

# Clinical Profile of HIV and its Correlation with CD4 Count in a Tertiary Care Centre in Telangana

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## ABSTRACT

**Introduction:** HIV infection is a major health problem in India. In a setting where viral load is not always available and with such varied presentation of the disease, CD4 count is a valuable tool in the assessment and management of HIV infection. The aim was to study the clinical profile of HIV and its correlation with CD4 count before and after initiating ART in a tertiary care centre in Telangana.

**Material and Methods:** It was a prospective and observational study of HIV infected patients admitted in our hospital from January 2018 to December 2018.

**Results:** We studied 85 patients with a male to female ratio of 1.7:1. The most frequently seen opportunistic infection (OI) was Tuberculosis (TB). Extra pulmonary TB was seen the most often (20%) followed by pulmonary TB (14%). Pneumocystis jirovecii pneumonia (PCP) was encountered in 11% and disseminated TB in 6% of patients. The majority of patients had a CD4 cell count below 100cells/microlitre at presentation (34%). 21% of patients had a CD4 cell count of 100-200cells/microlitre. In patients with AIDS defining illnesses such as CMV esophagitis, CNS vasculitis, PML, and Cryptococcal meningitis, mean CD4 count was <100cells/microliter.

**Conclusions:** CD4 count helps in assessment of severity of HIV infection at diagnosis and during treatment and follow up.

**Keywords:** HIV Infection, CD4 Count, Antiretroviral Treatment (ART), Tuberculosis (TB), Opportunistic Infection (OI)

count in HIV infected patients at presentation and follow up, we present our experience here.

## MATERIAL AND METHODS

Case details of HIV infected patients admitted to Nizams Institute of Medical Sciences (NIMS) hospital, a multidisciplinary tertiary care centre in Telangana, were collected from January 2018 to December 2018. It was a prospective and observational study conducted after getting approval from ethical committee of NIMS.

### Inclusion criteria

All patients confirmed to be HIV positive by ELISA/Western Blot assay admitted in medical care wards were included.

### Exclusion criteria

1. Patients aged below 12 or above 70 years
2. Pregnant females

Information from case sheets of all patients recruited for analysis was reviewed. In the history, demographic details, symptoms like fever, loss of appetite, cough with or without expectoration, fatigability, shortness of breath, altered sensorium, jaundice, oliguria, weight loss were noted. The risk factors considered were blood transfusion, needle stick injuries, alcohol intake, IV drug abuse and sexual contact. Clinical findings specifically noted were temperature, weight, pallor, clubbing, lymphadenopathy and organomegaly. Thorough systemic examination was carried out.

The investigation reports of hemogram, complete urine examination, ESR, renal function test, liver function tests, chest radiograph, abdominal ultrasonography (using MYLAB60 model, eSaote company from Ahmedabad), Contrast Enhanced Computed Tomography (CECT) of Neck, Chest, abdomen with HRCT (using Philips Brilliance 16

## INTRODUCTION

Human immunodeficiency virus (HIV) is retro virus presenting as asymptomatic to acquired immunodeficiency syndrome (AIDS) and leading to life threatening opportunistic infections (OI).<sup>1</sup> India has the third highest number of HIV infected individuals after South Africa and Nigeria.<sup>2</sup> HIV infection selectively infects and kills CD4 cells.<sup>3</sup> As HIV infection progresses CD4 cell count progressively falls over a period of time. When CD4 cell count falls below 200, acquired immunodeficiency syndrome (AIDS) like syndrome<sup>4</sup>, malignancies and fatal OIs develop.<sup>5</sup> With antiretroviral treatment (ART) CD4 cell count increases, hence immunodeficiency is reversed too.<sup>6</sup> 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.<sup>7</sup> The World Health Organization (WHO) also suggests that CD4 count testing is suitable.<sup>8</sup> Since there are few studies from India comparing CD4 cell

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model, 16 slice CT, PHILIPS company from Netherlands), MRI Brain (1.5 Tesla PHILIPS), Mantoux test, HIV antibody detection by ELISA, Western Blot assay, CD4 count cells/microlitre by flow cytometry, sputum culture, sputum for Tubercular bacilli, blood cultures, urine cultures, bone marrow cultures, FNAC (Fine Needle Aspiration Cytology)/ biopsy of lymph node, bone marrow aspiration, biopsy and cerebro spinal fluid (CSF) analysis and culture wherever required were also done. Electrocardiogram, trans-thoracic echocardiogram were documented.

