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A COMPARATIVE STUDY OF CLINICO-RADIOLOGICAL FINDING OF PULMONARY TUBERCULOSIS AMONG HIV SERO-POSITIVE WITH HIV SERO-NEGATIVE PATIENTS

Medicine

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ABSTRACT

BACKGROUND: WHO estimated burden of tuberculosis in HIV among estimated incident TB patients was 5.0% (4.5%– 5.4%) in India.Diagnosis of tuberculosis among HIV infected persons is often delayed, and is difficult to make since HIV-infected persons with tuberculosis are more likely to have negative sputum smears and minor or non-specific X-ray abnormalities. AIM: To compare clinical and radiological finding between HIV seropositive and HIV seronegative new pulmonary tuberculosis cases.

METHOD: This was a prospective study conducted in the department of Respiratory Medicine,R.N.T.Medical College, Udaipur, Rajasthan on total 100 new pulmonary tuberculosis cases consisting 50 HIV seropositive and 50 HIV seronegative, above age of 15 years.Blood investigations, CD4 count, chest x-ray, sputum examination for AFB, sputum / BAL for CBNAAT was performed (in sputum smear negative cases and all HIV seropositive cases).

RESULTS: Majority were in age group of 20-39years (54%) and with male predominance. Cough was the predominant respiratory symptom in both groups followed by expectoration, Dyspnoea, chest pain and blood in sputum. Chest pain was more common in HIV seropositive(52%vs 18%). Fever was more common in HIV seronegative (96%) PTB as compared with HIV seropositive(82%)whereas weight loss, weakness and anorexia was more common in HIV seropositive PTB cases. Lymphadenopathy,pallor,edema and oral thrush were more common in HIV seropositive PTB cases.Most of the study subjects had moderate to far advanced disease and bilateral radiological involvement. Mid and lower zone involvement was more in HIV seropositive PTB cases(76%vs46%). Infiltration was the most common presentation seen both in HIV seropositive and HIV seronegative PTB. Consolidation was significantly more common in HIV seronegative PTB cases .Cavity was present only in 8% HIV seropositive and 20% seronegative PTB cases. Other presentation was infiltration with hilar enlargement, infiltration with pleural effusion, military mottling.

CONCLUSION: Clinico-radiological presentation of pulmonary TB differs between HIV-seropositive and HIV-seronegative patients due to progressive immunodeficiency from HIV infection.

KEYWORDS

Hiv, Pulmonary Tuberculosis, Clinical And Radiological Features.

INTRODUCTION:

As per WHO Global TB Report, 2015, out of the estimated global annual incidence of 9.6 million TB cases, 2.2 million were estimated to have occurred in India. WHO estimated burden of tuberculosis in HIV among estimated incident TB patients was 5.0% (4.5%– 5.4%) in India. There exists a synergistic relationship between TB and HIV. The interface between TB and HIV is increased in countries like India where both TB and HIV infection are maximally prevalent in people of 15-49 years of age. Also, the socioeconomic factors of poverty, ignorance and stigma are common to both the disease. HIV infection is a most common risk factor to activate latent tuberculosis and usually associated with rapid progress of infection toward disease. Diagnosis of tuberculosis among HIV infected persons is often delayed, and is difficult to make since HIV-infected persons with tuberculosis are more likely to have negative sputum smears and minor or non-specific X-ray abnormalities. Early detection of TB, effective TB treatment, and prompt linkage to HIV care and early initiation of treatment can mitigate the impact of TB on the health and survival of PLHIV. To effectively control the dual burden of HIV and TB co-infection, the National AIDS Control Programme (NACP) and RNTCP have been undertaking joint collaborative efforts since the year 2001.On review of various literature which stated atypical presentation of pulmonary tuberculosis in HIV seropositive patients in their studies, we also planned this study at T.B. & chest hospital attached department of Respiratory medicine, RNT Medical college Udaipur, Rajasthan.

METHODS: This was a prospective study conducted in the department of Respiratory Medicine, R.N.T. Medical College, Udaipur Rajasthan on 100 New Pulmonary TB cases; 50 cases were HIV seropositive and 50 cases were HIV seronegative.We got approval from the ethical committee of this medical college for the present study. Written informed consent from the study population was obtained prior to the study. Patients with signs and symptoms suggestive of TB including cough >2 weeks, fever >2 weeks, significant weight loss, hemoptysis and any abnormality in chest radiograph, were our study population. The demographic profile, socioeconomic status, occupation, personal history, family history of TB, clinical history and previous ATT history of each patient were carefully assessed and documented. In them detailed history and physical examination was done. Blood investigations, CD4 count, MT ,chest x-ray, sputum smear examination by microscopy under RNTCP, sputum / BAL for CBNAAT was performed (in sputum smear negative cases and all HIV seropositive cases). The CXR presentations were classified according to site, extent, and type of lesion. We analysed the respiratory symptoms, constitutional symptoms, physical signs and radiological presentation in both groups to find out any significant relationship.

