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Evaluation of CD4 Cell Count and its Associating Factors - In HIV-TB Co-Infection

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A B S T R A C T

HIV/AIDS is a serious life threatening disease. The interaction of TB & HIV is two-fold, with TB being the leading cause of death among HIV infected patients. A decrease in CD4 count in HIV-TB co-infection, leads to an increase in morbidity and mortality. So this study was done to evaluate the CD4 cell count and its associating factors in HIV-TB co infection to estimate their immune status. This was a retrospective study, conducted in Jawahar Lal Nehru Medical College & associated group of Hospitals, Ajmer, Rajasthan, India. A total of 289 HIV-TB co- infected patients attending ART centre, from January 2015 to December 2016 were enrolled in this study. CD4 count was done by BD FACS count. Statistical analysis was performed with the SPSS. A total of 289 HIV/AIDS sero-positive cases on ART having co-infection of TB were included in the study. In our study EPTB patients160 (55.36%) were higher in number as compared to PTB patients106 (44.64%). In majority of cases CD4 count was <200cells/µl which were 171 (59.17). A significant correlation was observed with age & CD4 count. Extra-pulmonary & sputum negative pulmonary HIV-TB patients outnumbered the sputum positive HIV-TB co-infected patients, which concludes that a newer & better test is required.

Introduction

AIDS/HIV has become a worldwide epidemic, affecting different populations and geographic areas and has become the most important public health problem (Geo *et al.*, 2013). An estimated 36.7 million people were infected with HIV, globally, in 2015, out of which 2.1 million were new infections. People living with HIV accounted for 1.2 million (11%) of all new TB cases worldwide. India has been reported to be in the 0–4.9% zone of HIV prevalence in new TB cases. Globally in 2015, 55% of notified TB patients (3.4 million) had a documented HIV test result, an 18-fold increase in testing coverage since 2004 (Global Tuberculosis Report,

2015). According to sentinel surveillance held in 2014-2015 in India, HIV prevalence was 0.26%. Adult HIV prevalence for males was 0.30% and that of females was 0.22%.The most common age group affected was 15–49 years (National AIDS Control Organisation, 2015)

HIV mainly affects the CD4 cell count, as the infection progresses, the CD4cell count declines. These cells play a major role in body defense against various opportunistic infections, of which the most common is Tuberculosis (TB) (Sameer *et al.*, 2011) Worldwide, in 2015, approximately 1.2

million people were HIV-TB co infected & 0.4 million people died with HIV-TB co-infection (Global Tuberculosis Report, 2015). Approximately 60-80% of HIV- TB co-infected patients have pulmonary Tuberculosis (PTB), and 30-40% have extra pulmonary TB (EPTB). As the infection progresses there is advanced immune-suppression in HIV-infected persons & incidence of EPTB rises (Fauci *et al*., 2015).

HIV-TB co-infection is one of the most health challenging issues worldwide, especially in developing countries like India. HIV- TB co-infection is associated with special diagnostic and therapeutic challenges and constitutes an immense burden on healthcare systems. Globally, HIV is threatening the control of TB. Treatment of co-infection with HIV and TB requires commitment and a focused approach. Appropriate use of antiretroviral drugs to treat HIV infection and ensuring high levels of coverage and compliance is required to prevent TB by preserving immunity.

Against this background, the present study was aimed at evaluation of CD4 cell count and its associating factors in HIV-TB (Pulmonary and extra-pulmonary) co infection to estimate their immune status.

Materials and Methods

This was a hospital based observational, descriptive & retrospective type of study conducted on a total of 289 HIV-TB co-infected patients in ART centre of JLN Medical College & associated group of Hospitals, Ajmer. The two year data was collected from January 2015 to December 2016 of the HIV-TB co-infected patients. The patients on ART were included in the study. Clinical profile & data of other investigations like cytology, fine needle aspiration and biopsy, acid fast bacilli staining for sputum and other body fluids, culture, cartridge based

nucleic acid amplification test, X ray, computed tomography scan, renal function test and liver function test was also retrieved. HIV infection was determined by detection of anti-HIV antibodies by dot immunoassay, immuno-chromatography and immuno-filteration (National AIDS Control Organisaiton, 2015). The data of CD4 cell count was taken from CD4 laboratory in ART centre JLN Medical College& Hospital, Ajmer and was done by BD FACS count (Becton Dickinson Immunocytometery System, San Jose, CA, USA).

