



A Study of Tuberculosis and HIV Co-infection and Its Correlation with CD4 Count

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ABSTRACT

Background: Tuberculosis is most common in India. TB is the cause of one third deaths of HIV. HIV not only increases susceptibility to M. Tuberculosis infection but also increases rate of progression from infection to active disease.

Aims and objectives: To assess clinical manifestations, radiological profile & diagnostic usefulness of sputum smear microscopy for AFB in TB/HIV coinfectd patients in relation to CD4 count.

Materials & Methods: Present study is retrospective study of 100 adult patients having co-infection with TB/HIV. Detailed clinical history, physical examination and necessary laboratory investigation were analyzed.

Results: Majority of patients (75 %) were male and 81% of patients were in reproductive age group. CD4 count varied from 22 to 619. Majority of patients had Pulmonary TB(PTB) (63%), isolated Extrapulmonary TB(EPTB) was found in 21%, Disseminated TB(DTB) was common (43%). Majority (44%) had CD4 between 200-400. Sputum AFB negativity was greater than positivity (51.72 % versus 48.27 %) among PTB cases .With CD4 >200, positivity was higher and with CD4 <200, negativity was higher.

Conclusion: Patients with TB/HIV co-infection are predominantly male of reproductive age group. As CD4 count decreases Sputum smear positivity for AFB decreases.

Key Words: HIV/TB Coinfection, CD4 COUNT, DTB, EPTB, CXR in HIV/TB

INTRODUCTION

Among the various respiratory diseases, tuberculosis (TB) is the most common in India. Mycobacterium tuberculosis (M. Tuberculosis) has highly sensitive social impact. Spread of tuberculosis infection with multidrug resistant organisms is a great threat to society and particularly to medical and paramedical personnel.

It has been shown that HIV not only increases the susceptibility to M. tuberculosis infection but also increases the rate of progression from tuberculous infection (recent or latent) to the active TB disease. This risk increases with increasing immunosuppression. TB is the cause of one third deaths of HIV.^{1,2}

By producing a progressive decline in cellmediated immunity, HIV alters the pathogenesis of TB, greatly increasing the risk of disease from TB in HIV-co infected individuals and leading to more frequent extra pulmonary involvement, atypical radiographic manifestations, and paucibacillary disease, which can impede timely diagnosis³.

HIV infection has contributed to a significant increase in the worldwide incidence of TB^{4,5,6}. The risk of developing TB is estimated to be between 16-27 times greater in people living with HIV than among those without HIV infection. In 2015, there were 10.4 million new cases of TB globally, of which 1.2 million were among people living with HIV⁷. India bears the burden of 2.5 million people

infected with HIV. Of these, 40% suffer coinfection with TB.⁸

In 2013 WHO has estimated HIV among incident TB patients is 5.7% , among them 6.1% are MDR TB cases are seen.⁹

A large scale population based survey in Gujarat and Maharashtra has indicated multi- drug resistance (MDR-TB) level of < 3% among new TB cases and 14-17 % among previously treated TB patients. However, this translates into a large absolute number of MDR –TB cases, with an estimated annual incidence of 131,000 cases in the country⁹. People living with HIV infection are facing infection with MDR TB and extensive drug resistance (XDR TB) more than people without HIV infection¹⁰.

The main objective of this study is to find out correlation of CD4 count with HIV/TB coinfection so that early measures can be taken to prevent progression of infection to active disease.

MATERIAL & METHOD

The present study is a retrospective study of 100 adult (age >12 years of age) patients having coinfection with TB/HIV (either of them preceded or followed by other) attending TB & chest Out Patient Department or hospitalized of Sharda ben General Hospital Ahmedabad during period of year 2013 to 2015 and data was analyzed in year 2016.

A detailed clinical history and complete (general and systemic) physical examination and necessary laboratory investigation were analyzed and dually recorded.

Diagnosis of HIV: The diagnosis of HIV seropositivity was done at Voluntary Counselling and Testing Centre .

Diagnosis of TB: Apart from clinical manifestation and contact history, the diagnosis of TB was based on (i) sputum smear Acid Fast Bacilli(AFB) examination (ii) Chest radiograph-PA View(CXR-PA) (iii) Mantoux test (iv) Fluid analysis (v) cytology (Fine Needle Aspiration Cytology) of concerned tissue (vi) Sonography abdomen.

RESULTS

This study was conducted on 100 patients. In our study proportion of male was more among the HIV/ TB coinfectd cases as compared to females (75 males and 25 females) and also more common in reproductive age group. Mean age in present study was 35.99 years (Table 1).

