Original Articles

A Study on Type of Respiratory Infections and Its Correlation with CD4 Count in HIV Positive Patients

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ABSTRACT

Background : Several important changes in the pattern of pulmonary diseases that have become recently apparent have implications for the diagnosis, management and outcome of AIDS patients. The present study was planned with an objective to study pattern of various respiratory infections and to correlate CD4 count with various respiratory infections in HIV patients.

Methodology : The present cross-sectional study was carried out in 50 HIV positive patients admitted in Medicine ward/ ICU/TB ward in a tertiary care hospital. The information regarding clinical examination, sputum examination and laboratory parameters including CD4 counts were recorded.

Results : The most common respiratory infection was pulmonary tuberculosis (76%) followed by pneumonia (12%). M. tuberculosis was found in 40 cases (80%), P. aeruginosa in 3 cases (6%), K. pneumonia in 3 cases (6%), S. Pneumonia in 2 cases (4%) and S. aureus in 1 case (2%). Mean CD4 count in sputum positive TB patients was 224.4±159.75 while for sputum negative TB patients it was 167.90±60.88. Mean CD4 for patients of Pseudomonas pneumonia in this study was 286.66±160.74, while for K. pneumoniae it was 421±222.03 and for P. aeruginosa it was 270±124.45.

Conclusion : It is concluded from present study that there is a strong correlation between CD4 count and pattern of respiratory complications in HIV-seropositive patients. Patients with CD4 count <200 cells/μL are more prone for respiratory complications. Hence, high level of clinical suspicion required for diagnosis of respiratory complications in HIV-infected individuals particularly with patients having CD4 count <200 cells/μL.

INTRODUCTION

The lungs are portal of entry for many infectious agents in our body that either may cause acute illness or may cause latent infection.[1] Among these, the majority are pulmonary tuberculosis and pneumonia in India. As these pulmonary infections indicate underlying progression of HIV infection, we need to update our knowledge of these diseases for better diagnosis and management.

Over the past decade, several changes in the pattern of disease have occurred. While Pneumocystis Carinnii Pneumonia (PCP) is the most common opportunistic pathogen in AIDS patients in developed countries, infection with mycobacterium tuberculosis & other organisms causing pneumonia are major health problems in developing countries.[2] It appears unbelievable that bacterium identified in the 1880's would become partner with a virus isolated a century later, and in combination poses a challenge in the field of medicine. The pattern of TB in AIDS is distinct from non-immuno compromised persons. The association of TB and compromised HIV has caused so much concern that strategies for diagnosis, effective treatment and control of TB have to be reframed.[3] For diagnostic and therapeutic reasons, especially those concerning prevention, it is far more useful to consider the entire continum of HIV infection than only the last and invariably fatal stage that we call AIDS.1

Again, the pattern of respiratory disease is different in HIV seropositive patients in developed countries and in developing country like India. Above all, because several important changes in the pattern of pulmonary diseases that have become recently apparent have implications for the diagnosis management and outcome of AIDS patients, it is worthwhile to update our knowledge of

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pulmonary disease in HIV infected individuals as we approach the end of the forth AIDS decade.

MATERIALS AND METHODS

The present cross-sectional study was carried out in 50 HIV positive patients admitted in Medicine ward/ ICU/TB ward in a tertiary care hospital. Considering proportion of HIV patients admitted with respiratory infections, which was calculated by two week pilot surveyed at Medicine ward/ ICU/TB ward at a tertiary hospital as p=3.22 %, Z (level of significance)= 1.96, L (Allowable error) = 5% the calculated sample size (n) = Z2pq / L2 was 50.

Adults HIV positive patients above 18 years of age and with abnormal X ray findings were included in the study while patients with known case of respiratory disorder such as asthma, chronic obstructive airway disease and lung cancer were excluded from the study. The study was conducted after getting ethical clearance certificate and participants are included after taking voluntary informed consent from them.

Detailed history and clinical examination of the participants were done. Two sputum samples (One spot and one early morning expectorated sputum [induced sputum if required]) were collected separately in sterile containers from all patients. Induction of sputum was done using a Nebulizer (model - Medel Aero Family) and 3% hypertonic saline for 15 minutes. Microscopic examination of sputum was done for the presence of trophozoites and cysts of P.carinii,while the expectorated sputum was examined for bacterial and fungal pathogens. Bartlett's scoring method was used for microscopic evaluation of the expectorated sputum.[4] A sputum was considered unsuitable if it had a final score of 0 or less. All unsuitable specimens were discarded and a repeat specimen was collected. The sputum specimens were inoculated into blood agar with 10% sheep blood, Chocolate agar with 10% sheep blood, McConkey's agar and Brain Heart Infusion (BHI) agar. Any significant bacterial growth was further processed as per the

RESULTS

standard procedure to identify the pathogens.[5] The sputum was also inoculated onto Sabouraud dextrose agar (SDA) with antibiotics, SDA without antibiotics in duplicate (incubated at 37°C and 25°C) and BHI agar (incubated at 37°C). Any significant growth of a fungal species was further identified as per standard protocol.[6]

In addition to sputum, 10 ml of blood was collected from all patients included in the study for investigations like Complete Blood Count (CBC), Erythrocyte Sedimentation rate (ESR), Renal Function Test (RFT), Liver Function Test (LFT), Lactate Dehydrogenase (LDH) (if needed), Arterial Blood Gas (if needed) etc. Pleural fluid examination was done in cases of pleural effusion if required, and it was sent for routine microscopy, protein, sugar, LDH and ADA.

