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Research Article

CD4 count evaluation in HIV-TB co infection before and after anti-tubercular treatment

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ABSTRACT

Background: The global impact of Tuberculosis (TB) and Human Immunodeficiency Virus (HIV) co-infection is one of the major public health challenge. India has a very high burden of TB according to the WHO. A decrease in CD4 counts in HIV-TB co-infection leads to an increase in morbidity and mortality.
Methods: Information regarding the duration of HIV, type of TB, CD4 counts before and after ATT and any associated Opportunistic Infections (OIs) were collected from the records of 100 patients with HIV-TB co-infection who attended ART centre for a period of one year. The collected data was statistically analyzed.
Results: In the study group, 35 had Pulmonary Tuberculosis (PTB) and 65 had Extra Pulmonary Tuberculosis (EPTB), 40 had OIs. Mean CD4 count prior to ATT in PTB was 197 (7-940), EPTB 192 (13-683) and with OIs 129 (7-288). After completion in PTB was 300, EPTB 302 and 252 in OIs. Least CD4 count of 121 was observed in patients above 50yrs and after completion it was 133. Incidence of both EPTB and PTB was higher in males 66.2% and 62.9%, and in the age group of 31-50 yrs 50.8% and 60% (Cell counts expressed in cells/µl.).
Conclusion: In our study, we found that there was significant recovery of CD4 cells following ATT. Difference in CD4 counts among patients with PTB and EPTB was not significant. There was remarkable reduction of CD4 counts in patients who had other OIs and the recovery after ATT was also marginal.

Keywords: HIV-TB co-infection, CD4 counts, ATT

INTRODUCTION

Concomitant Human Immunodeficiency Virus (HIV) infection and Tuberculosis (TB) is a lamentable medical phenomenon with dreadful social and economic impact across the globe, aptly described as a cursed duet.[1] According to WHO at least one third of 35.3 million people living with HIV worldwide are infected with latent TB. Globally about 14.8% of patients with TB are co infected with HIV. Persons co-infected with HIV-TB are 29.6 times (27.1 - 32.1) more likely to develop active TB disease than persons without HIV. TB is the leading cause of death among people living with HIV, accounting for one in five HIV-related deaths.[2] In India, it is estimated that 62% of HIV positive patients are affected with Tuberculosis (TB) so it is the most common Opportunistic Infection.[3]

HIV increases the probability of recently acquired TB infection to progress to the status of active disease.[4] As HIV progresses there is cutaneous energy, as well as impaired tissue containment of Mycobacteria leading to widespread dissemination of the organism.[5] CD4 counts are critical in the control of infection with Mycobacterium tuberculosis, as quantitative and qualitative deficiency of these effector cells in HIV

infected individuals increases the rate of both primary and reactivation of disease.[6]

Unlike other opportunistic infections which have a selective range of CD4 counts in which the disease occurs, TB occurs throughout the course of HIV. The interaction between HIV and TB in persons with co-infection is bi-directional and synergistic.[5] HIV infection is associated not only with an increased incidence of TB, but with altered clinical manifestations. While pulmonary TB can develop at any level of CD4 counts, extra pulmonary and disseminated forms of the disease is more common as immunodeficiency increases.[5]

Estimation of CD4+ T-lymphocyte is one of the measures of ascertaining the immune competence of the HIV infected individual. This test is generally done in patients with ART to know the response to treatment.

Our attempt was to evaluate the relation of CD4 counts to occurrence and type of TB, and to observe for the recovery of CD4 counts after treatment for Tuberculosis in patients of pulmonary and extra pulmonary tuberculosis with or without Opportunistic Infections.

METHODS

This Retrospective study was conducted with the access data base available in the hospital. 100 Patients who had the dual infection were included for the study. The details regarding the duration of HIV and Anti-Retroviral Therapy (ART), type of tuberculosis pulmonary (PTB) or extra-pulmonary (EPTB), ATT, CD4 counts before and after ATT 6 months of treatment, previous history of TB/ contact with TB infected individuals, presence of opportunistic infections; other associated medical conditions were collected. The study subjects were included in register by the following criteria.

HIV seropositivity was diagnosed by using NACO (National AIDS Control Organisation) supplied Comb-AIDS, Tridot and Triline test kits and tests interpreted as per manufacturers instruction and diagnosis was done as per national guidelines.[7]

CD4 count was performed with FACS (Fluorescent Assisted Cell Sorter) counter, with labelled antibodies. Pulmonary TB was diagnosed when either sputum smear was positive for AFB or when clinical or X-ray findings are strongly suggestive of TB.

Extra-pulmonary TB was defined as the involvement of organs other than lungs like lymph node, pleura, pericardium, meninges, abdomen, bladder, joints and spine. Diagnosis was based on culture, histo-pathological proof, radiological evidence or strong clinical suspicion.

Collected data was statistically analysed with SPSS software for windows, version 13.0. Descriptive statistics and Chi-square test was performed on demographic data.

RESULTS

In the study group of 100 patients, 65 had Extra Pulmonary Tuberculosis (EPTB) and 35 had pulmonary tuberculosis (Table 1).

Table 1: Distribution of types of tuberculosis.

TB	Frequency	Percent
EPTB	65	65.0
PTB	35	35.0
Total	100	100.0

Among the clinical types of EPTB analysed tubercular meningitis was the commonest form of EPTB found, followed by pleural effusion, abdominal tuberculosis and others. The distribution is shown in Table 2.

Table 2: Distribution of types of EPTB and their incidence.

