lymphadenopathy (38%), tachycardia(36%) & raised Jugular venous pressure in 6 (6%) cases, edema feet was seen in 4(4%) and icterus in 4(4%) cases.

Examination of cardiovascular system revealed no abnormality in any case. On respiratory system examination, 11 patients had findings suggestive of pleural effusion, 8 patients had finding suggestive of fibrocavitary disease. On abdominal examination hepato splenomegaly was seen in 19 patients.

Investigations:

a) Hemoglobin levels:

In the present study, out of 100 cases studied,

haemoglobin was less than 7 grams/dL in 10(10%) patients. It was between 7 to 10grams/dL in 23(23%) patients & hemoglobin was between 10-14gram/dL in 36(36%) patients. In 31(31%) cases, the haemoglobin level was normal ranging from 14.1grams/dL to 15.4grams/dL.

CD4+ T cell count showed that maximum cases that is 33(33%) were having CD4+Tcell count more than 200cells/mm^3 while in 9 cases (9%) CD4+ T cell count less was than 50 cells/mm^3. The count of CD4+ T cell was between 151-200cells/mm^3 in 26(26%) cases & in 13 (13%) patients CD4+ T cell count was ranging between 51-100. It was between 101-150 cells/mm^3 in 19(19%) cases. (Table No 1)

C. Biochemical Investigation:

(C-1)Creatinine kinase MB (CKMB):

The CKMB more than 25 U/L was considered as elevated in the present study. In the present study out of 100 cases studied 24(24%) patients had raised CKMB. It was normal in 76(76%) patients. None of these cases 24(24%) cases who had raised CKMB levels had clinically evident myocardial damage.

LDH and SGOT were within normal limit in all cases.

In the present study, out of 100 cases studied, 62(62%) patients had normal ECG. Commonest abnormalities were sinus tachycardia observed in 24(24%) cases. Further ECG was suggestive of left ventricular hypertrophy in 8(8%) cases & it showed low voltage complexes in 6(6 %) cases only.

The two dimensional echocardiography was done in all 100 cases of the study population. It was observed that 2D echocardiography was normal in 51 (51%) cases. (Table No 2)

Left ventricular diastolic dysfunction was the commonest findings being noticed in 28 cases (28%).

Pericardial effusion of various grades was observed in 14 cases (14%) & restrictive cardiomyopathy was noted in 7(7%) cases.

Further amongst 14 cases with pericardial effusion, 8 (57.14%) cases had mild pericardial effusion,5 (35.71%) cases had moderate effusion and 1(7.14%) case had severe pericardial effusion. The 6 cases with moderate and severe pericardial effusion were subjected for pericardial paracentesis.

It was noticed that out of 6 cases in which paracentesis was attempted the fluid could be aspirated only in two cases and in both these cases the morphology of fluid was suggestive of tubercular etiology.

It was noticed further that all the 7cases who showed evidence of LVH on ECG showed LV diastolic dysfunction and all 6 cases who had low voltage complexes in ECG had pericardial effusion on 2D echocardiography.

Thus it was concluded that based on ECG & 2D echocardiography, cardiac manifestation in HIV/AIDS cases was noticed in 49% cases.

It was also be further concluded that the type of structural involvement showed LV diastolic dysfunction in 28(28%) cases and pericardial effusion in 14(14 %) cases and restrictive cardiomyopathy in 7% cases.

An attempt was made in the present work to correlate various findings on 2D echocardiography with CD4 + T cell count.(Table No 3)

It was noticed that amongst 28(28%) cases with left ventricular diastolic dysfunction, CD4 + T cell count was less than 200 cells /mm^3 in 17 cases (60.71%), while in 11 cases(39.28%) it was more than 200 cells /mm^3.

Further amongst 17 cases in whom CD4 + T cell count was less than 200 cells /mm^3 , the CD4 + T cell count was less than 50 cells /mm^3 in 1(3.57%) case .It was between 51- 100 cell / mm^3 in 4(14.28%) cases, 101-150 in 3(10.71%) cases, and it was between 151-200 cells mm^3 in 9(32.14%) cases.

Thus though very low CD4+ T cell count (less than 50 cells/ mm^3) was not observed in cases with LV diastolic dysfunction, the count between 101-200 cells was observed in 12(42.85%) cases

Amongst 14 cases with pericardial effusion in no case CD4 + T cell count was more than 150 cells/mm^3. The count was less than 50 cells in 3 cases (21.4%), 51-100 in 10(71.4%) cases and 101-150 in 1 (7.14%) case. This is statistically significant. ($\chi 2=9.57$)

Thus it can be further concluded that CD4 + T cell count decrease more significantly and was less than 150 cells/mm^3 in all 14 cases of pericardial effusion.