Statistical Analysis

Statistical analysis was performed with the SPSS, Trial version 23 for Windows statistical software package (SPSS inc., Chicago, il, USA) and Primer. The Categorical data were presented as numbers (percent) and were compared among groups using Chi square test. The quantitative data were presented as mean and standard deviation and were compared using by students t-test and ANOVA Test and post Hoc Test Turkey Test applying to find out the most significant groups among all the groups. P value <0.05 was considered statistically significant.

Results and Discussion

The total study population was 289 cases in two years of duration. In year 2014 -15, 144 (49.83%) and in Year 2015 -16, 145 (50.17 %) cases attended the hospital. The most common age group of HIV TB co-infection was >40 year (35.64%) followed by 30-39 Years 94(32.53%). Males outnumbered the females (77.16% vs 22.84%). According to CD4 cell Count, 171(59.17%) cases were in range of less than and equal to 200 cells/□ lof CD4 count. Only 27 (9.34%) cases, were ≥500 cells/□ lCD4 cell Count. (Table no 1).In our study maximum patients had EPTB which were 160(55.36%) which was followed by

SP-TB 106 (36.68%) (Figure no.1) Association of Age and CD4 cell count with HIV-TB co- infection status was statistically significant (Table no 2).

In our study CD4 cell count was significantly less than 200 cells/µl in older age groups as compared to younger age group in which the CD4 cell count was greater than 500 cells/µl. No significant association with gender was observed (P=0.076NS). There was no significant association was observed with CD4 cell count with type of TB infection (Table no 2).

In our result we observed a higher number of patients whose had CD4 cell count <200 cells/µl were Extra-pulmonary TB 98 (61.25%) as compared to the Pulmonary TB cases 73 (56.58%). The Mean CD4 cell count in Sputum negative cases was 252.79±248.99 followed by EPTB & Sputum positive cases which was 203.38± 188.132 & 175.30±154.452.73 (56.58%). There was no significant association observed between CD4 cell count and type of TB infection (P=0.102NS).

The harmful association between the HIV and tuberculosis epidemics has added dramatically to the suffering and death caused by each disease alone. HIV/AIDS affects mainly the CD4 cell count, as there is decrease in the cell count the chances of opportunistic infection increases. The most common opportunistic infection in AIDS is TB. The HIV-TB co-infection is the emerging threat and most health challenging issues globally.

This study was done on 289 HIV-TB coinfected patients. The most common age group of HIV TB co-infection was >40 year 103(35.64%). Our finding were similar to Siddeswari *et al.,* (2016) in which there were 37.50% cases, whereas Mihir Bhattacharya *et al.,* (2011) reported slightly higher number of cases in which there were 45% cases affected in the same age group. This may be due to the fact, that, as the age progresses the immunity decreases (Mihir *et al*., 2011; Siddeswari *et al*., 2016). In this study males were affected more than females which was 223(77.16%). Ketki Jangid *et al.,* (2015) & Amara Ezeamama *et al.,* (2015) also reported males to be in higher number which were 81.25% & 57% respectively. This may be because of the reason that the male has to migrate for occupation and stay away from spouse for a longer period.
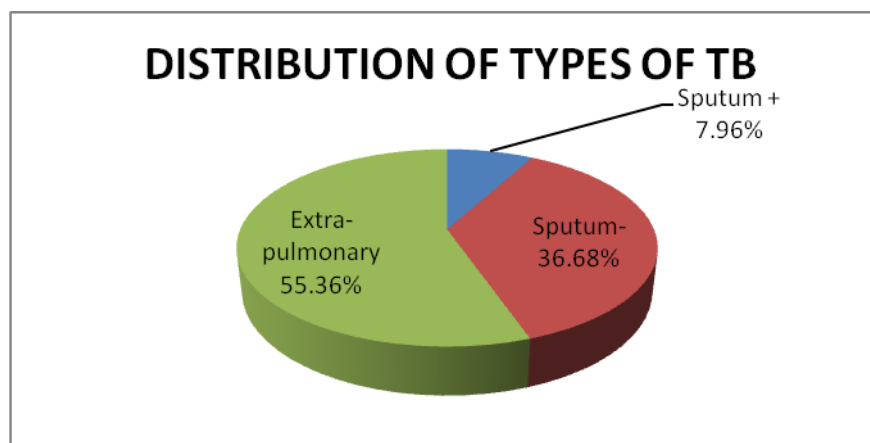
Table.1 Demographic profile of the study population