Extra pulmonary tuberculosis (EPTB)	Frequency	Percent
Tubercular meningitis	17	26.2
Tubercular pleural effusion	13	20.0
Tubercular abdomen	13	20.0
Lymphadenitis	12	18.5
Miliary tuberculosis	3	4.6
Disseminated tuberculosis	3	4.6
Spine tuberculosis	1	1.5
Tubercular arthritis	1	1.5
Tubercular cystitis	1	1.5
Tubercular scrotum	1	1.5
Total	65	100.0

Incidence of both EPTB and PTB was higher in the age group of 31-50 years. Lower CD4 count was observed in patients with PTB, who were >50 years of age, and recovery was also minimal and insignificant in this age group. Age wise distribution of the disease and the respective CD4 counts are shown in Table 3.

Table 3: CD4 counts in different age groups.

Ages (years)	TB	No. of patients	Mean CD4 before ATT (cells/µl)	Mean CD4 after ATT (cells/µl)
18-30	EPTB	27	232	347
	PTB	10	243	405
31-50	EPTB	33	164	263
	PTB	21	190	285
50+	EPTB	5	169	319
	PTB	4	120	133

Mean CD4 counts at the incidence of Tuberculosis was <200 cells/µl. Mean CD4 counts in patients with PTB prior to ATT was 197cells/µl (ranging from 7-940) and those in patients with EPTB was 192 cells/µl (13-683).

Following ATT, it was 300 cells/µl (ranging from 21-695) and 302 cells/µl (ranging from 64-695) respectively (Table 4).

No statistically significant difference was observed in CD4 counts between PTB and EPTB, before and after ATT. There is statistically significant difference in CD4 count before and after ATT.

Table 4: CD4 counts before and after ATT.

	TB	Mean	Statistical significance before and after ATT
CD4 before ATT (cells/µl)	PTB	197	0.000 (<0.005 considered significant)
	EPTB	192	
CD4 after ATT (cells/µl)	PTB	300	
	EPTB	302	

In patients with opportunistic infections, mean CD4 counts prior to ATT was 129, after ATT was 133, change was meagre and not significant (Table 5). There is a significant reduction of CD4 counts in patients with OIs.

Table 5: CD4 counts in patients with OIs.

	OI	Mean
CD4 before ATT (cells/µl)	No	240
	Yes	129
CD4 after ATT (cells/µl)	No	336
	Yes	252

DISCUSSION

Tuberculosis is the most common opportunistic infection in HIV seropositives in India.

In our study we found that 65% of the study population had Extra-Pulmonary TB. Study conducted by Ghiya R. Naik et al. showed similar results.[1] Pulmonary TB was found in 35% of the patients. 25 of PTB patients were smeared positive for acid fast bacilli. Other studies have reported a higher incidence of pulmonary TB.[8,9]

Extra pulmonary TB is the commonest cause of Pyrexia of Unknown Origin (PUO) among HIV positive individuals in developing countries.[5] Commonest form of extra pulmonary TB was tubercular meningitis, followed by pleural effusion and abdominal tuberculosis. Gland TB ranks fourth in our study, in contrast to other studies.[7] 3 patients were diagnosed to have disseminated tuberculosis and their CD4 counts were found to be <100 cells/µl. All varieties of EPTB have been described in HIV infected patients. Isolated extra pulmonary localisations are described in 53-63% of TB cases.[4]

Common extra pulmonary sites include lymph nodes (superficial) and pleura; less commonly, the brain, pericardium, meninges, and abdomen are affected. Diagnostic tests for tuberculosis in this population therefore need to be not only more sensitive but also applicable to sites other than pulmonary sites. Furthermore, physicians caring for HIV infected patients need to consider tuberculosis in the differential diagnosis of many different symptom complexes and also screen for tuberculosis regularly.[10] Mycobacteremia has been observed to be an important cause of PUO, particularly among patients with severe immunosuppression, but is difficult to diagnose as it requires facilities to perform blood culture using rapid culture techniques like BACTEC.[5]

CD4 count of <200 cells/µl was observed in patients with PTB and EPTB which correlates with other studies.[11,12] Mean CD4 count of HIV and EPTB was lower when compared with HIV and pulmonary TB. There was no significant correlation between CD4 cell counts and occurrence of type of tuberculosis. There was a statistically significant recovery in the CD4 cell counts following ATT and ART. Similar results are reported by others studies.[4,13,14]

Magnitude of CD4 cell recovery may depend on variety of factors, including maintenance of virologic suppression with ART, age and CD4 count at ART initiation[6]. In this study, minimal recovery of CD4 counts was observed in patients who were >50 years of age.

Significant increase in CD4 cells during treatment for Tuberculosis strongly suggests that TB additionally contributes to subnormal CD4 cell levels in blood.[15] Lower CD4 Counts are associated with more severe systemic infections.[16] Incidence of opportunistic infections is common when the CD4 counts reduces below 200 cells/µl. Similar findings were observed in other studies.[17]

CONCLUSION

As per our study CD4 count in extra pulmonary tuberculosis was lower than in case of pulmonary tuberculosis. There was a significant change in CD4 count after the patient was put on ATT. As per present revised national tuberculosis control programme, all HIV patients needs to be screened for tuberculosis but it is better they are subjected for screening whenever they come to take ART. So that we will not miss any case and in the study we found that there is statistically significant change in their CD4 count before and after ATT. Improvement in the CD4 count protect them against other opportunistic infection also, so it reduces morbidity and mortality improves their life span qualitatively and quantitatively.

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