Research Article

CD4 cell counts recovery in HIV/TB co-infected patients in a tertiary care Hospital

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Abstract: Tuberculosis is a common opportunistic infection and a leading cause of death in HIV patients worldwide, especially in developing countries. The study was conducted 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 tuberculosis and extra pulmonary tuberculosis. This retrospective study was conducted for a period of 2 months (February 2015- March 2015) at Dr. Ram Manohar Lohia Hospital & PGIMER. Total Number of HIV positive patients that came for CD4 testing were 1187. 80 patients who had dual infection (HIV with tuberculosis) were included in the study. Details regarding age, sex, duration of HIV, ART therapy, type of tuberculosis whether PTB or EPTB and ATT were collected. CD4 counts before initiating ATT and after completion of ATT was collected. So, the prevalence rate of tuberculosis in HIV infected patients was found to be 6.7%. Out of 80 patients, 47 patients had extra pulmonary tuberculosis and 33 had pulmonary tuberculosis. Mean CD4 counts in patients with PTB prior to ATT was 241 cells/ µl ranging from (22-541 cells/ µl). Mean CD4 counts in patients with EPTB prior to ATT was 224 cells/ µl, ranging from (80-600 cells/ µl). Following ATT, it was 322 cells/ µl in PTB patients and 303 cells/ µl in EPTB patients. There was statistically significant increase in CD4 count after ATT in PTB and EPTB.
Keywords: HIV, PTB, EPTB, CD4 counts, ART, ATT.

INTRODUCTION

Tuberculosis is a common opportunistic infection and a leading cause of death in HIV patients worldwide, especially in developing countries [1]. There are clinical and experimental evidences suggesting that active TB accelerate the course of HIV disease [1]. HIV infection being an immunosuppressive disease predisposes patient with latent tuberculosis infection to develop tuberculosis disease[2]. In addition, immunosuppression also leads to reactivation of old tuberculosis infection and to previously treated patient being easily re-infected when exposed to a patient with the disease [2]. TB provides a milieu of continuous cellular activation and irregularities in cytokine and chemokine circuits that are permissive of HIV replication [3]. In tuberculosis-HIV co-infection, the clinical features of tuberculosis are altered due to immunosuppression [2]. Estimation of CD4 T-lymphocyte is one of the measures of ascertaining the immune competence of the HIV infected individual. We hypothesized that since TB infection contributes to additional reduction in CD 4counts in HIV/TB patients, there would be greater improvement in CD4 counts following treatment with ATT and ART. Main aim of the study 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 tuberculosis and extra pulmonary tuberculosis.

MATERIALS AND METHODS

This retrospective study was conducted for a period of 2 months (February 2015- March 2015) at Dr. Ram Manohar Lohia Hospital & PGIMER. Total Number of HIV positive patients that came for CD4 testing were 1187. 80 patients who had dual infection (HIV with tuberculosis) were included in the study. Details regarding age, sex, duration of HIV, ART therapy, type of tuberculosis whether PTB (Pulmonary tuberculosis) or EPTB (Extrapulmonary tuberculosis) and ATT were collected. CD4 counts before initiating ATT and after completion of ATT was collected. HIV seropositivity was diagnosed by using NACO approved SD bioline, CombAIDS and trispot test kits interpreted as per manufacturer instruction and diagnosis was done as per national guidelines. CD4 count was performed by FACS Calibur. Collected data was statistically analysed with SPSS software for windows, version 20.0.

RESULTS AND DISCUSSION

In this study we included 1187 HIV positive patients who came for CD4 testing. Out of 1187, 80 patients had dual infection (HIV with tuberculosis). So, the prevalence rate of tuberculosis in HIV infected patients was found to be 6.7%. Out of 80 patients, 47 patients had pulmonary tuberculosis and 33 had extra pulmonary tuberculosis (Table 1). Out of 47 patients of PTB, 40 were male and 7 were female while among 33 EPTB patients 25 were male and 8 were female.

Among the type of EPTB analyzed abdominal tuberculosis was the commonest form of EPTB found, followed by tubercular lymphadenitis, tuberculosis meningitis and spinal tuberculosis. The distribution is shown in table 2.

