

# A study of clinico-demographic profile of different opportunistic pulmonary infections in HIV/AIDS patients at teaching hospital

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## Abstract

**Background:** HIV/AIDS most frequently affects the lungs and the failure of the respiratory system is one of the leading causes of death in these patients. Opportunistic pulmonary infection in HIV positive patients may have atypical presentation. The early diagnosis and treatment of these infections can reduce morbidity and mortality and improve the quality of life of HIV patients. **Material and Methods:** A total of 97 HIV seropositive cases, seen in Medical OPDs and those admitted as indoor patients more than 18 years old and with two successive reactive ELISA sera (by rapid tests as recommended by the NACO) later confirmed by Western Blot Test and with clinical and or radiological evidence of respiratory involvement were included in the study. **Results:** Sexually active age group (26-30years) was commonly affected with HIV and there was a male preponderance of cases. Unprotected heterosexual contact was the most common possible mode of transmission of HIV. The commonest symptom was weight loss while respiratory symptoms were more severe and seen at increased frequency with declining CD4 counts. The commonest opportunistic pulmonary infection was pulmonary tuberculosis and found at all CD4 count. **Discussion:** Considering the demographic factors in this study, there is still a need to raise awareness of HIV, its modes of transmission and methods of prevention especially among the poorly educated, low socioeconomic strata, CSWs and other high-risk groups.

**Key Words:** HIV, opportunistic pulmonary infection, CD4 count, high risk groups.

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## INTRODUCTION

The pandemic of Human Immunodeficiency Virus (HIV) infection and Acquired Immunodeficiency Syndrome (AIDS) is typically affecting millions of lives of people worldwide. As per the India HIV Estimation 2015 report, adult (15-49 years) HIV prevalence in India was

estimated at 0.26% (0.22-0.32%) in 2015. Around 21.17 lakhs of people in India are living with HIV in 2015<sup>1</sup>. AIDS is a fatal illness caused by HIV virus which breaks down the body's immune system, leaving the victim vulnerable to a host of life threatening opportunistic infections<sup>2</sup>. It is well known that patients with HIV have an increased risk of opportunistic pulmonary infections in the form of *Mycobacterium tuberculosis*, *Pneumocystis jirovecii* pneumonia, other bacterial, fungal and viral pneumonia<sup>3,4</sup>. Tremendous advances have occurred in the care of patients with HIV/AIDS resulting from the advent of highly active antiretroviral therapy (HAART). This has led to differences in the presentations of HIV-related pulmonary disease. Infections such as bacterial pneumonias, particularly *Streptococcus pneumoniae*, remain commonplace, while opportunistic agents such as *Pneumocystis jirovecii* remain a concern in patients without adequate access to optimal medical care. The

tuberculosis epidemic, once thought to be slowing, has been re-energized by the spread of HIV in developing countries<sup>5</sup>. Despite the use of HAART and prophylactic antibiotics over the years, AIDS most frequently affects the lungs, and hence, the failure of the respiratory system is one of the leading causes of death in HIV/AIDS patients. Opportunistic pulmonary infection caused by above organisms in HIV positive patients may have atypical presentation on chest radiograph. As most of the pulmonary manifestations caused by above organism are curable, the early diagnosis and treatment of these infections can reduce morbidity and mortality and improve the quality of life of HIV patients.

## MATERIAL AND METHODS

This prospective observational study was conducted at Department of Medicine Wanless Hospital, a 450-bedded multispecialty teaching hospital in Southern Maharashtra with ART and DOTS center with well-equipped laboratories, radiological services, intensive care units and bronchoscopy services. It caters to urban and rural population of South Maharashtra and North Karnataka within a 200 km radius. A total of 97 HIV seropositive cases, seen in Medical OPDs and those admitted as indoor patients more than 18 years old and with two successive reactive ELISA sera (by rapid tests as recommended by the NACO) later confirmed by Western Blot Test and with clinical and/or radiological evidence of respiratory involvement were included in the study. Pregnant and lactating women, HIV positive patients with cardiac disease contributing to breathlessness and cough and those cases in which definitive diagnosis was not achieved were excluded from study. The Ethics Committee of the Institute approved the protocol. A written informed consent was taken from all the patients. History was recorded which included demographic profile, most common symptoms, occupation, education, marital status and sexual habits. Routine laboratory workup like haemogram, sputum and pleural fluid examination along with X-ray chest and CD4 count were done. Specific investigations like High resolution computed tomography, bronchoalveolar lavage examination, polymerase chain reaction for *M. tuberculosis*, *P.jiroveci* and other microbes, Lymph node or lung biopsy was performed in whom diagnosis was difficult. Bacteriological investigations such as sputum acid fast bacilli smears, sputum gram staining and cultures on blood agar, Chocolate agar with 10% sheep blood and McConkey's agar were done. Any significant bacterial growth was further processed as per the standard procedure to identify the pathogens. The sputum specimens were concentrated by the modified Petroff's method and inoculated in the Lowenstein Jensen's

