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Original Research Article

A Study on Correlation between Clinical Profile and CD4 Count among HIV Patients

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Abstract

Background: Though India has low prevalence of HIV but it is the world's third largest population suffering from HIV. HIV infection selectively infects and kills CD4 cells. As HIV infection progresses CD4 cell count progressively falls over a period of time.

Aim and Objectives: The aim the study was to know clinical profile of HIV and its correlation with CD4 count.

Materials and Method: This is an Observational Prospective study conducted in the Department of General Medicine, Nizams Institute of Medical Sciences, Punjagutta, Hyderabad during the period of January 2018 to September 2018. We have undertaken sample size of 85 after getting informed consent, ethical approval from the institute. We have considered the patients those who have fulfilled the inclusion and exclusion criteria. Mean difference between the CD4 cell counts were analysed with the help of paired t-test. P-value<0.05 were considered as statistically significant. Analysis was done with help of software SPSS version 25.

Results: Among 85 patients maximum number of the patients were observed in the age group of 30-50 years of age, male is female ratio was 1.7:1, hypertension was commonest comorbid condition followed by diabetes mellitus, respiratory system is the most common system involved. Tuberculosis is most common opportunistic infection we found in the study.

Conclusion: CD4 count is the best marker to know about severity of HIV infection at diagnosis, during treatment and follow-up, the CD4 counts are low among most of the HIV positive patients which describes that advanced disease at presentation and after treatment It balanced too normal.

Keywords: HIV, Tuberculosis, CD4, diabetes mellitus, respiratory system

Introduction

HIV (Human immunodeficiency virus) is the agent implicated in the causation of

Acquired Immune deficiency syndrome (AIDS). AIDS was for the first time recognized in the USA in 1981, when the casual occurrence of Pneumocystis carinii and Kaposi's sarcoma was reported in previously healthy homosexual men in Los Angeles and New York respectively. Though India has low prevalence of HIV but it is the world's third largest population suffering from HIV. There is 34 million people living with HIV globally, in India it is 2.4 million (0.36%) and in Kerala around 25,000(0.12%).

HIV infection selectively infects and kills CD4 cells. [1] As HIV infection progresses CD4 cell count progressively falls over a period of time. When CD4 cell count falls below 200, acquired immune deficiency syndrome (AIDS) like syndrome [2], malignancies and fatal OIs develop. [3] With antiretroviral treatment (ART) CD4 cell count increases, hence immunodeficiency is reversed too. [4] To monitor HIV infected individuals, ideally, HIV viral load is required. In a resource limited setting, this is not always feasible so, CD4 count is measured. [5] The World Health Organization (WHO) also suggests that CD4 count testing is suitable. [6]

HIV viral load measures the amount of virus in the blood. This test is used to monitor the level of viral replication and effectiveness of ART. The treatment goal is to reduce the viral load in the blood to undetectable levels (less than 50 copies/ml), and the persistent presence of detectable viral load (greater than 1000 copies/ml) in people living with HIV on ART is an indicator of inadequate treatment response and the need to change or adjust the treatment regimen.

As the availability of antiretroviral medications improves, it is important to develop feasible strategies for the management of antiretroviral therapies in resource-limited settings [7]. In industrialized nations, changes in CD4 count and plasma viral load are used to determine the responses of the virus to antiretroviral therapy. Standard methods of CD4 count and plasma viral load enumeration require highly trained personnel and dollars of initial investment in laboratory instrumentation [8].

There are many studies conducted in India suggesting correlation between the CD4 cells and among HIV patients, in this study also we are presenting our experience of correlation between CD4 cells among HIV patients.

Materials and Method:

This is an Observation Prospective study conducted in the Department of General Medicine, Nizams Institute of Medical Sciences, Punjagutta, Hyderabad during the period of January 2018 to September 2018. We have undertaken sample size of 85 after getting informed consent, ethical approval from the institute. We have considerd the patients those who have fulfilled the inclusion and exclusion criteria as given bellow.

Inclusion Criteria

- All patients confirmed to be HIV positive by ELISA/ WESTERN BLOT were included in the study.
- Patients who are admitted in NIMS emergency, inpatient wards acute medical care, outpatients are included in the study.

Exclusion Criteria:

- Pregnant females, Neonates, early infants and children.
- Patients with age >70 yrs. are excluded.