The majority of patients (64%) were seen in age group of 30-49 followed by 22% in 20-29. Males outnumber females giving a male to female ratio of 1.7:1. Mean age of study participants was 36.2±11.25 years, while mean age for male is 36.13±10.96 and for female is 36.33±12.06.

The most common symptoms were cough (80%) and fever (74%). Among the signs observed in our study, the most common signs were pallor (48%) and oral candidiasis (30%). The most common finding on auscultation was crepitations (70%). The findings like bronchial breathing and increased Tactile Vocal Framitus (TVF)/ Vocal Resonance (VR) suggestive of consolidation were found in 14% cases. Decreased breath sound and decreased Tactile Vocal Framitus (TVF)/ Vocal Resonance (VR) suggestive of pleural effusion were found in 8% cases. Rhonchi were heard in 8% cases.

The most common respiratory infection was pulmonary tuberculosis followed by pneumonia. Pulmonary tuberculosis was found in 38 cases (76%), pneumonia in 6 cases (12%), pneumonia with pleural effusion in 1 case (2%), PCP in 1 case (2%) and bronchiectesis was seen in 1 case (2%). Tuberculous pleural effusion was seen in 3 cases (6%).

Table 1: Age and Sex distribution of patients

Age(years)	Sex		Total (%)
	Male (%)	Female (%)	
15-19	2 (6.3)	2 (11.1)	4 (8)
20-29	8 (25.0)	3 (16.7)	11 (22)
30-39	11 (34.4)	5 (27.8)	16 (32)
40-49	9 (28.1)	7 (38.9)	16 (32)
>50	2 (6.3)	1 (5.6)	3 (6)
Total	32 (100)	18 (100)	50 (100)

Table 2: Distribution of clinical signs and symptoms

Symptoms	No. (%)
Cough	40 (80)
Fever	37 (74)
Breathlessness	20 (40)
Chest pain	10 (20)
Weight loss	33 (66)
Diarrhea	18 (36)
Hemoptysis	4 (4)
Oral candidiasis	15 (30)
Genital ulcer	4 (8)
Signs	
Pallor	24 (48)
Icterus	03 (6)
Cyanosis	1 (2)
Clubbing	3 (6)
Pedal edema	2 (4)
Lymphadenopathy	5 (10)
Oral candidiasis	15 (30)
Dermatitis	1 (2)
Genital ulcer	4 (8)

Table 3: Spectrum of respiratory manifestations in HIV positive patients

Diseases	No. (%)
Tuberculosis	38 (76)
Pneumonia	6 (12)
Pneumonia with pleural effusion	1 (2)
Pleural effusion	3 (6)
Infective Bronchiectesis	1 (2)
PCP	1 (2)
Total	**50(100)**

Table 4 : Spectrum of respiratory manifestations in HIV positive patients

Micro-organism	No. (%)
M. Tuberculosis	20 (40)
Ps. Aeruginosa	2 (4)
K. Pneumonia	2 (4)
Str. Pneumonia	1 (2)
No any pathogen isolated	25 (50)

M. tuberculosis was found in 40 cases (80%), P. aeruginosa in 3 cases (6%), K. pneumonia in 3 cases (6%), S. Pneumonia in 2 cases (4%) and S. aureus in 1 case (2%). Hemoglobin level was normal (≥12 gm/dl) in 15 cases (30%) and anemia was observed in 35 cases (70%). Among anemia, most cases had moderate anemia (16 cases, 32%). Mild anemia was seen in 11 cases (22%) and severe anemia was seen in 8 cases (16%).

Mean CD4 for sputum positive tuberculosis is 224.4±159.75 while for sputum negative it is 167.90±60.88. Thus it states that sputum negativity is more frequent with lower CD4 count. Mean CD4 for pneumonia in this study is 286.66±160.74, while for K. pneumoniae it is 421±222.03 and for P. aeruginosa it is 270±124.45.

DISCUSSION

In the study conducted by K.C.Mohanty et al7, maximum 43.5% of patients were found in age group 15-30 years, followed by 28.3% in 30-39 years and 7.8% in 40-49 age group. Another study carried out by Sunderam et al[8,] similar results were observed being maximum 56.3% in same age group as above and then in 30-39 age group. Fairly comparable results were obtained in the present study.