Furthermore amongst 7 cases with restrictive cardiomyopathy, CD4 + T cell count was less than 50 cells/mm^3 in 4 cases(57.14%), and it was between 51-100 cells/mm^3 in 3 cases (42.85%).This was however statistically not significant.($\chi 2=1.42$)

The correlation of CD4 + T cell count was correlated with severity of pericardial effusion .It was observed that out of 8 cases with mild pericardial effusion no case had CD4 + T cell count of less than 50 cellsmm/^{3} or more than 150 cells/mm^3.

The CD4 + T cell count was between 51-100 cells/mm^3 in 5(62.5%) and 101-150 cells/mm^3. in 3 cases (37.5%).

Further amongst 5 cases with moderate pericardial effusion 3 cases (62.5%) has CD4 + T cell count less than 50 cells/mm^3. Two (37.5%) cases had CD4 + T cell count 51-100 cells/mm^3.

In one case with severe pericardial effusion CD4 + T cell count was less than 50 cells/mm^3. (Table 4).Thus it can be concluded further that as the severity of pericardial effusion worsens the CD4+ T cell count decreases. This is statistically significant (P value=0.04).

DISCUSSION

In the present work out of 100 cases studied, maximum cases that is 38% were in the age group of 31-40 years of age and 32% cases were between 41-50 years of age. The mean age was 32.2 years. The age range varied from 20-50 years. Most of the patients belonged to young age between 31 to 40 years of age.

In a study carried by Shrinivas et al [3] most of the patients belonged to young age between 26 to 40 years.

Thus the mean age of cases in a study population in the present work & the common age group was similar to previous workers.

In the present study out of 100 HIV/AIDS cases of which 75% cases were male and 25% cases were female. The male to female ratio was 3:1.

Shrinivas et al (2006) [3] et al (2006) studied 50 cases out of which 80% of the patients were males and 20% were females. The male to female ratio is 4:1.

The common symptoms noticed in the present study were fever in 68% cases, cough in 34% cases, and breathlessness in 33% cases, weight loss in 22% cases, malaise in 21% cases, loose motion in 20% cases, headache in 18% cases each, & palpitation in 11% cases.

Basvaraj et al (2001)[4] noticed commonest symptoms in their study as fever (82.5%), cough (67.5%) and breathlessness (45%).

Andrew et al (2009)[5] noticed fever in 81% of the patients, cough in 55%, weight loss in 51% in their study.

Cardiac symptoms like breathlessness and palpitation were not noticed significantly by previous workers. This might be due to the fact that that the present study was designed only to detect cardiac manifestations in HIV/AIDS cases and hence more stress was being given to detect cardiac symptoms in particular.

The cardiovascular examination in the present work did not show any abnormalities

in the present study.

In the present study, out of 100 cases studied maximum cases that is 33% were having CD4+Tcell count more than 200cells/mm^3 while in 9 cases (9%) CD4+ T cell count less was than 50 cells/mm^3. The count of CD4+ T cell was between 151-200cells/mm^3 in 26% cases & in 13% patients CD4+ T cell count was ranging between 51-100 cells/mm^3. It was between 101-150 cells/mm^3 in 19% cases.

Shrinivas et al [3] et al (2006) noticed that out of 50 patients studied, 28 patients (56%) had CD4 counts between 50 to 200 cells/mm^3, 13 patients (26%) had CD4+ T cell count between 200 to 350 cells/mm^3 , 6 patients (12%) had CD4+ T cell count counts less than 50 cells/mm^3 & 3 patients (6%) had CD4+ T cell count counts more than 350/ mm^3

Heidenreich et al [7] noticed CD4+ T cell count less than 200 cells/ mm^3 in 12% cases.

The CD4+T cell count less than 200 cells/mm^3 was noted in 67% cases in the present study. The CD4+T cell count less than 200 cells/mm^3 usually is a cut off value to suggest the occurrence of various opportunistic infections or systemic involvement in HIV/AIDS cases. Further analysis of the study group showed that various cardiac manifestations were noted in 49% cases only. This disparity between total number of cases with reduced CD4+Tcell count <200 cells/mm^3 (67% cases) and various cardiac manifestations is 49% cases can be postulated on the fact that the cases in the study group had additional other opportunistic infections and hence low CD4 + T cell count.

In the present study, out of 100 cases studied, 62% patients had normal ECG. The various abnormalities were noted in 38% cases.

Commonest abnormalities were sinus tachycardia in 24% cases, left ventricular hypertrophy in 8% cases & low voltage complexes in 6 %cases only.

Basvaraj et al (2002) [4] et al noticed sinus tachycardia in 72% cases, low voltage complex in 10% cases, ischaemic heart disease in 6% cases & left ventricular hypertrophy in 4% cases.

