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STUDY OF CARDIAC MANIFESTATION IN PATIENTS WITH HIV INFECTION AND THEIR CORRELATION WITH CD4 COUNT

Medical Science

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ABSTRACT

There is currently lack of information on association between cardiac manifestation and CD4 count. Hence new data is required to define this association.

Aim of the study was to evaluate the cardiac manifestations in HIV/ AIDS cases.

This is a hospital base observational study was carried out in 102 cases of HIV/AIDS admitted in Medicine ward during the period of 2 years from August 2013 to July 20015 in government medical college and Hospital, Nagpur.

The CD4+T cell count less than 200 cells/mm3 was noted in 47 (46.07%) cases in the present study. The CD4+T cell count less than 200 cells/mm3 usually is a cut off value to suggest the occurance of various opportunistic infections or systemic involvement in HIV/AIDS cases.

The 2D echocardiography cardiography is an important diagnostic tool for the evaluation of cardiac dysfunction in all patients. The CD4 +T cell count is significantly low in cases with cardiac manifestation.

KEYWORDS

Cardiac Manifestation, Cd4 Count, Hiv Infection

INTRODUCTION

India has the third highest number of estimated people living with HIV in the world. According to the HIV Estimations 2012, the estimated number of people living with HIV/AIDS in India was 20.89 lakh, with an estimated adult (15-49age group) HIV prevalence of 0.27% in 2011.India has demonstrated an overall reduction of 57% in the annual new HIV infections among adult population from 2.74 lakh in 2000 to 1.16 lakh in 2011, reflecting the impact of various interventions and scaled-up prevention strategies under the National AIDS Control Programme (NACP). The trend of annual AIDS deaths is showing a steady decline since roll out of the free Anti-Retroviral Therapy (ART) programme in India[1]. The most important clinical application of HIV-related immunology is measurement and interpretation of the absolute CD4 cell count. CD4 cells are composed of many different specificities— not only those that are specific for HIV but also those that are specific for other pathogens, including opportunistic pathogens. The CD4 + T cell count does not provide any indication of the specific function of the CD4 + T cells, only a cumulative number of cells present. It is currently recommended that patients have this test performed at the time of HIV diagnosis and then again approximately every 6 months, usually in conjunction with an HIV RNA (viral load) test. Recovery of the CD4 + T cell count in response to anti retroviral treatment has been shown to be the most important predictor of clinical outcome, even more so than the virologic response. The wide range of cardiac abnormalities associated with HIV infection has been suggested by autopsy studies. The various abnormalities include pericardial effusion, lymphocytic interstitial myocarditis, dilated cardiomyopathy (frequently with myocarditis), infective endocarditis, and malignancy (myocardial Kaposi sarcoma and B-cell immunoblastic lymphoma).[2] 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 conditions include pericardial effusion, left ventricular (LV) systolic dysfunction/heart muscle disease, and intracardiac masses.[3] Heart muscle disease is the most important cardiac manifestation of HIV infection and is likely to become even more prevalent as HIV infected patients live longer. Myocardial involvement in HIV infection is multifactorial and may arise as a result of myocardial invasion with infection itself, opportunistic infections, autoimmune response to viral infection, drug-related cardiac toxicity, nutritional deficiencies, and prolonged immunosuppression.[4] The relation of CD4 + T cell count is also important as it correlate with severity of cardiac involvement. The present study is therefore undertaken to detect occurrence of symptomatic or asymptomatic cardiac involvement in HIV/ AIDS cases and their correlation with CD4 + T cell count When patients are examined by echocardiography, Xray and ecg cardiac abnormalities are detected more often than would be expected from clinical symptoms and physical examination

The present study is undertaken with following aims and objectives:

1) To evaluate the cardiac manifestations in HIV/ AIDS cases.
2) To determine type of cardiac involvement in HIV/AIDS cases.
3) To correlate CD4 + T cell count with pattern of cardiac involvement.

MATERIALS AND METHODS

This is a hospital base observational study was carried out in 102 cases of HIV/AIDS admitted in Medicine ward during the period of 2 years from August 2013 to July 20015 in government medical college and Hospital, Nagpur.

Total 102 consecutive seropositive patients were taken up for study.
All patients were assessed clinically by detailed history taking and general physical examination

INCLUSION CRITERIA

All patients admitted in hospital Dignosed to have HIV were included

EXCLUDING CRITERIA

Patients suffering from

1. Congenital heart disease
2. Rheumatic heart disease
3. Hypertension
4. Ischemic heart diseasewere excluded

RESULTS AND DISCUSSION

HIV infection has become pandemic and incidence and prevalence is fast increasing. The trend is no different in India. Cardiac involvement in HIV infected individuals occurs frequently and occurs quite early in disease process.

Cardiac dysfunction is clinically quiescent in the early stages and later it may manifest as direct cause of death.

The study included 102 cases who were sero-positive for HIV. The various investigations like haemoglobin estimation, ECG, X ray chest & 2D Echo were done in all cases.