The treatment details like medical management including surgical procedures were also noted. ART, antibiotics dose and duration wherever given were also documented.

### Follow up

Patients were followed up after 12 weeks in the out-patient clinic in the department of general medicine, NIMS, Hyderabad. Assessment of response to therapy was made by measurement of CD4 count cells/microliter. The above data from all patients was tabulated and analysed.

### STATISTICAL ANALYSIS

Microsoft office 2007 was used for the statistical analysis. Descriptive statistics like mean and percentages were used to interpret the data. The mean CD4 count is calculated by independent t test.

### RESULTS

A total of 85 HIV infected patients were included in the study, with 54 males (64%) and 31 females (36%) (M: F :: 1.7:1). Age of the patients ranged from 20 to 60 years with maximum number of patients in the age group of 30-50 years- 66 (77%), followed by 14 (16%) patients in 20-29 years age group and 5 (7%) patients in the 50-60 age group. Symptoms at presentation are shown in Table 1. The most common presenting symptoms were fever and loss of appetite with 78% and 70% of patients reporting these respectively. Examination findings (Table 2.) were more varied with the most common sign being pallor (31%).

The systemic involvement (Table-3) with opportunistic infection was seen most commonly in the respiratory system in 37(43%) patients followed by the nervous system in 23 (27%) patients. The most frequent OI at presentation was extra pulmonary tuberculosis in 20%, followed by candidiasis (14%) and pulmonary tuberculosis (14%).

In our study, (Table-4), majority of patients had CD4 count less than 100 in 29 (34%) patients, followed by 18 (21%) patients with CD4 count between 100-200 and least in 200-300 group with 9 (10.58%) patients. In the follow up CD4 count of patients after 12 weeks of treatment with ART and other supportive treatment, the majority of patients had CD 4 count below 100 in 25 (29.4%) and least number of patients had CD4 count between 300-400 in 4 (4.7%).

The mean CD4 count at presentation and follow up according to clinical profile is tabulated in Table 5. The highest CD4 counts were observed in patients with pyelonephritis (630 cells/microliter), HIV associated neurocognitive disorder (HAND) (537cells/microliter) and pulmonary TB (336cells/

Symptoms	Number of patients	Percentage
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
Epigastric pain	8	9.4
Vomiting	13	15.2
Generalised weakness	45	52.9
Bleeding	3	3.5
Chest pain	2	2.3
Memory Impairment	6	7.05
Difficulty in moving limbs	6	7.05
Burning micturition	4	4.7
Desquamative rash	1	1.17
Seizure episode	2	2.35

**Table-1:** Distribution according to presenting symptoms

Signs	Number of patients	Percentage
Pallor	27	31.76
Lymphadenopathy	11	12.94
Pedal Oedema	5	5.88
Tachypnoea	17	20
Tachycardia	10	11.76
Temperature	13	15.29
Hypotension	4	4.7
Hypertension	2	2.35
Wheeze	1	1.17
Crepitations	18	21.17
Diminished breath sounds	5	5.88
Hepatomegaly	1	1.17
Splenomegaly	1	1.17
Fluid thrill	1	1.17
Asterixis	1	1.17
Drowsiness	20	23.52
Shifting dullness	1	1.17
Oral Candidiasis	14	16.47
Skin rash	1	1.17
Bronchial breathing	10	11.76
Motor weakness	6	7.05

**Table-2:** Distribution of signs

microliter). The mean CD4 count of less than 100 cells was observed in Cytomegalovirus (CMV) esophagitis, central nervous system (CNS) vasculitis, progressive multifocal leukoencephalopathy (PML) and, Cryptococcal meningitis. After treatment with ART, the CD4 cell count of all patients were done at 12 weeks of follow up. Patients with disseminated TB, extra pulmonary TB had rise in mean CD4 count from 116 to 183 and 197 to 214 respectively. Similar rise in CD4 count were observed in pulmonary TB, HIV associated nephropathy (HIVAN), CNS vasculitis, CMV esophagitis, Cryptococcal meningitis, Candidiasis, chronic inflammatory demyelinating polyneuropathy (CIDP) and,

