

CD4 T Cell Count and Opportunistic Infections in HIV-AIDS Patients

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Abstract

Background: Human immunodeficiency virus pandemic is among the greatest health problem ever faced by humanity. AIDS is characterized by a number of opportunistic infections which are responsible for mortality and morbidity. The spectrum of opportunistic infections is ever-expanding. As the disease progresses there is deterioration of immune system of the patient which causes decline in CD4 T cell count. **Aim:** The aim of the present study was to document the correlation of opportunistic infections and CD4 T cell count in HIV infected patients. **Material and Methods:** 40 symptomatic HIV infected patients admitted in various departments at IGMC Shimla were included in the study to find the correlation between CD4 cell count and opportunistic infections. **Result:** It was observed that maximum no. of patients were in the age group of 31-40 years (47.5%) It was found that there were 75% males and 25% were females. Male to female ratio was 3:1. Mean age of the study group was 33.47 (SD 9.577) years. The most common mode of transmission was heterosexual transmission (95%) The commonest opportunistic infection was tuberculosis (50%) followed by oral candidiasis, herpes zoster, oral hairy leukoplakia, cryptosporidium, toxoplasmosis, 30%, 5%, 2.5%, 2.5% and 2.5% respectively. CD4 T cell count of all the patients was done and there was significant decrease in CD4 T cell count in patients with opportunistic infections. CD4 T cell count was between 50-500/cmm... **Conclusion:** The study demonstrates that tuberculosis, oral candidiasis were the most common opportunistic infection in HIV patients. As CD4 T cell count decreases chances of getting opportunistic infection increases. Appearance of opportunistic infections can be used a predictive tool for CD4 T cell count and to start antiretroviral therapy/prophylaxis for opportunistic infections.

Keywords: opportunistic infections, male, female tuberculosis, CD4 T cell.

I. INTRODUCTION

HIV, the virus that causes AIDS “acquired immunodeficiency syndrome” has become one of the world’s most serious health challenge. The first case was reported in 1981. There are approximately 36.7 million people currently living with HIV and tens of millions of people have died of AIDS-related causes

since the beginning of the epidemic. While new cases have been reported in all regions of the world, approximately two-thirds are in sub-Saharan Africa, with 46% of new cases in Eastern and Southern Africa. Many people living with HIV or at risk for HIV do not have access to prevention, care, and treatment, and there is still no cure. HIV primarily affects those in their most productive years; about a third of new infections are among young people (ages 15-24 years) [1], [2].

India has the third largest HIV epidemic in the world. In 2015, HIV prevalence in India was an estimated 0.26% [1]. This figure is small compared to most other middle-income countries but because of India's huge population (1.2 billion) this equates to 2.1 million people living with HIV. In the same year, an estimated 68,000 people died from AIDS-Related illnesses [2]. The HIV epidemic in India is driven by heterosexual sex, which accounted for 87% of new infections in 2015. NACO also categorises truck drivers as a bridge population because truck drivers often have unprotected sex with high-risk groups such as female sex workers as well as their regular partners.

HIV infection leads to profound immunodeficiency resulting primarily from progressive quantitative and qualitative deficiencies of the subset of T-lymphocytes referred to as helper T cells (CD4). In the untreated patient, the CD4+ T cells count falls rapidly and the patient becomes highly susceptible to opportunistic infections like tuberculosis, candidiasis, Pneumocystis carini pneumonia (PCP), cryptococcal meningitis, parasitic diarrhoea, hepatitis, herpes zoster, UTI, etc. Death in HIV infection is mostly due to opportunistic infections. Pulmonary disease is one of the most frequent complications of HIV infection and worldwide approximately 1/3rd of all AIDS-related deaths are associated with tuberculosis. . But the prevalence is variable from country to country and in different regions. The depletion of T-lymphocytes which result from the proliferation of HIV causes the immune system to become severely compromised and the usually benign infectious agents become pathogenic. Global evidence suggests that the overall incidence of opportunistic diseases increases with the degree of immunosuppression resulting from HIV disease progression. The Antiretroviral Therapy (ART) started in the mid 1990s was instrumental in reducing the mortality related to HIV infection. ART

not only reduces the incidence of OIs but also improves survival rate of patients living with HIV. In India, Treatment of Opportunistic Infections (OI) is one of the main goals of comprehensive management to people living with HIV/AIDS, served through Care, Support and Treatment.