Mean CD4 counts in patients with PTB prior to ATT was 241 cells/ µl ranging from (22-541 cells/ µl). Mean CD4 counts in patients with EPTB prior to ATT was 224 cells/ µl, ranging from (80-600 cells/ µl). Following ATT, it was 322 cells/ µl in PTB patients and 303 cells/ µl in EPTB patients.(Table 3). Incidence of both EPTB and PTB was higher in age group of 31-40 years. Age wise distribution of the disease and respective CD4 counts are shown in Table 4. There was statistically significant difference in CD4 count before and after ATT in PTB (p value = .000) and EPTB (p value = .006).

Table-1: Distribution of cases of tuberculosis

Tuberculosis	Frequency	Percent
PTB	47	58.8
EPTB	33	41.2
Total	80	100

Table-2: Distribution of cases of EPTB and their incidence

Extrapulmonary Tuberculosis	Number of cases	Percent
Tubercular abdomen	16	48.5
Tubercular lymphadenitis	10	30.3
Tubercular meningitis	4	12.1
Spine tuberculosis	3	9.0
Total	33	100

Table-3: CD4 counts before and after ATT

	Tuberculosis	Mean
CD4 count before ATT (cells/µl)	PTB	241
	EPTB	224
CD4 count after ATT (cells/µl)	PTB	322
	EPTB	303

Table-4. CD4 counts in different age groups

Age (years)	Tuberculosis	Number of patients	Mean CD4 count before ATT(cells/µl)	Mean CD4 count after ATT(cells/µl)
11-20	PTB	4	276	418
	EPTB	0	0	0
21-30	PTB	7	220	373
	EPTB	6	327	374
31-40	PTB	18	273	322
	EPTB	16	187	302
41-50	PTB	14	212	281
	EPTB	9	231	297
51-60	PTB	2	115	153
	EPTB	1	147	101
61-70	PTB	2	376	424
	EPTB	1	105	170

Tuberculosis is the most common opportunistic infection in HIV patients in India [4]. In our study we found that 41.2 % of study population had PTB while 58.8% of study population had EPTB. Magnitude of CD4 cell recovery may depend on variety of factors including maintenance of virological suppression with ART, age and CD4 count at ART initiation [5]. In this retrospective study we compared the change in CD4 counts following ATT and ART in HIV and tuberculosis infected patients.

Additional increment in CD4 counts in patient with co-infection following treatment suggest that CD4 suppression at the onset of TB maybe the direct evidence of Mycobacterium tuberculosis growth[1]. Interaction between TB and HIV have additional effect on CD4 counts as compared to HIV alone [1]. CD4 lymphocyte depletion is known to occur in TB patients not affected with HIV[6] and become normal following ATT [7].

Mean CD4 count before and after ATT in HIV and EPTB patients was lower when compared with HIV and PTB patients.(Table 3)Mean CD4 count in EPTB was lower than in case of PTB. There was a statistically significant recovery in CD4 counts following ATT and ART. Similar results were reported in other studies. In a study conducted by Kavya et al there was a significant increase in CD4 counts before and after ATT & ART in PTB and EPTB [8]. In other study by Wanchu et al there was a greater increment in CD4 counts with ATT and ART in dually infected patients [1]. In the study by Elliott AM, et al. in HIV patients with pleural TB, CD4 count improved following ATT but did not reach statistical significance [9]. In South African patients with dual infection not receiving ART, median CD4 count improved from 186 cells/mm^3 at baseline to 239 cells/mm^3 after 6 months of ATT but the change was not statistically significant [10]. In the prospective study by Kalou M, et al. CD4 count changed from 393 cells/mm^3 at baseline to 370 cells/mm^3 at 12 months of follow-up [11]. Significant increase in CD4 counts during treatment for tuberculosis strongly suggests that TB additionally contributes to subnormal CD4 levels in blood.

In HIV patients affected with TB, TB adds to the immunologic deterioration caused by HIV [1]. Patients with co-infection show elevated levels of pro inflammatory cytokines and increased expression of cellular activation markers [12]. ATT results in decrease level of some of these markers of immune activation and consequently rise in CD4 cell count is expected [13].Our study has few limitations like we did not have data on viral load in our patients as routine viral load testing is not available. Even with this limitation our study provides some evidence in the clinical setting that TB additionally influences the reduction in CD4 count in HIV patients.

CONCLUSION

There was statistically significant increase in CD4 count after ATT in PTB and EPTB. Greater increment in CD4 counts with ATT and ART in dually infected patients suggests that TB additionally influences the reduction of CD4 counts in HIV patients.

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