Age Group(years)	Number (%)
<20	36 (12.46)
20-29	56 (19.38)
30-39	94 (32.53)
>40	103 (35.64)
Sex	**Number (%)**
Female	66 (22.84)
Male	223 (77.16)
CD4 cell count (cells/µl)	**Number (%)**
≤200	171 (59.17)
201-350	62 (21.45)
351-500	29 (10.03)
≥500	27 (9.34)

Table.2 Associating Factors of CD4 cell count(cells/µl)

Age Groups(Years)	CD4≤200 N=171		201-350 N=62		351-500 N=29		≥500 N=27		Total 289	P Value LS
<20	11	30.56	11	30.56	5	13.89	9	25.00	36	
20-29	31	55.36	10	17.86	9	16.07	6	16.67	56	
30-39	55	58.51	21	22.34	9	9.57	9	25.00	94	
>40	74	71.84	20	19.42	6	5.83	3	8.33	103	<0.001S
Sex										
F	33	50.00	16	24.24	12	18.18	5	13.89	66	
M	138	61.88	46	20.63	17	7.62	22	61.11	223	0.076NS
TB status										
Sputum+	18	78.26	2	8.70	2	8.70	1	2.78	23	0.33NS
Sputum-	55	51.89	28	26.42	11	10.38	12	33.33	106	0.33NS
Extra-pulmonary	98	61.25	32	20.00	16	10.00	14	38.89	160	1.0NS

Fig.1 Distribution of types of tuberculosis

In our study, 160 (55.36%) cases were EPTB followed by 129(44.64%) of PTB. Our study was comparable with Kavya *et al.,* (2014) in which it was 65% &35% respectively. Out of the total PTB cases in our study Sputum-(SP) TB and Sputum + (SP+)TB cases were 106 (36.68%) & 23 (7.96%) cases, respectively, Leandro Cruz Campos *et al.,* (2014) also had the similar findings which was 41.10% &36.20%,respectively. Maximum cases i.e 171(59.17%) had CD4 cell Count of less than and equal to 200 cells/□ lof CD4 count. Our results correlated with Yasmin *et al.,* (2016) and Siddeswari *et al.,* (2016), in which there were 60.38%&60% cases respectively, as there is decrease in CD4 cell count there is increase in opportunistic infections. In our study, age group had a significant association. CD4 cell count of ≤200 cells/□ l was significantly more in older age groups

74(71.84%) as compared to younger age group, which was also echoed in study done by Ketki Jangid *et al.,* (2015) 63%. This is in accordance with the fact that the CD4 cell count decreases with the advancing age.

A higher number patient with Extra-pulmonary TB 98(61.25%) was observed to have CD4 cell count ≤200 cells/µl as compared to the Pulmonary TB cases 73(56.58%). Kavya *et al.,* (2014) reported 58.46% EPTB and 41.64% of PTB in the range CD4 cell count ≤200 cells/µl which was comparable to our results. The direct correlation of all kind of tuberculosis and CD4 cell count depletion was observed. It was also observed that as the age advances the immunity tapers down. Also, the co infection was seen more in male patients, so it is suggested increase monitoring and nutritional support as adjunct therapy should also be considered. Extra-pulmonary and sputum negative pulmonary HIV-TB patients outnumbered the sputum positive HIV-TB patients, which concludes that a newer & better diagnostic test is required.

Acknowledgement

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