Statistical analysis: All data were entered in predesigned proforma formed in Microsoft Excel version 7 and Statistical Package for Social Sciences ver. 16 (SPSS. 16) and results were analysed using appropriate statistical tests e.g. Chi square test and 't' test. P value less than 0.05 was taken as statistically significant difference.

RESULTS:

Table 1.Characteristics of study population

Characteristics	HIV seropositive PTB (n=50)	HIV seronegative PTB (n=50)
Male: female	3.5 : 1	1.9 : 1
Age <20 20-39 40-60	1 25 24	4 29 17
Marital status Married Unmarried	41 9	45 5
Rural : urban	2.1: 1	2.8:1
Literate: illiterate	32:18	28:22
MT positive	16(32.00%)	40(80.00%)
Sputum positivity	36(72.00%)	42(84.00%)

Table 1 shows that maximum number of cases in both groups belonged to age of 20-39years (54%) with male predominance (72%) and male: female ratio in HIV seropositive and HIV seronegative pulmonary

tuberculosis cases was 3.5 : 1 and 1.9 : 1 respectively. Most of them were Married and litrate. CD4 count of most of the HIV seropositive PTB case was above 200 (56%). MT was positive only in 32% HIV seropositive PTB cases as compared with HIV seronegative PTB cases where 80% had positive result which was statistically significant(P<0.001). Sputum smear positivity for AFB was recorded in 72% HIV positive and 84% HIV seronegative PTB cases. There was no statistical difference between the two groups.

Table 2: Symptoms of pulmonary tuberculosis in HIV seropositive and HIV seronegative pulmonary tuberculosis cases.

Symptoms	HIV seropositive PTB (n=50)		HIV seronegative PTB (n=50)		P value
	No.	%	No.	%	
Cough	48	96.00%	50	100.00%	0.15
Expectoration	46	92.00%	49	98.00%	0.17
Dyspnea	42	84.00%	34	68.00%	0.06
Chest Pain*	26	52.00%	9	18.00%	<0.001
Blood in Sputum	8	16.00%	14	28.00%	0.15
Fever*	41	82.00%	48	96.00%	0.02
Weight Loss*	38	76.00%	20	40.00%	<0.001
Weakness*	38	76.00%	10	20.00%	<0.001
Anorexia*	27	54.00%	8	16.00%	<0.001
Night Sweats	32	64.00%	29	58.00%	0.54
Diarrhoea	8	40.00%	4	40.00%	0.22
Gen. Weakness	4	20.00%	3	30.00%	0.69
Odynophagia	3	15.00%	0	0.00%	0.08
Pain Abdomen	5	25.00%	3	30.00%	0.46

*P value < 0.05

Table 2 shows that Cough was the predominant symptom in both groups present in 96% HIV seropositive and 100% HIV seronegative PTB cases which was followed by expectoration (92% vs 98%), Dyspnoea (84% vs 68%), blood in sputum (16% vs 28%) and chest pain(52% vs 18%). Chest pain was more common in HIV seropositive as compared to HIV seronegative PTB cases which was statistically significant .(p <0.001)

Fever was the most common constitutional symptom experienced more by HIV seronegative (96%) PTB cases as compared with HIV seropositive(82%)and was statistically significant. Symptoms such as weight loss (76% vs 40%), weakness (76% vs 20%), and anorexia (27% vs 8%) was more common in HIV seropositive PTB cases . Other symptoms were night sweats (64% vs 58%), diarrhea (40% vs 40 %), weakness (20% vs 30%),odynophagia (15% vs 0%)and pain abdomen(25% vs 30%).

Table3. Radiographic features of pulmonary tuberculosis in HIV seropositive and HIV seronegative pulmonary tuberculosis cases.

