

Original article

Disease wise distribution of pulmonary involvement in HIV seropositive patients and its correlation with CD4 count

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Abstract:

Introduction: As HIV infection causes decreased humoral and T- cell mediated immune responses, it results in increased susceptibility to many opportunistic infections. As a result PLHIV seem to have an increased incidence of respiratory illness as compared to the general population. Overall reduced immunity in HIV leading to increased frequency of respiratory infections in HIV patients .

Materials and methods: This descriptive cross-sectional study was conducted in the Dept. of General Medicine, Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune for 2 years duration. It was approved by the IEC of our university. Assuming a proportion of 30% pulmonary manifestation in HIV positive patient, the sample size calculated using WinPepi software keeping acceptable error at 10% with 95% CI was 60. The desired sample was randomly selected from the line list of HIV positive patients from the General Medicine Department (OPD and IPD). Patients were included in the study after taking their voluntary informed consent.

Results: The most common respiratory infections seen in HIV seropositive patients was tuberculosis followed by bacterial pneumonia and then pneumocystis pneumonia infection. It was seen that the mean CD4 count in Tuberculosis cases was 255.5 ± 151.8 cells/ cu mm, in Bacterial Pneumonia cases was 305.9 ± 75.5 cells/ cu mm, in Pneumocystis Jiroveci cases was 135.2 ± 42.6 cells/ cu mm, in Covid 19 cases was 348.0 ± 216.3 cells/ cu mm, in Idiopathic infection cases was 344.0 cells/ cu mm, in Normal cases was 546.8 ± 228.7 cells/ cu mm.

Conclusion: On the basis of our results, we conclude that 2/3rd of the HIV seropositive patients had pulmonary involvement. The most common disease observed was tuberculosis followed by bacterial pneumonia and the probable diagnosis of respiratory infection according to the patient's CD4 count can be made using this study.

Keywords: HIV seropositive patients, CD4 count.

Introduction

As HIV infection is linked with decreased humoral and T- cell mediated immune responses, it results in increased susceptibility to many opportunistic infections. ¹As a result PLHIV seem to have an increased incidence of respiratory illness in comparison to the general population. ²Respiratory diseases are more likely to affect people as they age because of increasing underlying comorbidities. Lung damage in people with chronic HIV infection are evident from multiple sources of information. ³Most of the recent evidence is gathered from studies in the Europe or USA and comparatively less is known about populations in other countries. ⁴

Higher occurrences of respiratory diseases inspite of ART have been a constant finding of studies done in HIV seropositive populations. There are likely to be many factors for this, like damage to the lung occurring prior to the initiation of antiretroviral treatment, higher rates of illegal drug abuse and smoking, and likely are the results of the continuing disordered immune responses and immune activation associated with HIV. ⁵

Overall reduced immunity in HIV leading to increased frequency of respiratory infections in HIV patients . There is scarcity of this kind of studies in India. So with this background, the present research was undertaken to study the prevalence and clinico-pathological spectrum of different respiratory disorders in HIV infection and to correlate them with the CD4 counts in patients with HIV infection.

Materials and methods :

This descriptive cross-sectional study was conducted in the Dept. of General Medicine, Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune for 2 years duration. It was approved by the IEC of our university. Sample includes both IPD and OPD patients in medicine department .

Assuming a proportion of 30% pulmonary manifestation in HIV positive patient, the sample size calculated using WinPepi software keeping acceptable error at 10% with 95% CI was 60. The desired sample was randomly selected from the line list of HIV positive patients from the General Medicine Department (OPD and IPD). Patients were included in the study after taking their voluntary informed consent.

Inclusion criteria

- Age more than 12 years
- Patient who are positive for HIV antibodies by ELISA testing

Exclusion criteria

- Age equal to or less than 12 years
- The cases who are Pregnant
- Patients with pre-existent lung diseases (emphysema, bronchial asthma)

Study Tools

A predesigned semi-structured questionnaire was prepared based on the review of literature on pulmonary manifestations in HIV cases. This questionnaire included the information regarding age, gender, education, employment status, occupation, marital status, BMI and presence of pulmonary involvement. It also included information regarding type of disease of pulmonary involvement, sputum examination, X ray findings and HRCT findings. It also included findings of the laboratory investigations like CD4 count, haemoglobin, TLC, ESR, platelets, Bl.Urea, S.creatinine, S.Bilirubin, SGOT, Bl.sugar, cholesterol, triglycerides, CRP and CBNAAT.