In the study conducted by K.C.Mohanty et al[7], sputum smear positivity was seen in 47.8% while negative in 52.2%. Another study of Theur et al[9], Jayswal et al[10] and sputum smear positivity was seen in 47% and 27.6%. In the present study, Sputum smear positivity was seen in 47.62% while negative in 52.38%

In the present study, tuberculosis including tuberculous pleural effusion is the most common disease seen in 84% cases. K.C.Mohanty et al[7] observed that most common pulmonary disease was tuberculosis [including pleural effusion] (88.8%) followed by pneumonitis (9.4%). The other disease like PCP was seen in 0.9% and bronchiectesis in 0.9%. Another study by Sara Chako et al[11], similar results were noted. Tuberculosis was the most common and found in 52% cases followed by pneumonitis in 18% cases. 3.2% had nonspecific interstitial pneumonitis.

A study carried out by Toshniwal et al[12] showed that 69.1% cases had respiratory tract infections when their CD4 count was <200. Patients with CD4 count >500 had less frequency of respiratory infections as compare to other group in the study. As the CD4 count decreases, frequency of respiratory infections increases. In present study, comparable results were found. Early diagnosis of opportunistic infections and prompt treatment with

Table 5 : Association of CD4 count with respiratory infections in HIV positive patients

Respiratory infections	CD4 count (cells/mcL)			Total (%)
	>500	200-500	<200	
Tuberculosis				
a) Sputum positive	2 (10)	7 (35)	11 (55)	20 (100)
b) Sputum negative	0	5 (26.3)	14 (73.7)	19 (100)
Pneumonia				
a) P. aeruginosa	0	1 (50)	01(50)	2(100)
b) K. pneumoniae	1(50)	1(50)	0	2(100)
c) S. pneumoniae	0	0	1(50)	1(100)
d) No pathogen	0	0	1(50)	1(100)
Pleural effusion(tuberculous)	0	1 (33.3)	2 (66.7)	3 (100)
PCP	0	0	1 (100)	1 (100)
Bronchiectesis	0	0	1 (100)	1 (100)
Total	03 (6)	15 (30)	32 (64)	50 (100)

specific antimicrobials definitely contributes to increased life expectancy among infected patients delaying the progression to AIDS.

CONCLUSION

It is concluded from present study that there is a strong correlation between CD4 count and pattern of respiratory complications in HIV-seropositive patients. Patients with CD4 count <200 cells/μL are more prone for respiratory complications. Hence, high level of clinical suspicion required for diagnosis of respiratory complications in HIV-infected individuals particularly with patients having CD4 count <200 cells/μL.

REFERENCES

1. Murray J F, Mills J. Pulmonary infectious complications of HIV infection (part-2). Am Rev Respir Dis 1990. 141: 1356-1372.
2. Weissler JC, Moots Ar. Southwestern internal medicine conference: pulmonary disease in AIDS patients. Am J Med Sci, 1990; 300: 330-343.
3. S. Anuradha, Suniti Solomon, S. Rajsekaran. HIV positivity in patients with respi diseases. Ind. J. Tub 1993. 40;13-15.
4. Koneman EW, Allen SD, Janda WM, Schreckenberger PC, Winn WC Jr.The role of Microbiology laboratory in the diagnosis of infectious disease: Guidelines to practice and management, Chapter 2. In: Color atlas and text book of diagnostic microbiology, 5th edition. Lippincott, Philadelphia, New York (Pubs.) 1997:69.
5. Garcia LS, Procop GW, Roberi GD, Thompson RB, Jr. Over view of Conventional methods for bacteril identification, Chapter13. In : Bailey And Scott's diagnostic microbiology, 10th edition 1998. Forbes BA, Sahm DF, Weissfeld AS (Eds.) (Mosby).1;167-181.
6. Procop GW, Robert GD. Laboratory methods in basic Mycology, Chapter 65. In: Bailey and Scott's Diagnostic microbiology, 10th edition 1998. Betty A. Forbes Daniel F. Sahm, Alice S, Weissfied (Mosby): 871.
7. Mohanty K.C., Sundrani R.M., Nair S. HIV infection in patients with respiratory disease. Ind. J. Tub. 1993 ; 40 : 5.
8. Sunderam G, Mc Donald RJ, Maniatis T. TB as a manifestation of AIDS. JAMA 1986, 256:362-366.
9. Theur CP, Hopewell PC, Elias D, et al. HIV infection in tuberculosis patients. J Infect Dis 1990, 166: 8-12.
10. R.Jayaswal, P.N.Arora, B.N.Ponda. TB and HIV infection. Ind. J. Tub. 1995;42-125.
11. Sara chako, T. J. john, P.G.Babu. Clinical profile of AIDS in India:A review of 61 cases. JAPI, 1995,43(8): 535-538.
12. Toshniwal SP, Mathapati SM, Kabara MV. Respiratory Complications in Human Immunodeficiency Virus-Seropositive Patients in Correlation to CD4 Count: An Observational Cross-Sectional Study. Int J Sci Stud 2014;2(6):1-5.