Characteristics	HIV seropositive PTB (n=50)	HIV seronegative PTB (n=50)	P value
Site of lesion			
Unilateral	21 (42.00%)	19 (38.00%)	0.68
Bilateral	29(58.00%)	31(62.00%)	
Radiological extent of lesion			
Minimal disease	11(22.00%)	18(36.00%)	0.12
Moderately advanced disease	18(36.00%)	22(44.00%)	0.41
Far advanced disease*	21(42.00%)	10(20.00%)	0.01
Involvement of zone in chest radiograph			
Upper*	1 (2.00%)	18(36.00%)	<0.001
Mid & Lower*	38(76.00%)	23(46.00%)	0.002
Mixed /all	11(22.00%)	9(18.00%)	0.62
Type of Lesion			
Infiltration	10(20.00%)	11(22.00%)	0.80
Consolidation*	5(10.00%)	14(28.00%)	0.02
Infiltration with consolidation	11(22.00%)	8(16.00%)	0.44
Infiltration with hilar enlargement	4(8.00%)	1(2.00%)	0.17
Infiltration with Pleural effusion	3(6.00%)	1(2.00%)	0.30
Infiltration with Cavity	4(8.00%)	10(20.00%)	0.08
Miliary mottling	4(8.00%)	1(2.00%)	0.17
Hilar enlargement	4(8.00%)	1(2.00%)	0.17
Fibro-cavitary	2(4.00%)	3(6.00%)	0.64
Pleural effusion	3(6.00%)	0(0.00%)	0.08

*P value<0.05

The radiographic features of both groups is summarised in Table 4. Most of the study subjects had moderate to far advanced disease in chest and bilateral radiological involvement (58% vs 62%). There was no statistically significant difference between the two groups. Upper zone involvement was less common in HIV seropositive (2%) as compared to HIV seronegative PTB cases (36%) whereas mid and lower zone involvement was more in HIV seropositive PTB cases (76%) as compared to HIV seronegative (46%). Both these findings were statistically significant. Consolidation was more common radiological finding in HIV seronegative PTB cases (28%) as compared to HIV seropositive (10%) which was statistically significant .Infiltration was commonly seen both in HIV seropositive (20%) and HIV seronegative(22%) PTB cases followed by infiltration with consolidation (22% vs 16%), infiltration with hilar enlargement (8% vs 2%,)infiltration with pleural effusion (6% vs 2%), infiltration with cavity(8% vs 20%), military mottling (8% vs 2%), fibrocavitary (4% vs 6%) and pleural effusion (6% vs 0%).

DISCUSSION: Tuberculosis is the most common opportunistic infection in HIV / AIDS patients. There exists a synergistic relationship between TB and HIV, hence untreated HIV-TB co infection further increases the morbidity and mortality in HIV/ AIDS patients. With the increasing prevalence of HIV infection in India, physicians need to be aware of the different manifestations of tuberculosis in HIV positive patients, so that early diagnosis can be made to prevent the morbidity and mortality. This study documents the various radiological presentations of TB among HIV seropositive and HIV seronegative patients.

In this study, most patients among both groups were in the age group 20-39 years with male predominance (72%). And the male: female ratio in HIV seropositive and HIV seronegative pulmonary tuberculosis cases was 3.5 : 1 and 1.9 : 1 respectively similar to studies by other workers like *R. Prasad et al (2003)* (6) where in *Ahmedi et al (2012)* (7) ,*C.N.Deivanayagam et al (2001)* (8), *Pratima gupta et al (2006)* (9). In low income countries, women often have a reduced access to economic resources and fewer educational opportunities as compared to male. As a result, many women are unable to locate and reach appropriate health services. The higher rates of TB among male is due to a higher prevalence of infection among men.

In this study, maximum numbers of patients in both groups were married. 71.00% patients were from rural areas whereas only 29.00% patients were from urban areas. Diagnosis of HIV TB in rural areas may also be due to the HIV TB collaborative activities in which each HIV confirmed patient with chest symptoms should be tested for TB and all TB patients should be tested for HIV as well.

MT was positive only in 32% HIV seropositive PTB cases and 80% HIV seronegative cases. Similarly lower rates of tuberculin positivity has been reported by other workers like *R.Prasad et al (2004)* (6) *Soumya Swaminathan et al (2002) (10), Rajasekharan S et al (11), Purohit SD et al (12), Samuel NM et al* (13) .Studies indicate that the probability of significant induration to the tuberculin test indicative of TB infection is significantly lower among HIV infected persons as compared to HIV uninfected. Reliability of test can diminish as the CD4 + T lymphocyte count declines. (<200/mm^3)

Sputum smear positivity for AFB was recorded in 72% HIV positive and 84% HIV seronegative PTB cases. It was consistent with studies done by *G Panda et al (2017)* (14),*Soumya Swaminathan et al (2007)* [10] *R.Prasad et al (2004)* (6) but few other studies like *C. N. Deivanayagam et al (2001)*[8] Mohanty KC et al[15][16][17].reported low sputum positivity. It has been shown that sputum smear is often positive in the early stages of HIV infection[18] .