Clinical Profile	Number of Patients	Percentage
Decompensated liver disease	1	1.17
Extra Pulmonary TB	17	20
Pneumocystis jirovecii pneumonia (PCP)	10	11.76
Candidiasis	12	14.11
Pulmonary TB	12	14.11
Disseminated TB	5	5.88
CMV esophagitis	3	3.52
Pyelonephritis	2	2.35
Idiopathic thrombocytopenic purpura	1	1.17
Colo-colic Intussusception	1	1.17
Aplastic anemia	1	1.17
Strongyloidiasis	1	1.17
HIVAN	2	2.35
CNS vasculitis	2	2.35
Constructive pericarditis	1	1.17
Congestive heart failure	1	1.17
Cryptococcal meningitis	5	5.88
Lymphoma	3	3.52
PML	2	2.35
HAND	3	3.52
CIDP, MNM	3	3.52
HSV encephalitis	1	1.17
Pancreatitis	1	1.17
Cardiomyopathy	1	1.17

HIVAN- HIV associated nephropathy, CNS- central nervous system, PML- progressive multifocal leukoencephalopathy, HAND- HIV associated neurocognitive disorder, CIDP- Chronic inflammatory demyelinating polyneuropathy, MNM- mononeuritis multiplex, HSV- Herpes simplex virus

**Table-3:** Distribution of clinical profile

CD4 counts	No. of patients at presentation (%)	No. of patients at 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)
Total	85 (100)	85 (100)

**Table-4:** Distribution of cd4 counts at presentation

Clinical Profile	Mean CD4 count at initial presentation	Mean CD4 count in follow up
Extra pulmonary TB	197	214
Pulmonary TB	336	367
Disseminated TB	116	183.2
Pneumocystis jirovecii pneumonia	162	144
Candidiasis	209.25	250.33
CMV esophagitis	57	123.3
Pyelonephritis	630	662
HIVAN	186.5	219
CNS vasculitis	98.5	111
Cryptococcal meningitis	79.8	114
PML	68	63
HAND	537	494.6
CIDP	317	377.3
Lymphoma	169	165.6
Mean	225.79	249
Standard Deviation	174.09	169.43

CMV- Cytomegalovirus, HIVAN- HIV associated nephropathy, CNS- central nervous system, PML- progressive multifocal leukoencephalopathy, HAND- HIV associated neurocognitive disorder, CIDP- Chronic inflammatory demyelinating polyneuropathy

**Table-5:** Correlation of mean cd4 count with clinical profile of our patients.

Variable	Rajkondawar AV etal <sup>11</sup>	Sarvepalli AK etal <sup>17</sup>	DoshiTM etal <sup>10</sup>	Present study	
Year published	2017	2017	2018	2021	
Duration of the study (years)	NA	NA	1 year	1 year	
Number of patients	100	200	100	85	
Male;Female ratio	79:21	75:25	58:42	64:36	
Age range in years	12years to 50 years	20 years to 60 years	15 years to 50 years	20 years to 60 years	
Commonest symptom	Fever 71%	Fever 88%	Weight loss 40%	Fever 78%	
Commonest sign	NA	NA	Pallor 54%	Pallor 31%	
CD4count cells/microlitre	At presentation Number of patients in%	At presentation Number of patients in%	At presentation Number of patients in%	At presentation Number of patients in%	Follow up after 12 weeks with ART number of patients in %
<100	6%	61%	85%	34%	29%
100-200	34%	16%	85%	21%	21%
>201	60%	23%	15%	55%	50%
Opportunistic infection with Mean CD4 count	Mean CD4 count	Mean CD4 count	Mean CD4 count	Mean CD4 count	Mean CD4 count
Pulmonary TB	NA	74.5	118	336	367
Extra pulmonary TB	NA	67.5	106	197	214
Disseminated TB	NA	68	117	116	183
Pneumocystis jirovecii pneumonia	NA	35.8	100	162	144
Cryptococcal meningitis	NA	61.2	26	79.8	114
NA - Not available					

**Table-6:** Comparison of results of present study with other published studies

pyelonephritis. But there was a fall in CD4 count in PCP, PML, HAND, Lymphoma and, bacterial pneumonia patients.