Statistical Analysis

Data management and analysis was done using Microsoft excel and Epi-info software. The frequency distribution and graph were prepared for the variables. The categorical variables were assessed using Pearson chi-square. The test was considered significant only if the p value comes out to be less than 0.05. The quantitative variables were assessed using student T test. The test was considered significant only if the p value comes out to be less than 0.05.

Results

It was seen that in 39 (65.0) cases had pulmonary involvement and 21 (35.0) cases did not had pulmonary involvement.

Table 1: Disease wise distribution of cases

Pulmonary involvement	Frequency	Percent
Tuberculosis	20	51.3
Bacterial Pneumonia	11	28.2
Pneumocystis Jiroveci	4	10.3
Covid 19	3	7.7
Idiopathic infection	1	2.6
Total	60	100.0

This table displays case distribution according to disease. It was seen that 20 (51.3) cases had tuberculosis, 11 (28.2) cases had Bacterial Pneumonia, 4 (10.3) cases had Pneumocystis Jiroveci, 3 (7.7) cases had Covid 19 and 1 (2.6) cases had idiopathic infection.

Table 2: Comparison of CD4 count found in Pulmonary diseases

Pulmonary involvement	N	Mean	Std. Deviation
Tuberculosis	20	255.5	151.86
Bacterial Pneumonia	11	305.9	75.57
Pneumocystis Jiroveci	4	135.2	42.66
Covid 19	3	348.0	216.36
Idiopathic infection	1	344.0	
Normal	21	546.8	228.79
Total	60	305.5	254.65

The above table displays comparison of CD4 count according to Pulmonary involvement. It was seen that the mean CD4 count in Tuberculosis cases was 255.5 ± 151.8 cells/ cu mm, in Bacterial Pneumonia cases was 305.9 ± 75.5 cells/ cu mm, in Pneumocystis Jiroveci cases was 135.2 ± 42.6 cells/ cu mm, in Covid 19 cases was 348.0 ± 216.3 cells/ cu mm, in Idiopathic infection cases was 344.0 cells/ cu mm, in Normal cases was 546.8 ± 228.7 cells/ cu mm.

Discussion

In this study, it was seen that in 39 (65.0) cases had pulmonary involvement and 21 (35.0) cases did not had pulmonary involvement.

In this study, it was seen that 20 (51.3) cases suffered from tuberculosis, 11 (28.2) cases had Bacterial Pneumonia, 4 (10.3) cases had Pneumocystis Jiroveci, 3 (7.7)

In this study, it was seen that mean CD4 count in cases with pulmonary involvement was 165.8 ± 137.9 cells/cu mm and in cases without pulmonary involvement was 546.8 ± 228.7 cells/cu mm. The CD4 count was significantly lower in pulmonary involvement cases as compared to without pulmonary involvement cases ($p < 0.05$).

In this study, it was seen that the mean CD4 count in Tuberculosis cases was 255.5 ± 151.8 cells/ cu mm, in Bacterial Pneumonia cases was 305.9 ± 75.5 cells/ cu mm, in Pneumocystis Jiroveci cases was 135.2 ± 42.6 cells/ cu mm, in Covid 19 cases was 348.0 ± 216.3 cells/ cu mm, in Idiopathic infection cases was 344.0 cells/ cu mm, in Normal cases was 546.8 ± 228.7 cells/ cu mm. In the study conducted by Sham P. Toshniwal et al.,⁷ it was observed that the mean CD4 count in Tuberculosis cases was 152.1 cells/ cu mm, in Bacterial Pneumonia cases was 325.9 cells/ cu mm, in Pneumocystis Jiroveci cases was 99 cells/ cu mm, in other fungal infections and malignancy cases was 50.0 cells/ cu mm. In the study conducted by Shubhangi V Dhadke et al.,⁶ it was observed that among the Tuberculosis cases, 1 (1.4) case observed in CD4 counts > 500 cells/cu mm, 26 (36.6) cases were observed in CD4 count range of 201-500 cells/cu mm, 14 (19.7) cases were observed in CD4 count range of 151 – 200 cells/cu mm, 10 (14.1) cases were observed in CD4 count range of 101-150 cells/cu mm, 12 (16.9) cases were observed with CD4 count of 50-100 cells per cubic mm and 8 (11.3) cases were observed in CD4 count of <50 cells per cubic mm.