Methodology

- All the Patients fulfilling the inclusion criteria are included in the study.
- In each individual patient detailed medical history including age, sex, smoking, alcohol intake,

sexual contact, IV drug abuse, needle stick injuries, blood transfusions. Presence of Clinical features like easy fatigability, fever, weight loss, headache, cough with or without expectoration, loss of appetite, altered sensorium, shortness of breath, bleeding manifestations, jaundice, oliguria, etc. will be noted

- A detailed physical examination will be done in every patient for pallor, jaundice, hepatosplenomegaly, lymphadenopathy, clubbing, vital signs and all the systemic manifestations like cardiovascular, respiratory, abdomen, central nervous system were examined.
- Baseline investigations like hemogram, complete urine examination, ESR, Bio chemical analysis, liver function tests, renal function tests, ultra sound, CD4 count, sputum culture, csf examination, ELISA of HIV, hepatitis B and hepatitis C.
- Additional investigations will be done, if found necessary, dictated by the patients clinical scenario which includes urine and blood culture, serum LDH, genexpert, serum CRAG, indian ink stain, lymphnode biopsy or FNAC, CECT neck, chest and abdomen with HRCT cuts, bone marrow aspiration and biopsy, bone marrow cultures, MRI brain plain and contrast.
- Clinical profile of HIV patients and their correlation with CD 4 counts will be evaluated.
- Follow-up CD4 counts of the patients, and their clinical improvement are monitored with in their next visit to the hospital.

Statistical Analysis: Collected data were entered in the Microsoft Excel 2016 for further analysis, Qualitative data were presented in the form of frequency and proportion while quantitative data were presented in the form of Mean and Standard deviation. Mean difference between the CD4 cell counts were analysed with the help of paired t-test. P-value<0.05 were considered as statistically significant. Analysis was done with help of software SPSS version 25.

Results:

Table 1: Basic Characteristics of the patients

Parameters	Frequency	Percentage
Gender		
Males	54	64
Females	31	36
Age		
20-30 Years	14	16.47
30-40 Years	30	35.29
40-50 Years	36	42.3
50-60 Years	3	3.52
>60 Years	2	2.35
Comorbidity		
DM	9	10.58
HTN	10	11.76
CVA	1	1.17
None	60	70.58

The study was carried out during the period of January 2018 to October 2018 in Nizam's institute of medical sciences after taking institutional ethics committee approval and 85 patients were included those who have fulfilled the inclusion and exclusion criteria.

In the study we have observed male dominance which was 64% of the study population and 36% of the females. 42.3% of the patients we have obtained from the age interval of 40-50 years, followed by 35.29% from the age group of 30-40 years of age 16.47% of the patients from the age group of 20-30 years of age. Of the study population 11.76% of the patients were found with hypertension and 10.58% of the patients found with diabetes mellitus and only patients found with CVA.

Table 2: Distribution of Symptoms and Systematic Involvement.

Parameters	Frequency	Percentage
Symptoms		
Fever	67	78.8
Cough	35	41.1
Shortness of breath	32	37.6
Headache	24	28.2
Weight loss	56	65.8
Loss of appetite	60	70.5
Dysphagia	19	22.3
Vomiting's	13	15.2
Generalised weakness	45	52.9
Epigastric pain	8	9.4
Systematic Involvement		
Respiratory system	37	43.52
CVS	3	3.52
GIT	7	8.23
CNS	23	27.05
Urogenital	4	4.7
Haematological	5	5.88

Among the patients 78.8% of the patients found with symptoms fever followed by 70.5% of the patients with loss of appetite, 65.8% of the patients observed with weight loss, 52.9% of the patients observed with generalized weakness, 41.1% of the patients were with cough. 37.6% were had shortness of breath, 28.2% were with headache and other symptoms. Out of all among 43.52% of the patients respiratory system of the body was involved in the disease, 27.05% with CNS and involvement like GIT, CVS, Urogenital and Haematological shown in above table No. 2.

Table 3: Distribution of CD4 cell count during presentation and follow up.

CD4 counts at	Presentation	Follow Up
<100	29(34.11%)	25(29.41%)
100-200	18(21.17%)	18(21.17%)
200-300	9(10.58%)	18(21.17%)
300-400	12(14.11%)	4(4.7%)
>400	17(20%)	20(23.52%)

Table 4: Distribution of CD4 cell count during presentation and follow up.