## DISCUSSION

HIV infection is a disease that compromises the immune system with CD4 count being an essential part of evaluation and treatment.<sup>9</sup> We studied 85 patients and analysed the data. Age of the patients was between 20 years to 60 years, with maximum number in 30-50 years age group with male preponderance, male to female ratio of 1.7:1. Findings were similar to studies done by Doshi TM et al<sup>10</sup>, Rajkondanwar AV et al<sup>11</sup>, Sharma SK et al<sup>12</sup> (Table 6). Male preponderance may be due to migration, rate of exposure and socio-economic factors.<sup>11,13,14</sup>

The most common symptoms at presentation were fever, loss of appetite, weight loss, malaise and cough which were consistent with studies done by Zuber et al<sup>15</sup>, Doshi et al<sup>10</sup>, Kothari et al<sup>13</sup>, Sircar et al.<sup>14</sup> On general and systemic examination most common finding was pallor, followed by drowsiness, tachypnoea, oral candidiasis which is similar to Doshi TM et al<sup>10</sup> study.

Among the systemic involvement respiratory infections were common like pulmonary tuberculosis, pneumocystis jirovecii pneumonia accounting for the majority followed by gastro intestinal system and then nervous system in our study. This is similar to studies done by Doshi TM et al<sup>10</sup>, S K Sharma et al<sup>12</sup>, Megha A et al<sup>16</sup>, Sarvepalli AK et al.<sup>17</sup> In our study among opportunistic infections (OI), tuberculosis(TB) was commonest with extra pulmonary tuberculosis being more common in 20%, followed by pulmonary tuberculosis

in 14%, disseminated tuberculosis in 5.8%, tubercular meningitis in 14% and abdominal tuberculosis in 2.3% which is similar to studies done by Doshi TM et al<sup>10</sup>, Praveen Kumar et al<sup>18</sup>, Kumarswamy et al.<sup>19</sup> In our study in nervous system, tubercular meningitis was commonest in 14% followed by Cryptococcal meningitis in 6% patients, which is comparable to Doshi TM et al<sup>10</sup>, Sarvepalli AK et al<sup>17</sup> studies.

Candidiasis was second commonest OI seen in 11% patients, which is similar to Doshi TM et al<sup>10</sup> study, but less than Sarvepalli AK et al.<sup>17</sup> Pneumocystis jirovecii pneumonia was third commonest OI seen in 11% patients, similarly reported by Doshi TM et al<sup>10</sup>, Sarvepalli AK et al<sup>17</sup> (Refer Table 6).

In our study majority of the patients presented with CD<sub>4</sub> counts less than 200 in 55% patients, which is similar to study by Doshi TM et al<sup>10</sup>, Rajkondawar AV et al<sup>11</sup>, Sarvepalli AK et al.<sup>17</sup> After follow up of 12 weeks with ART, majority of our patients still had CD<sub>4</sub> count below 100 (29%). Possibly, ART has failed to reconstitute to preinfection levels.<sup>20</sup>

Patients who had mean CD4 counts <100cells/microliter at presentation were found to have CMV esophagitis, CNS vasculitis, PML, and Cryptococcal meningitis which are all considered AIDS defining illnesses suggesting that CD4 counts can play a role in assessment of an HIV infected individual.

During follow up after 12 weeks with ART treatment and other supportive treatment the mean CD4 count improved in our patients with pulmonary tuberculosis from 336 to 367, in extra pulmonary TB from 197 to 214, in disseminated



TB from 116 to 183, in Cryptococcal meningitis from 79 to 114 but there was fall in mean CD4 count in PCP from 166 to 144, in PML from 68 to 63, in HAND from 537 to 494. A possible explanation for this discrepancy maybe that there are effective treatment protocols for TB and meningitis and hence, such patients had a better immunological recovery. The improvement in CD4 counts suggests that it maybe a useful tool for follow up in a few subset of patients when viral loads are not available. Negredo et al opined that CD<sub>4</sub> count at the time of initiation of ART had significant impact on immune system recovery after ART.<sup>21</sup> Our study is the only study which followed mean CD<sub>4</sub> count of all patients at presentation and at 12 weeks of follow up with treatment.

### Limitation

The study had a small number of patients and was conducted over a short period. Viral load and serial CD4 measurements were not done. This makes it statistically weak and difficult to draw definite conclusions.

### CONCLUSION

This study demonstrates the utility of CD<sub>4</sub> count in the assessment and management of HIV infected individuals in a resource limited setting.

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