medium and in the Bactec- 12B vials for culturing Mycobacterium. The latter was processed in the BACTEC 460TB system. The sputum was inoculated on to Sabouraud dextrose agar (SDA) with antibiotics, SDA without antibiotics in duplicate (incubated at 37°C and 25°C) and/or BHI agar (incubated at 37°C). Any significant growth of a fungal species was further identified as per standard protocol. Induced sputum specimen was washed with saline and centrifuged and the sediment was smeared and stained for *P.jiroveci*. Diagnosis of *M. tuberculosis* was considered if AFB staining of sputum/BAL/Pleural Fluid shows acid fast bacilli or sputum/BAL/Pleural Fluid culture was positive or PCR *M. tuberculosis* of sputum/BAL/Pleural Fluid was positive. Diagnosis of *P.jiroveci* pneumonia was considered if sputum or induced sputum or BAL staining for *P.jiroveci* was positive. Diagnosis of bacterial pneumonia was considered if sputum/ induced sputum or BAL gram staining was positive and there was growth of organism on culture. Diagnosis of fungal pneumonia was considered if sputum/ induced sputum or BAL shows positive fungal staining or growth of organism on fungal culture.

## RESULTS

Ninety-seven patients of HIV/AIDS with pulmonary infection fulfilling the inclusion criteria and in which definitive diagnosis was achieved form the basis of this prospective observational study. Out of 97 cases, Maximum number of cases i.e., 44 (45.36%) was seen in age group of 26 to 30 years with the mean age of 31.97±6.74 years. Out of 97 cases, 66 (68.04%) were males while 31 (31.96%) were females showing male preponderance with a male to female ratio of 2.13:1. In the present study, out of 97 cases of pulmonary infection in HIV/AIDS, 70 (72.16%) were educated. Of these, 24 (24.74%) cases had finished primary schooling while 18 (18.56%) cases were educated up to secondary school level and 15 (15.46%) were educated up to higher secondary school level. 13 (13.40%) cases had completed technical or professional education. Only 27 cases (27.84%) were uneducated. In the present study, majority 36 (37.11%) were laborers and agriculture workers, 21 (21.65%) were in transport business, 20 (20.62%) were housewife, 13 (13.4%) were professional (businessman) while only 7 (7.22%) were commercial sex workers. In the present study of 97 cases of pulmonary infection in HIV/AIDS, the possible mode of transmission of HIV was through heterosexuals contact in 94 (96.97%) blood and blood product transfusions in 2 (2.06%) of cases and unknown in 1 (1.03%) of cases there were no homosexuals or injection drug users (Table 1).

**Table 1: Demographic characteristics of study population (n=97)**

Demographic characteristics	No. of patients (%)
<b>Age groups (years)</b>	
18-25	11(%)
26-30	44(%)
31-35	17(%)
36-40	14(%)
41-45	08(%)
>45	03(%)
<b>Sex</b>	
Male	66 (%)
Female	31 (%)
<b>Level of education</b>	
Uneducated	27 (%)
Primary (Upto 4th)	24 (%)
Secondary (5th to 9th)	18 (%)
Up to Higher Secondary	15 (%)
Technical to Professional	13 (%)
<b>Occupation</b>	
Labor / Farming	36 (%)
Transporters	21 (%)
Housewife	20 (%)
Professional	13 (%)
Commercial Sex Workers	07 (%)
<b>Possible mode of HIV transmission</b>	
Heterosexual	94 (%)
Homosexual	00 (%)
Blood and blood product transfusion	02 (%)
Injection drug users	00 (%)
Unknown	01 (%)

In the presenting study, the commonest presenting symptoms was weight loss seen in 84 (86.59%) cases followed by fever in 64 (65.98%), dyspnoea in 55 (56.7%), cough with expectoration in 52 (53.61%) chest pain in 50 (51.55) and dry cough in 40 (41.24) cases, while hemoptysis was rare, seen in only 8 (08.25 %) cases. Many of these presenting symptoms were seen in combination in most of the cases. As CD4 count decreases the symptoms become more severe and seen in increasing number of patients.

**Table 2: Distribution of study population according to symptoms**

Symptoms	No. of patients (CD4 <200)	No. of patients (CD4 >200)	Total No. of patients
Weight Loss	56(57.73%)	28(28.87%)	84(86.59%)
Fever	45(46.39%)	19(19.59%)	64(65.98%)
Dyspnoea	34(35.05%)	21(21.65%)	55(56.70%)
Expectoration	27(27.84%)	25(25.77%)	52(53.61%)
Chest Pain	36(37.11%)	14(14.43%)	50(51.55%)
Dry Cough	24(24.74%)	16(16.5%)	40(41.24%)
Hemoptysis	1(01.03%)	7(07.22%)	8(08.25%)

In the presenting study, 11(11.34%) cases of pulmonary infection in HIV/AIDS had CD4 count less than 50 cells/cmm, 44(45.36%) had CD4 count between 51-200

cells/cmm and 42(43.30%) of cases had CD4 count more than 200 cells/cmm cases. The mean CD4 count study population was 191.18±120.8 cells/cmm.