Clinical profile	Number	Mean CD4 count at initial presentation	Mean CD4 count in follow-up
Extra pulmonary TB	17(20%)	197	214
Pulmonary TB	12(14.11%)	336	367
Disseminated TB	5(5.88%)	116	183.2
PCP	10(11.76%)	162	144
Candidiasis	12(14.11%)	209.25	250.33
CMV esophagitis	3(3.52%)	57	123.3
Pyelonephritis	2(2.35%)	630	662
HIVAN	2(2.35%)	186.5	219
CNS vasculitis	2(2.35%)	98.5	111
Cryptococcal meningitis	5(5.88%)	79.8	114
PML	2(2.35%)	68	63
HAND	3(3.52%)	537	494.6
CIDP	3(3.52%)	317	377.3
Lymphoma	3(3.52%)	169	165.6
Mean		225.79	249
Standard Deviation		174.09	169.43

In our study, majority of patients had CD 4 count less than 100 (34.1%), least number of patients are with CD4 count between 200-300 about 10.5% at the initial presentation to the hospital. The follow up CD 4 counts of patients after 12 weeks are majority are below 100 about 29.4% and least number of patients were between 300-400 i.e 4.7% as shown in table No. 3.

A shown in table 4., extra pulmonary tuberculosis was the most common disease manifestation observed in about 20% of patients in our study. 14% of patients presented with candidiasis and pulmonary TB.

The mean CD 4 count of all the patients presenting with varying disease manifestations were calculated at initial presentation and after follow up in our study. Patients with disseminated TB /extra pulmonary TB has risen in CD4 count while treating at follow up i.e from 116 to 183.2 and 197 to 214 after 12 weeks, similar rise in CD4 counts observed in patients with pulmonary TB, candidiasis, CMV esophagitis, HIVAN, CNS vasculitis, cryptococcal meningitis, chronic inflammatory demyelinating polyneuropathy (CIDP), pyelonephritis.

Fall in CD4 counts are observed in patients with pneumocystis carini pneumonia, bacterial/fungal pneumonia, progressive multifocal leukoencephalopathy, other HIV Associated Neurocognitive disorders (HAND), lymphoma.

We found the CD4 count mean difference at intial presentation and after follwe up was statistically not significant, p-value was 0.7236

Discussion:

85 patients with HIV were studied and anlyzed, observed that age of the patients was lying between the range of 20-60 years, with maximum patients in the reproductive age between 30-50 years. We found 54 males and 31 females in the ratio of 1.7:1 with the preponderance of male candidates. We observed 20 patients with underlaying co-morbidities in which hypertension being the most common comorbidities followed by diabetes mellitus.

Other studies conducted by Singh A et al [9] , Sharma SK et al [10] observed that maximum patients in the reproductive age between 30-50 years of age. Male dominance was observed in the study conducted by Praveen Kumar et al [11], Attili VSS et al. [12]

Fever was the most common presentation (78.8%) followed by loss of appetite and weight loss similar to the study done by Zuber Ahmad et al [13] (89%). Pallor was the predominant sign on examination (31.76%) which was similar with Tejas. M. Doshi et al [14] and Megha Antwal et al [15] studies (54%) and (53%).

Among the systemic involvement, respiratory infections were commonly observed. Tuberculosis and pneumocystis carinii pneumonia accounted for the most number of cases. Tuberculosis was the most common opportunistic infection in our study, seen in 34 (39.98%) patients which were similar to other studies like S.K Sharma et al [10], Merchant RH et al [16] and Sarvepalli AK et al [17]. HIV infection is a strong risk factor for the active tuberculosis in persons with latent M. tuberculosis infection. The risk of active tuberculosis in HIV seropositive patients is 14% over 2 years-contrasting strikingly with the estimated 10% lifetime risk in HIV negative persons with latent tuberculosis infection. In patients with tuberculosis , extra pulmonary TB cases were more common than pulmonary TB and disseminated TB which was observed in 20% of patients in our study , 12 patients presented with TB meningitis , 3 patients with TB lymphadenitis and 2 patients with TB abdomen similar to study done by Praveen Kumar et al [11]. Among meningitis patients, tuberculosis was most common cause followed by cryptococcal infection similar to that observed in studies like Attili et al [12], Satish chandra et al [18].

Predominant extra pulmonary TB patients were due to decreased immune response i.e. significantly decreased CD 4 count at the initial presentation and reactivation of latent TB. Candidiasis was the second most common opportunistic infection seen in 12 patients(14.1%) which is contrary with Singh et al study (59%)where candidiasis was first most common , Pneumocystis carnini pneumonia was the third common manifestation of about 10(11.7%)patients similar with Russian DA et al 36% study of (33%) . Dilated cardiomyopathy was seen in 1 patient. Usual causes of DCM in HIV patients are myocarditis, opportunistic infections, nutritional and drug induced especially zidovudine. The cause in our patient was viral myocarditis.