Hamide et al 8 also noticed sinus tachycardia in 40% cases, low voltage complex in 10% cases, ischaemic heart disease in 3% cases & left ventricular hypertrophy in 4% cases.

Thus the occurrence of sinus tachycardia in 24% cases in the present work was less than that of Basavraj et al(2002) [4] and Hamide et al(2002) [8] who noticed higher incidence of sinus tachycardia. Both the previous workers noted lower incidence of left ventricular hypertrophy(4% each) compared to higher incidence (8%) cases in the present work. The findings of low voltage complexes was however comparable with other worker. There is no specific explanation for these variations and it can vary from study to study. The low voltage ECG in 6% cases in the present study might be related to occurrence of pericardial effusion because all the cases showed pericardial effusion on 2D echocardiography. The sinus tachycardia might suggest an early evidence of cardiac failure or left ventricular diastolic dysfunction.

The evidence of ischaemic heart disease was not noticed in any case in the present study.

The two dimensional echocardiography was done in all 100 cases of the study population. It was observed that 2D echocardiography was normal in 51 (51%) cases, while various abnormalities were observed in 49% cases.

Left ventricular diastolic dysfunction was the commonest findings being noticed in 28%.Other abnormal findings were pericardial effusion in 14% cases and restrictive cardiomyopathy in 8% cases.

Similiarly amongst 14 cases with pericardial effusion, mild pericardial effusion was noted in 8 cases, moderate in 5 cases and severe in 1 case.

The findings of left ventricular diastolic dysfunction in 28% cases were much higher in the present work compared to previous worker. Basavraj et al 4 noticed it in 10 % cases, Hamide et al[8] in 7% cases and Moreno et al [9] noticed the same in 7.2% cases. A very high prevalence of 64% was noticed by Schuster et al(2008).[10]

The left ventricular diastolic dysfunction is one of the earliest evidence of myocardial involvement and may be a asymptomatic in early stages. The clinical symptoms appear with higher grades of left ventricular diastolic dysfunction. In the present work high incidence of left ventricular diastolic dysfunction therefore might suggest higher symptomatic or asymptomatic cardiac manifestations in cases of HIV/AIDS.

Pericardial effusion of various grades was observed in 14 cases (14%).

Further among 14 cases with pericardial effusion, 8 (57.14%) had mild pericardial effusion, 5 (35.71%) cases had moderate effusion and 1(7.14%) case had severe pericardial effusion.

The 14% occurance of pericardial effusion in the present work was well compared with findings of Hamide et al (2004) [67] who also noticed 19.6% incidence of pericardial effusion.

Basavraj et al (2003) [62] noticed pericardial effusion in 45% cases, Moreno et al (1997) [68] al noticed it in 39% cases and Shrinivas et al (2006)[25] noticed the same in 28% cases. There is no specific explanation for this variable result. In the present work however all asymptomatic as well as symptomatic cases for cardiac manifestations were involved and hence might explain lower incidence in study population.

Restrictive cardiomyopathy was observed in 7(%) cases in the present study. All these cases had CD4+T cell count less than 100/mm^3. No case had dilated cardiomyopathy.

Giuseppe et al (1999)[70] noted an echocardiographic diagnosis of dilated cardiomyopathy 8% cases. The incidence of dilated cardiomyopathy was higher in patients with a CD4 count of less than 400 cells per cubic millimeter (as compared with a CD4 count of $\geq$ 400 cells per cubic millimeter) in this work.

Currie et al (1993)[4] observed dilated cardiomyopathy in 4.39% cases & all of them had CD4+ Tcell count less than 100/mm^3.

In the present work an attempt was made to correlate the type of abnormality on 2D echocardiography with CD4 + T cell count. It was observed that in 28 cases with left ventricular diastolic dysfunction CD4 + T cell count was less than 200 cells /mm^3 in 17 cases (60.71%) while it was more than 200 cells / mm^3 in 11 (39.28%) cases. Further CD4 + T cell count was less than 50 cells /mm^3 in 3.57 % cases, between 51-100 cells /mm^3 in 14.28% cases, 101-150 cells mm^3 10.71% cases and 151-200 cells /mm^3 in 32.14% cases. This was statistically significant. Thus in the present work very low CD4+ T cell count (less than 50 cells mm^3) was not common in left ventricular diastolic dysfunction and most cases (42.85%) had CD4 + T cell count between 101-200 cells /mm^3.

The correlation of CD4 + T cell count showed that it was correlated with severity of pericardial effusion. It was observed that out of 8 cases with mild pericardial effusion no case had CD4 + T cell count of less than 50 cells/mm^3 or more than 150 cells/mm^3.