II. MATERIAL AND METHODS

This was a prospective study done over a period of one year in the department of medicine and microbiology at IGMC Shimla. The study group included all HIV infected patients admitted in various departments of IGMC Shimla. Diagnosis of HIV was made as per National Guidelines for HIV testing based on E.R.S. (Elisa Rapid and Simple). Necessary pre and post test counseling was done and relevant data collected.

Various specimens were collected as per symptoms and clinical presentation and were processed for various pathogens as indicated using universal precautions. Various samples sputum, blood, urine, stool, CSF, lymph node aspirate were collected as per clinical presentation, using suitable sterile containers. Chest radiograph of every patient was done. Sputum smears were prepared and stained by Gram staining, Zeihl Neelson staining, 1%Nigrosine and Geimsa staining. Stained smears were then examined for bacteria, acid fast bacilli and fungus. Fecal smears were fixed in Schaudinn,^s fluid and screened for pseudohyphae. Cryptosporidia, Microspordia, Isospora belli. Stool culture was done for fungus. CSF was screened for Bacteria, Acid Fast Bacilli and fungus. All patients showing skin and mucus membrane involvement were screened for Budding yeast cells, CT head was done of patients with neurological symptoms. CD4 T cell count estimation was carried out by Fluorescent Activated Cell Sorter System.

III. RESULTS

Majority of the patients were male heterosexual (90%), promiscuous behavior was observed to be the single most important factor. 10% of patients were homosexual. Age and sex distribution is shown in the table no. 1. Majority of the patients were in the age group of 31-50. 75% of the patients were male and 25% were females. 97.5% of patients were from rural background. 73.3% of patients were drivers by profession.

All of the patients were presented with more than one symptom. Various symptoms presented by these patients were fever (90%), weight loss (75%), loss of appetite (75%), weakness (90%), cough with expectoration, chronic diarrhea (30%).

In the present study total 44 events of opportunistic infections were found comprising of bacterial, fungal and parasitic infections. A total of 20(50%) patients were having tuberculosis.

Candidiasis was present in 12(30%) patients. Herpes zoster and AIDS dementia complex was found two patients. Other infections are shown in table 3.

CD4 T Cell count was done in 34 (85%) patients. Out of these CD4 T cell count <50 was found in 10 patients. Another 10 % patients were having CD4 T cell count between 50-100. Overall 85.5 % of patients were having CD4 T cell count < 200 (Table 3).

Table 1. Age (Years) and Sex Distribution of HIV Infected patients.

Age	Male	Female	Total
<30	7	6	13
31-40	17	2	19
41-50	5	2	7
>50	1	0	1
Total	30	10	40

Table 2 CD4 T Cell Count of Patients.

Sr. no.	CD4 T Cell count	No. of Patients
1	<50	10
2	50-100	10
3	101-150	8
4	151-200	1
5	201-250	1
6	251-300	1
7	301-350	1
8	351-400	0
9	401-450	2
10	451-500	0
11	>500	0

Table 3 Opportunistic Infection and CD4 T Cell Count. of HIV Infected Patients

S. No.	Opportunistic infection	No. of patients	Mean CD4 T cell count
1	Tuberculosis	20	87.91
2	Candidiasis	12	95.5
3	Herpes zoster	2	32
4	Oral Hairy Leukoplekia	1	45
5	AIDS dementia complex	2	83
6	Seborrheic dermatitis	1	12
7	Cryptococcus	1	59
8	Molluscum contagiosum	1	12
9	Kaposi's sarcoma	1	134
10	Crptosporidium	1	96

Table 4 Mean CD4 T Cell Count in Various Opportunistic Infections and Comparison with Other Studies.