34% of patients have very low CD 4 counts (<100 cells/microlit). Only small percentage of patient's i.e. about 10.5% have their CD4 between 200-300 cells As the CD4 count declines, incidence of extra pulmonary involvement of tuberculosis was increased over the incidence of pulmonary TB.

During follow-up after 12 weeks, 29% of patients had persistently low CD4 counts (<100 cells/microlit) and 4.7% of patients had CD4 counts between 300- 400 cells/microlit. CD4 counts usually improves in 3 months with appropriate ART, the persistent low CD4 counts in our study is due to noncompliance with ART medication, delayed ART initiation until advanced disease, untreated co-infections.

Therefore, it is more valuable to evaluate a series of CD4 counts than any single CD4 count, the CD4 count is affected by the time of the day (lower in the morning), in any acute illnesses, refrigeration of the blood sample (decreased CD4 count) with rough handling or contamination of blood sample similar pattern observed by rajkondawar AV et al study.[19] The mean CD4 count in patients with disseminated TB and pulmonary TB were 116 and 336 cells/microlit at initial presentation and was 183.2 and 367 cells/microlit during follow up at 12 weeks respectively.

The extra pulmonary TB patients CD4 count was 197 and 214 cells/microlit both at the time of presentation and during the follow-up which was higher when compared to Sarvepalli et al study.

In our study HIV positive patients with disseminated TB and extra pulmonary TB had low mean CD4 counts than those with pulmonary TB compared with studies like Sarvepalli AK et al [17] both at initial presentation and during follow up. The low mean CD 4 counts were because of delayed presentations of patients with advance disease and noncompliance to ART during the follow up.

In patients with candidiasis the mean CD4 count was 209 cells/microlit which was higher than in the study done by Sarvepalli et al [17] which observed mean CD4 counts of 45 cells/microlit with oral thrush and CD4 of 40 cells/microlit with oesophageal candidiasis.

In PCP mean CD4 count was 162 cells/microlit which was higher than the mean CD4 count of 34 cells/microlit observed in Sarvepalli AK et al study [46], similar to studies done by shilpa et al [20] (145 cells/microlit)and Vajpayee et al (142 cells/microlit). [48]

The mean CD4 count of the patients with cryptococcal meningitis was 79.8 which was higher when compared with Sarvepalli et al (61.2 cells/microlit) and similar with shilpa et al study (72.89 cells/microlit).

Other opportunistic infections like CMV esophagitis, cryptococcal meningitis also had low mean CD 4 counts which is explained by delayed presentation of patients with HIV, the mean CD4 counts after followup increased in patients with candidiasis, CMV esophagitis, cryptococcal meningitis, decreased in patients with PCP among opportunistic infections. Thus the serial CD4 counts can be used as a prognostic marker in patients presenting with various clinical manifestations to reassess the treatment.

In patients with extra pulmonary tuberculosis and disseminated TB had low mean CD4 count in our study which was <200 cells/microlit, than pulmonary TB, in which the patients also had low mean CD4 count but >200 cells/microlit.

Study by Michael CG et al [22] showed that CD4 count at the time of initiation of ART has significant impact on immunological recovery, with high levels of CD4 count being associated with good response to therapy. Late presenters not only have poor quality of life but they also create huge economic burden for the country. Financial impact due to delayed diagnosis has been stressed in several studies. [23,24] The cost of medical care in patents presenting at late stagesis 200% higher than those who were diagnosed earlier.[44,45] This has been primarily attributed to frequent opportunistic infections and hospitalizations in the former group. [25]

We have faced with some limitation of study like, we had very small number of sample size and shorter duration to reach definite conclusion also viral load of many patients was not done because of financial constraints.

Conclusion:

In the conclusion we can say that male was more affected by the disease, than females more number of the patients were affected in the reproductive age group. Affected patients were found more with hypertension followed by diabetes mellitus. Fever, loss of appetite, loss of weight were the commonest presenting symptoms in the study. Respiratory system was commonly involved system in the disease. Tuberculosis is most common opportunistic infection in our study with extra pulmonary involvement more that pulmonary. The CD4 counts are low among most of the HIV positive patients which describes that advanced disease at presentation, CMV esophagitis, cryptococcal meningitis, pyelonephritis,

CNS Vasculitis, HIVAN, CIDP suggestive of better response to therapy.

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