In the study which was conducted by Halgarkar et al.,⁸ it was observed that among the Tuberculosis cases, 19.4% cases were observed in CD4 count range of 201-500 cells/cu mm, 48.4% cases were observed in CD4 count range of 151 – 200 cells/cu mm, 17.8% cases were observed in CD4 count range of 101-150 cells/cu mm, 11.3% cases were observed in CD4 count range of 50-100 cells/cu mm and 3.2% cases were observed in CD4 count of <50 cells per cubic mm.

In the study conducted by Shubhangi V Dhadke et al.,⁶ it was observed that among the Bacterial pneumonia cases, 5 (22.7) case observed with CD4 counts more than 500 cells per cubic mm, 9 (40.9) cases were observed in CD4 count of 201-500 cells per cubic mm, 3 (13.6) cases were observed with CD4 count of 151 – 200 cells per cubic mm, 1 (4.5) cases were observed in CD4 count of 101-150 cells per cubic mm range, 0 case were observed in CD4 count range of 50-100 cells/cu mm and 4 (18.2) cases were observed in CD4 count range of <50 cells/cu mm. We observed similar results in the study conducted by Sham p. Toshniwal et al. in which 17.6% cases had CD4 count >500 cells/cu mm, 50.9% cases had CD4 count 200-500 cells/cu mm and 31.4% in <200 cells/cu mm

In the study conducted by Shubhangi V Dhadke et al.,⁶ it was observed that among the PCP cases, 1 (14.3) case were observed in CD4 count range of 101-150 cells/cu mm, 1 (14.3) case were observed in CD4 count of 50-100 cells per cubic mm and 5 (71.4) cases were observed in CD4 count less than 50 cells per cubic mm.

In the study conducted by Pu Xuan Lu et al.,¹³⁵ it was observed that among the PCP cases, 6% cases were observed in CD4 count of more than 200 cells per cubic mm, 6% cases were observed in CD4 count range of 101-200 cells/cu mm, 8% case were observed in CD4 count range of 50-100 cells/cu mm and 80% cases were observed in CD4 count less 50 cells per cubic mm..

It was observed that mean CD4 count in cases with pulmonary involvement was 165.8 ± 137.9 cells/cu mm and in cases without pulmonary involvement was 546.8 ± 228.7 cells/cu mm. The CD4 count was significantly lower in pulmonary involvement cases as compared to without pulmonary involvement cases ($p < 0.05$).

Conclusion

On the basis of our results, we conclude that 2/3rd cases had pulmonary involvement in HIV seropositive patients. The most common disease observed was tuberculosis followed by bacterial pneumonia. In our study, the CD4 count was significantly lower in pulmonary involvement cases as compared to without pulmonary involvement cases ($p < 0.05$) and also the more probable respiratory illness correlating with the patient's CD4 count can be predicted with the help of our findings .

References:

1. Khalili M, Karamouzian M, Nasiri N, Javadi S, Mirzazadeh A, Sharifi H. Epidemiological characteristics of COVID-19: a systematic review and meta-analysis. *Epidemiol Infect.* 2020;148:e130.
2. Drummond MB, Kirk GD. HIV-associated obstructive lung diseases: insights and implications for the clinician. *Lancet Respir Med* 2014;2:583–92.
3. Attia EF, Akgün KM, Wongtrakool C, Goetz MB, Rodriguez-Barradas MC, Rimland D, Brown ST, Hoo GW, Kim J, Lee PJ, Schnapp LM. Increased risk of radiographic emphysema in HIV is associated with elevated soluble CD14 and nadir CD4. *Chest.* 2014 Dec 1;146(6):1543-53.
4. Drummond MB, Huang L, Diaz PT, et al. Factors associated with abnormal spirometry among HIV-infected individuals. *Aids* 2015;29:1691–700.
5. Almodovar S. The complexity of HIV persistence and pathogenesis in the lung under antiretroviral therapy: challenges beyond AIDS. *Viral Immunol* 2014;27:186–99.
6. Shah H, Bhatt P, Vaghani B, Patel K. HIV-AIDS patients with respiratory manifestation: study at tertiary care center. *Int J Adv Med* 2017;4:270-4.
7. Toshniwal SP, Mathpati SM, Kabara MV. “Respiratory complication in human immunodeficiency virus seropositive patient in co-relation to cd4 counts: an observational cross-sectional study”. *International Journal of Scientific Study* 2014; 2:1-5.
8. Halgarkar CS, Nilekar SL. “HIV prevalence and the co-relation of different opportunistic infection with CD4 cell count”. *Indian Medical GAZETTE* 2014; 157-160

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