In the present work out of 102 cases studiedmaximum cases that is 48 cases were in the age group of 31-40 years of age. The study included 15 cases in the age group of 41-50 years of age & 38 cases in the age group of 21-30 years of age.

In a study carried by Shrinivas et al [5] et al (2006) 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 102 HIV/AIDS cases out of which, 72 cases were males, and 30 cases were females. Male to female ratio was 2.4:1. Shrinivas et al (2006) [5] 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.

Thus the male sex predilection of cases in a study population in the present work & the common age group was similar to previous workers. This has helped us to compare our data with previous workers.

The common symptoms noticed in the present study were, common clinical symptoms were fever 69(67.6%), cough 17(16.7%), & exertional breathlessness (33%).Other symptoms observed were weight loss in 33(32.4%) cases, malaise in 21(21%) cases, loose motion in 37(36.3%)cases, headache in 4(3.9%)cases, vomiting in 17 (116.7%) cases & palpitation in 19(18.6%)cases.

Andrew et al(2009)[6] noticed fever in 81% of the patients, cough in 55%, weight loss in 51% in their study.

They did not noticed breathlessness and palpitation in their study. Joshi et al(2001) [7] noticed fever in 60.7%, weight loss in 51.5% & diarrhoea in 33.3% of patients.

Thus fever and cough were the commonest symptoms and were well comparable with all previous workers. However, 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 general physical examination in the study population showed pallor 33 (32.4%), raised Jugular venous pressure in 7(6.9%) cases. Further amongst 100 cases oedema feet was seen in 7(6.9%) and icterus was found in 4(3.9%) cases Andrew et al (2001)[6] noticed clinical signs which included lymphadenopathy in 51% cases, pallor in 40% cases and hepatosplenomegaly in 20% cases. Opportunistic infections were noticed in 22% cases of which 16% had candidiasis and Pneumoctytisjerovecii pneumonia in 16% cases each.

Joshi et al(2009)[7] noticed anemia in 41.36%.In the present work clinical signs of cardiac failure were noticed only in 4 cases and none had any evidence of infective endocarditis.

The signs of cardiac failure were not noticed by other previous workers.

This is probably due to the fact that such signs were carefully looked for in the present study to detect cardiac involvement and hence definite recognitation of these signs.

In the present study, out of 100 cases studied, haemoglobin was less than 7 grams/dL in 10(10%) patients, haemoglobin was less than 7 grams/dL in 20(19.6%) patients. It was between 7 to 10grams/dL in 40(39.2%) patients &hemoglobin was between 10-14gram/dL in 35(34.3%) patients. In 7(6.9%) cases, the haemoglobin level was more than 14grams/dL.

Imtiaz et al(2007)[8] noticedthat in 89% cases haemoglobin was below 13 gm% and in 21% cases haemoglobin level was below 6 gm%.

The haemoglobin level levelwas low and less than 10 gram % in 58.8% cases in the present study.

This low haemoglobin level also might be responsible for some abnormality on 2D echocardiography like left ventricular dysfunction.in study population.

In the present study, out of 102 cases studied maximum cases that is 55(53.9%) were having CD4+Tcell count more than 200cells/mm^3 while in 10 cases (9.8%) CD4+ T cell count less was than 50 cells/mm^3CD4 count. The count of CD4+ T cell was between 151-200cells/mm^3 in 11(10.8%) cases & in 9 (8.8%) patients CD4+ T cell count was ranging between 51-100. It was between 101-150 cells/mm^3 in 17(16.7%) cases

Shrinivas et al (2006)[5] 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 counts 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 [9] noticed CD4+ T cell count counts less than 200 cells/ mm^3 in 12% cases.

The CD4+T cell count less than 200 cells/mm^3 was noted in 47 (46.07%) 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 occurance of various opportunistic infections or systemic involvement in HIV/AIDS cases. Further analysis of the study group showed that various cardiac manifestation were noted in 49% cases.

In the present study, out of 102 cases studied 74.5 percent of the patients had normal X ray chest. Cardiomegaly was present in 8(7.8%) patients. Pleural effusion was seen in 4(3.9%) cases and fibrocaseous lesion was seen in 3(2.9%) patients. In 2(1.9%) cases X ray chest was showing bilateral reticulonodular shadows & cavitary lesions. pleuroparenchymal fibrosis in 3(2.9%)cases .Consolidation was noticed in 3(2.9%) cases.

Shrinivas et al (2006) [5] et al noticed that out of 50 cases, 33 patients (66%) had normal chest x-ray. Commonest abnormality noted in chest x-ray in HIV individuals were cardiomegaly in 14% cases, pleural effusion in 12% cases, pulmonary tuberculosis in 2% cases, basal pneumonia in 2% cases, bilateral Extensive reticulo nodular shadows in 2% cases, right paratracheal adenopathy in 2% cases.

Noticed cardiomegaly in 30% cases, pleural effusion in 10% cases & pulmonary tuberculosis in 6% cases.