Opportunistic infection	Mean CD4 T cell count in our study	Mean CD4 T cell count in other studies.
Tuberculosis	87.91	189 Vajpayee et al [12]

Oral Candidiasis	95.5	98 Shobhana A et al [8]
Molluscum contagiosum	12	13 Vozmediano JM et al [13]
Cryptococcal meningitis	59	60 Shaikh Mohammad et al [14]
Kaposi sarcoma	134	169 Crowe et al [15]
Cryptosporidium	96	213 Crowe et al [15]

IV. DISCUSSION

Although the Human Immunodeficiency Viruses are the initial causative agents in AIDS, most of the morbidity and mortality seen in the case of AIDS patient results from the opportunistic infections which take advantage of the lowered cellular immune functions of the patient. The infections encountered in the AIDS patients are of wide variety including bacteria, fungi, viruses and protozoa.

In the present study most common age group affected in males was 31-40 years. Various reports from United States and Africa have also shown similar age group vulnerable to HIV infection. E.O.Idigbe from Lagos, Nigeria found 50% of patients in the age group of 30-39 years [3]. In females most common age group affected was 20-30 years; this observation was comparable to that of Kumarsamy et al [4]. In the present study male to female ratio was 75% and 25%.

Keeping in view profession, (drivers) travelling and sexual behavior, in a male dominant society there is male preponderance of HIV infection in most of the studies. People in certain professions have been found to be more susceptible to infection with HIV. 73.3% of male patients in our study were Drivers. In the study conducted by Vishwanath BM et al drivers and businessman together constituted 77.7% of all HIV infected patients [5]. In our study 97.5% subjects were from rural areas mostly staying away from their respective families because of the nature of their job. Of the 10 females 5 had their husband working as truck drivers, thus staying away from the home for long periods. Unprotected multiple heterosexual contacts with professional sex workers have been demonstrated as predominant mode of HIV transmission, accounting for 70-96%. In our study heterosexual mode of transmission was found in 95%.

In this study most common opportunistic infection was tuberculosis (50%). This observation is comparable to the studies done by Sincar et al [6], Kumarsamy N et al [4], Kothari D et al [7] 54.8%, 61%, 64% respectively.

Oral candidiasis was the second most common opportunistic infection (30%) in our study similar to Shobhana et al. (36%) [8]. Herpes Zoster was found in 5% of patients in our study, which is

comparable to the study done by Jing W et al. 4.3% [9]. As the disease progresses there is decrease in CD4 T cell count which makes patient more susceptible to opportunistic infections. Majority (85%) of the patients were having CD4 cell count <200 cells/cmm, similar (82.6%) to the study done by SK Sharma et al [10]. Mean CD4 T cell count in tuberculosis patients was 87.91 cells/cmm. In studies done by Veeranoot Nissaptron et al [11] CD4 T cell count of patients with tuberculosis was <200 cells/cmm. CD4 T cell count in our patients was less; it may be because we included only admitted patients. CD4 T cell count of patients with various opportunistic infections and comparison with other studies is shown in table below.

V. CONCLUSION

There is a male preponderance over female, with maximum patients from sexually active age group (18-50 years). Hence one should focus on this age group for the prevention of high rate of HIV transmission. As the progresses the immune system deteriorates and CD4 T cell count decreases and patient is exposed to various opportunistic infections. In resource-limited settings, knowledge regarding the prevalence of various opportunistic infections might aid in making decisions regarding empirical treatment and would help to prioritize limited resources. Appearance of opportunistic infection can be taken as a strong evidence of low CD4 cell count. Tuberculosis is the most common opportunistic infection followed by Candidiasis, Herpes zoster, Oral hairy leukoplakia and AIDS dementia complex. With the better knowledge and diagnosis of opportunistic infections in HIV patients, clinicians and health planners can handle the health epidemic in a more effective manner. Specific antimicrobial prophylaxis by itself or in conjunction with antiretroviral therapy can reduce the substantial mortality and morbidity caused by opportunistic infections in HIV patients.

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