The CD4 + T cell count was between 51-100 cells/mm^3 in 3(37.5%) and 101-150 cells/mm^3 in 5 cases (62.5%).

Further amongst 5 cases with moderate pericardial effusion 3 cases (62.5%) has CD4 + T cell count less than 50 cells/mm^3 and two (37.5%) cases had CD4 + T cell count between 51-100 cells/mm^3.

In no case, CD4 + T cell count was more than

100 cells/mm^3 in this grade.

In one case with severe pericardial effusion CD4 + T cell count was less than 50 cells/mm^3. Thus it can be concluded further that as the severity of pericardial effusion increases the CD4+ T cell count decreases. This is statistically significant. P value=0.04

Shrinivas et al (2006)[25] correlated pericardial effusion with CD4 + T cell count and observed that presence of pericardial effusion is positively related to the less CD4 counts (CD4<200) P=0.009. It also showed that risk of developing pericardial effusion increases when CD4 counts decreases to less than <200 cells/mm^3. This was statistically significant (p=0.009).

Thus cardiac manifestations in HIV/AIDS were noticed to be significantly higher than considered. In the present work all 49% cases who had various types of cardiac involvement were not symptomatic. Hence asymptomatic cardiac manifestation in HIV/AIDS cases are considered to be present in these cases. Recognition of these asymptomatic cases of cardiac involvement is important because early institution of antiretroviral therapy and other measure to curtain or delay the frank cardiac failure can be instituted. The search for associated opportunistic infection specially tuberculosis can also be made more vigorously.

The two dimensional echocardiography is a very simple safe and non invasive tool to find out early cardiac involvement. Considering the positive yield on 2D echo in 49 % cases with HIV/AIDS, it is recommended that all cases of HIV/AIDS symptomatic or asymptomatic should be subjected to 2D echo regularly to detect cardiac involvement in HIV/AIDS. The CD4+T cell count has been shown to be positively correlated with various types of cardiac manifestations and with severity of lesion specially with pericardial effusion. It is therefore also recommended that regular CD4 + T cell count should be measure at periodic interval and fall in the count to less than 200 cells /mm^3 should alert the physician to undertake extensive search for cardiac involvement in such cases in addition to search for opportunistic infections.

Conclusion

Thus cardiac manifestations in HIV/AIDS were noticed to be significantly higher than considered. In the present work all 49% cases that had various types of cardiac involvement were not symptomatic.

It was also be further concluded that the type of structural involvement showed LV diastolic dysfunction in 28(28%) cases, pericardial effusion in 14(14 %) cases and restrictive cardiomyopathy in 7% cases. The CD4 + T cell count decreased more significantly and was less than 150 cells/mm^3 in all 14 cases of pericardial effusion. The correlation of CD4 + T cell count showed that it was correlated with severity of pericardial effusion. The two dimensional echocardiography is a very simple safe and non invasive tool to find out early cardiac involvement. Considering the positive yield on 2D echo in 49 % cases with HIV/AIDS, it is recommended that all cases of HIV/AIDS symptomatic or asymptomatic should be subjected to 2D echo regularly to detect cardiac involvement in HIV/AIDS.

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Table 1: CD4+T cell counts

CD4+T cell counts	No. of Patient	Percentage
< 50+T cells/mm^3	9	9%
51-100+T cells^3	13	13%
101-150+T cells^3	19	19%
151-200+T cells^3	26	26%
>200+T cells^3	33	33%
Total	100	100%

TABLE 2: 2D Echo findings in HIV/AIDS

Final diagnosis	No. of patients (n=100)	
	No.	%
LV diastolic dysfunction	28	28%
Pericardial effusion	14	14%
Restrictive cardiomyopathy	7	7%
Normal	51	51%

TABLE 3: Correlation of 2D Echocardiographic findings with CD4+ T cell count:

	No of cases		?					
	No.	%	< 50	51-100	101-150	151-200	>200	
LV Diastolic dysfunction	28	28%	1	4	3	9	11	12.71* Significant
Pericardial effusion	14	14%	3	10	1	-	-	9.57+ Significant
Restrictive cardiomyopathy	7	7%	4	3	-	-	-	1.42 Not significant
Normal	51	51%	0	0	12	17	22	
Total	100	100%	8	17	16	26	33	

TABLE 4: Correlation of CD 4 counts with pericardial effusion:

	CD4+ T Cell count						
	No. of cases(percentage)						Statistical test
Grades of pericardial effusion	No. of cases	<50	51-100	101-150	151-200	>200	χ^2-value
Mild	8	0	3 (37.5%)	5 (62.5%)	0	0	9.94 p-value=0.04 S,p<0.05
Moderate	5	3 (62.5%)	2 (37.5%)	0	0	0	
Severe	1	1 (100%)	0	0	0	0	