Thus the findings of cardiomegaly & pleural effusion in the present work were well camparable with the previous study

In the present study, out of 102 cases studied, 70(68.6%) patients had normal ECG. Commonest abnormalities was sinus tachycardia observed in 22(21.6%) cases. Further ECG was suggestive of right ventricular hypertrophy in 3(2.9%) cases, poor progression of R wave in 3(2.9%) & it showed low voltage complexes in 2(2 %) cases only

Thus the occurance of sinus tachycardia in 21.6% cases in the present work was less than that of who noticed higher incidence of sinus tachycardia. Both the previous workers noted lower incidence of left ventricular hypertrophy (4% each) compared to no such cases in the present work. The findings of low voltage complexes was however comparable with other worker. There is no specific explanation for these variation and it can vary from study to study. The low voltage ECG in 2%% 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 102 cases of the study population. It was observed that 2D echocardiography was normal in 53 (51.9%) cases, while various abnormalities were observed in 48.1% cases.

Left ventricular diastolic dysfunction was the commonest findings being noticed in 25 cases (24.5%).Pericardial effusion of various grade was observed in 11 cases (10.78%). Further 6(5.88%) patients had dilated cardiomyopathy, pulmonary hypertension in 4 (3.92%) patients, and global hypokinesia in 3(2.9%) patients.

The findings of left ventricular diastolic dysfunction in 24.5% cases was much higher in the present work compared to previous worker. Basavraj et al (2002) noticed it in 10 % cases, Hamide et al in 7% cases and Moreno et al[10] noticed the same in 7.2% cases. A very high prevalence of 64% was noticed by Schuster et al(2008).[11]

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 11cases (10.78%).

Shrinivas et al (2006)[5] noticed CD4 abnormalities in 28% cases of the pericardial effusion. Out of these 28% most of them were mild in 22% cases, moderate in 4% cases, large in 2% cases. Severity of pericardial effusion increases with lowering of CD4 counts.

Moreno et al (1997) [10] al noticed it in 39% cases and Shrinivas et al (2006)[5] 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 not observed in any cases in the present study.

Further 4(3.9%) patients had **dilated cardiomyopathy** majority with CD4LESS THAN 200/mm^3**.**

Giuseppe et al (1999)[12] notedan echocardiographic diagnosis of dilated cardiomyopathy8% cases. The incidence of dilatedcardiomyopathy was higher in patients with a CD4 count of less than 400 cells per cubic millimeter (as compared with a CD4count of $\geq$ 400 cells per cubic millimeter) in this work.

The cardiomyopathy restrictive or dilated was **noted by** other worker like Moreno et al [13] and Shrinivas et al (2006).[5]

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 25 cases with left ventricular diastolic dysfunction CD4 + T cell count was less than 200 cells /mm^3 in 16cases (64%) while it was more than 200 cells / mm^3 in 11 (36%) cases. Further CD4 + T cell count was less than 50 cells /mm^3 in 12 % cases, between 51-100 cells /mm^3 in 16% cases, 101-150 cells mm^3 12% cases and 151-200 cells /mm^3 in 24% 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 (36%) had CD4 + T cell count between 101-200 cells /mm^3.

The correlation of CD4 + T cell count was correlated with severity of pericardial effusion. It was observed that out of Shrinivas et al (2006)[5] 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 was noticed to be significantly higher than consider. In the present work all 48.1% cases who had various types of cardiac involvement 4weresymptomatic. 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 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 47.1 % 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

The 2D echocardiography cardiography is an important diagnostic tool for the evaluation of cardiac dysfunction in all patients.

The CD4 +T cell count is signicantly low in cases with cardiac manifestation.

There is statistically significant correlation of low CD4 counts with severity of pericardial effusion and left ventricular diastolic dysfunction.

It is therefore recommended that cardiac evaluation based cardiac enzymes, electrocardiography & 2D echocardiography, should be undertaken at periodic interval to detect early involvement of cardiac system.

Table 1 – Distribution Of Clinical Findings And Hemoglobin Levels

		NUMBER (n=102)	PERCENTAGE
CLINICAL FINDINGS	Raised Jvp	7	6.9
	Pedal Edema	7	6.9
	Pallor	33	32.4
	Icterus	4	3.9
	Cyanosis	1	1.0
	lymphadenopathy	8	7.8
	Oral candidiasis	7	6.9
	Emaciation	18	17.6
Hemoglobin levels	3.5- 7	20	19.6
	7-9.9	40	39.2
	10-13.9	35	34.3
	>14	7	6.9
CD4 COUNT	< 50	10	9.8
	50-100	9	8.8
	101-150	17	16.7
	151-200	11	10.8
	>200	55	53.9

Table 2 – Distribution Of Grade Of Pericardial Effusion And Staging.

		NUMBER (N=11)	PERCENTAGE
GRADE OF PERICARDIAL EFFUSION	MILD	04	36.36
	MODERATE	06	54.54
	SEVERE	01	9.09
STAGING	**I**	9	8.8
	II	39	38.2
	III	33	32.4
	IV	21	20.6

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