Table 1: Age and Sex distribution (n=100)

Age group (years)	Male(%)	Female(%)	Total (%)
20 to 30	21(21)	12(12)	33(33)
31 to 40	38(38)	10(10)	48(48)
41 to 50	13(13)	01(01)	14(14)
51 to 60	02(02)	01(01)	03(03)
> 60	01(01)	01(01)	02(02)

Table 2: Distribution of presenting symptoms

Symptoms	Number (n=100) (%)
Fever	93 (93)
Wt. loss	48 (48)
Chronic diarrhea	29 (29)
Cough	76 (76)
Breathlessness	44 (44)
Chest pain	28 (28)
Hemoptysis	10 (10)
Abdominal pain	20 (20)
Fatigue/weakness	66 (66)
Pallor	42 (42)
Oral Thrush	36 (36)
Lymphadenopathy	31 (31)
Others *	88 (88)

* Others includes headache, convulsions, odynophagia, swelling, vomiting, herpes labialis, burning feet

Table 3: Relation of Type TB to CD4 Count (N=100)

TB type	CD4 Count (%)				Total
	< 100	100-199	200-400	> 400	
PTB	03(03)	14(14)	16(16)	03(03)	36(36)
EPTB	04(04)	06(06)	11(11)	00(0)	21(2)
DTB	05(05)	18(18)	17(17)	03(03)	43(43)
Total	12(12)	38(38)	44(44)	06(06)	100(100)

DTB =EPTB + PTB

Table 4: Distribution of Radiological Lesion on chest x-ray PA view

Radiological lesion	<200 (n=50)	>200 (n=50)	Total (n=100)
Infiltration	22 (44)	24 (48)	46(46)
Pleural effusion	10 (20)	6 (12)	16(16)
Milliary shadow	4 (8)	3 (6)	07(07)
HL/ML lymphnode	9 (18)	5 (10)	14(14)
Cavity	3 (6)	2 (4)	05(05)
Pneumothorax	0 (0)	1 (2)	01(01)
Consolidation	0 (0)	2 (4)	02(02)
Nodule	0 (0)	2 (4)	02(02)
Healed/fibrotic lesion	0 (0)	1 (2)	01(01)
Bronchiectetic changes	0 (0)	3 (6)	03(03)
Pericardial effusion	1 (2)	0 (0)	01(01)
Normal	1 (2)	1 (2)	02(02)

Figure in parenthesis indicate percentage

Of 100 cases studied, 58 % of patients had been already diagnosed as HIV positive when TB was diagnosed while remaining 42 % cases were diagnosed as having HIV infection for the first time at time of TB diagnosis when HIV status was screened. Out of 58 patients who were already in-

ected with HIV, 55 % of them were on Anti Retroviral Therapy (ART) before affected by TB while 44 % were not put on ART and developed TB.

Common presenting clinical features in this study were fever (93%), Cough (76%). Easy fatigability and generalized weakness was found in 66 % of cases, Weight loss 48 %, chronic diarrhoea 29% were also common general symptoms. In Extra pulmonary tuberculosis (EPTB) cases, abdominal pain (20%) had been the commonest followed by headache in 12%, vomiting 8% and history of convulsion in 4%. Most of the patients in study group presented with multiple symptoms (Table 2).

In the present study, CD4 count was done in every case which shows 44% of patients had CD4 count between 200 to 400, 38 % patients having CD4 between 100 to 199, 12 % of cases had CD4 less than 100 while only 6% patients had CD4 of more than 400. The mean CD4 count was 213 .89(Table 3). Distribution of number of cases of PTB , DTB, EPTB according to CD4 count is shown in (Table3).

In present study typical CXR lesions were found in 17.46% cases with CD4 <200 and in 22.22% patients with CD4 > 200 . Atypical presentation was there in 33.33% cases with CD4 less than 200 while in 26.98% cases with CD4 >200. This clearly indicates overall greater number of atypical CXR (61.28%) than typical lesions on CXR (38.70%).