Cough was the predominant symptom experienced by both groups present in 96% HIV seropositive and 100% HIV seronegative PTB cases which was followed by expectoration (92% vs 98%), Dyspnoea (84% vs 68%), blood in sputum (16% vs 28%) and chest pain(52% vs 18%). Chest pain was more common in HIV seropositive as compared to HIV seronegative PTB cases which was statistically significant.It was consistent with study done by *G Panda et al (2017)* (14), *Pratima Gupta et al (2006)* [9] ,*C. N. Deivanayagam et al (2001)*[8] *Soumya*

Swaminathan et al (2002) (10) .HIV positive people with pulmonary tuberculosis may have the classic symptoms of TB. Cough, expectoration, dyspnea, chest pain and haemoptysis were the respiratory symptoms in HIV TB co infected patients. It depends on to which extent lung parenchyma is involved, extra pulmonary involvement, type of lesion in chest x ray, immune compromised status and involvement of tracheobronchial tree.

Fever was the most common constitutional symptom experienced more by HIV seronegative PTB cases whereas weight loss ,weakness and anorexia was significantly more common in HIV seropositive PTB cases. Other symptoms were night sweats, diarrhea , odynophagia and pain abdomen. It was consistent with study done by *G Panda et al (2017)* (14) ,*Pratima Gupta et al (2006)*[9] ,*C. N. Deivanayagam et al (2001)*[8] *Soumya Swaminathan et al (2002)* (10).

Most of the study subjects had moderate to far advanced disease with bilateral involvement in chest radiograph. It was consistent with study done by G Panda et al (2017) (14) . *Dr. S Geetha et al (2017)*[19], *Mahesha padyana et al (2012)*[20] *Anand patel et al (2012)*[21] also reported bilateral disease in HIV-TB coinfected patients. The chest radiographic finding is affected by HIV status and degree of immune suppression. Upper zone involvement was less common in HIV seropositive (2%)as compared to HIV seronegative PTB cases (36%) whereas mid and lower zone involvement was more in HIV seropositive PTB cases.It was consistent with studies done by *G Panda et al (2017)* (14) ,*Dr. S Geetha et al (2017)*[19] ,*Fatmeh Ahmadi et al (2012)* (7) *Kumar adesh et al (2015)*[22]. During the early phase of HIV when individual are not immune-suppressed, the radiographic pattern is similar to HIV uninfected individuals with more typical lesions-upper lobe infiltrates with or without cavities. With advancing immune suppression, extra pulmonary involvement, intra-thoracic / mediastinal lymphadenopathy, lower lobe infiltrate and military TB become more common.[23] Consolidation was more common radiological finding in HIV seronegative PTB cases(28%)as compared to HIV seropositive (10%) which was statistically significant .Infiltration was the most common presentation seen both in HIV seropositive (20%) and HIV seronegative(22%) PTB cases followed by infiltration with consolidation ,infiltration with hilar enlargement ,infiltration with pleural effusion ,infiltration with cavity,military mottling ,fibrocavitary and pleural effusion . *Banafsheh Moradmand Badie et al (2012)*[24] ,*R.Prasad et al (2004) (6)* ,*Soumya Swaminathan et al (2002)* (10), *Fatmeh Ahmadi et al (2012)* (7)

The radiological findings of pulmonary TB differ between HIV-seropositive and HIV-seronegative patients due to poor cellular immunity in HIV-infected patients.

Familiarity with the clinico-radiological spectrum of tuberculosis and co-existing opportunistic infections in HIV seropositive patients is absolutely necessary. Radiological presentation of pulmonary TB differs between HIV-seropositive and HIV-seronegative patients due to progressive immunodeficiency from HIV infection. Atypical chest x-ray findings are common in HIV- TB co infection .Whereas cavitation is less in HIV-TB co infection. Also, treating physician should strictly send sputum and/BAL for CBNAAT in all HIV seropositive presumptive TB patient and follow the diagnostic algorithm proposed by RNTCP.

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