Radiologic analyses in present study shows that 46% of patients had infiltrates on Chest X Ray PA view (44% and 48% cases with CD4 <200 and CD4 > 200 respectively), 16% patients had pleural effusion (20% and 12% cases with CD4 <200 and CD4 > 200 respectively), 7% had military shadows on CXR, 14% had lymphadenopathy (18% and 10% cases with CD4 <200 and CD4 > 200 respectively). Only 5% had cavity on chest X- Ray. 2% had normal X ray, some of patients had pneumothorax or fibrotic lesion or pericardial effusion on CXR. (Table 4)

Table 5: Anatomical Presentation of EPTB (n=64)

Type of the lesion	Cases (%)
Pleural effusion	19 (29.68)
External Lymphadenopathy	31 (48.43)
Ascites / GIT	26 (40.62)
CNS	9 (14)
Spine	1 (1.56)
Pericardial effusion	1 (1.56)

Table 6: Sputum Smear AFB Positivity of PTB Cases (n=58)

Sputum AFB report	CD4 <200(%)	CD4>200(%)	Total
Positive	13 (22.41)	15 (25.86)	48.27%
Negative	17 (29.31)	13 (22.41)	51.72%
Total	30 (51.72)	28 (48.27)	100

Our study shows 64% EPTB cases , 36 % of cases had isolated pulmonary involvement. Out of 64% EPTB cases 43% had disseminated TB(DTB) which involves pulmonary as well as extrapulmonary site while 21% had single organ involvement other than pulmonary site. Of these EPTB cases lymphadenopathy was the commonest (48.43%) followed by Koch’s abdomen which is 40.62%(Table 5)

Of the 63 patients having pulmonary involvement, result of sputum for AFB stain was available in 58 cases; in the rest it was unavailable because they were not able to produce sputum. Sputum smear for AFB was positive in 48.27 % and negative 51.72 %. As we can draw inference from the table that sputum smear for AFB positivity decreases as CD4 count goes down. (Table 6)

DISCUSSION

In present study we present data of 100 patients. Most (81%) of the study patients in the present study belonged to the age group of 20-40 years which is sexually active age group. This high incidence of co-infection in this high risk age group has also been reported by other studies from India. In Rajasekaran et al ¹¹study it was 84.6% while in R. Prasad et al¹² it was 87.1%.

In the present study 75% of patients were males. This striking male predominance has also been noted by Rajasekaran et al 2000, R. Prasad et al 2004, Tripathy S. et al 2011¹³ and Vijay S. et al 2011¹⁴ .The male predominance seen may be due to migrating male populations and social customs .

Our study shows 64% EPTB cases among total TB 100 cases, 36 % of cases had isolated pulmonary involvement. Patel et al 2011¹⁵ reported 60% cases of EPTB. In the current study DTB was the most common (43%) , followed by pulmonary TB 36% and only EPTB 21% while study done by Praveen Kumar et al¹⁶ shows DTB was 35.72% , pulmonary TB 54.76 and EPTB 9.52% .

In the current study, pulmonary infiltrates were noted in 47% cases, while others have reported them in range of 45.2% (by Prasad R¹²). Second most common finding in current study was pleural effusion 19%, similar to Swami-nathan et al study (12%).Variation in the frequency of cavitation was observed from 5% in present study, 14% Swami-nathan et al study¹⁷. Miliary pattern was seen in 7% cases in current study, a higher numbers were noted by Swami-nathan et al study (17%) and Praveen Kumar et al study (16.8%). Pericardial effusion and pneumothorax were seen in 1% cases each in present study. Normal CXR presentation was found in 2% cases in present study which is comparable to 3.2% by Prasad R study.

A higher percentages(9%) of CNS TB (meningitis) was found in current study while other study has reported it in range from 2.4% in Praveen Kumar et al study to 5.94% in Tambrum study¹⁸. A slight lesser incidence of pericardial effusion (1%) and pneumothorax (1%) was noted in current study while study done by Tambrum study¹⁸ have reported them in up to 6.13% of cases.

In the current study, there was only marginal difference in sputum AFB smear positivity (48.27%) and negativity (51.72%) which is in accordance with study Sameer Singhal et al¹⁹ while other study has noted a higher rate of smear negativity ranging from 67.7% in Rajasekaran et al.¹¹

In study group positivity for sputum smear AFB decreases as CD4 count decreases 25.86% in CD4 >200 and 22.41 in CD4 <200, study by Sameer Singhal et al 2011 also shows decreasing trend of sputum smear AFB positivity as CD4 count decreases.

CONCLUSION

HIV Tb coinfection affects more commonly reproductive age group persons. Clinical presentation of TB among HIV infected individuals varies with CD4 count, as CD 4 count decreases chances of getting infection increases. Patients with low CD4 count present mostly with atypical chest X- Ray findings and so is the case with EPTB (more common than PTB in HIV infected patients). Sputum smear for AFB will also be negative as CD4 count goes down.

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