**Table 3: Distribution of study population according to different lung infections in HIV/AIDS**

Infections	No. of patients	Mean CD4 Count ±SD
Pulmonary Tuberculosis	57(58.76%)	181.73±89.92
Bacterial Pneumonia	22(22.68%)	291.63±78.37
<i>P.jiroveci</i> Pneumonia	12(12.37%)	125.5±45.55
Tuberculosis+	4 (4.12%)	50±11.2
<i>P.jiroveci</i> Pneumonia		
Tuberculosis +	2(2.06%)	31.5±7.78
Bacterial Pneumonia		
<b>Total</b>	<b>97(100%)</b>	<b>191.18±120.8</b>

In the presenting study, most common lung infection was the pulmonary tuberculosis in 57 (58.76%) of cases followed by bacterial pneumonia in 22 (22.68%) cases, *P. jiroveci*pneumonia in 12 (12.37%) of cases. The mixed infection like pulmonary tuberculosis+ *P.jiroveci*pneumonia was found in 4 (4.12%) of cases and pulmonary tuberculosis+ bacterial pneumonia in 2 (2.06%) of cases. No other fungal infection or atypical mycobacterium detected in present study. This table shows that the mean CD4 count was 181.73±89.92cells/cmm in pulmonary tuberculosis 291.63±78.37cells/cmm in bacterial pneumonia, 125.5±45.55 cells/cmm in *P.jiroveci*pneumonia. The mean CD4 count was very low 50±11.2 cells/cmm and 31.5±7.78 cells/cmm in mixed infection like pulmonary tuberculosis+ *P.jiroveci*pneumonia and pulmonary tuberculosis+ bacterial pneumonia respectively.

## DISCUSSION

Pulmonary infection is common in patients with HIV infection. The affected individuals have significantly increased incidence of pulmonary infection as the HIV infection progresses and common disorders present with atypical features. They may be wide spread, have an unusual character and prolonged course and more resistant to treatment. Reviewing the various similar studies, the mean age of cases presenting with pulmonary infection of HIV/AIDS was reported maximum in the 4th decade. In the present study also we see the mean age was 31.97±6.74 years. According to Annual Sentinel Surveillance data from NACO for 2007<sup>6</sup>, prevalence of HIV increases with age with highest percentage of cases in the 3rd decade of life. According to Lanjewar *et al*<sup>7</sup> majority of cases (79%) with pulmonary infection occur at aged between 21±40 years which is comparable with present study where 88% occur between 18 ±40 years. Various studies confirm pulmonary infection in HIV/AIDS predominantly affect the most productive and sexually active age group between 20-40 years<sup>8-10</sup>, reflecting many young people still lack accurate,

complete information on how to avoid exposure to the virus and also tendency to experiment and an environment which makes discussing issues around sexuality taboo adds to their vulnerability. It also states that young earning population is affected with HIV, increasing financial burden on the country. Majority of similar studies show preponderance among males compared to females<sup>7,8,10,11</sup>. In the present study also there was preponderance among males with male to female ratio being 2.13:1. The male preponderance with HIV is because males are more likely to seek attention and probably more number males than females getting admitted in our hospital reflecting gender bias in our country. Women have poor access to health services as a result of lower priority given to their health and their lack of decision-making powers within the family<sup>6</sup>. So, strategies to increase women's economic independence and legal reforms to recognize women's property and inheritance rights should be prioritized by national governments. A large proportion of women with HIV appear to have acquired the virus from regular partners who were infected during paid sex. Consequently, women account for a growing proportion of people living with HIV (some 39% in 2008)<sup>6</sup>. It was noted in the Annual sentinel surveillance done in 2006 by NACO that HIV prevalence tends to decrease with increasing educational status. Similar finding also observed in present study, with 27.84% cases were uneducated 24.74% cases completed their primary schooling, 18.56% completed secondary schooling, 15.46% cases studied up to higher secondary and only 13.4% cases finished technical or professional course. Higher incidence in uneducated and in those who completed only primary schooling because lack of knowledge about safer sex. Occupation plays an important role in prevalence of HIV. Annual Sentinel surveillance by NACO in 2006 shows an increase in prevalence among farmers, unskilled workers and in truckers<sup>6</sup>. Various studies show that high prevalence is seen among unskilled laborers and agricultural workers<sup>12-14</sup>. Present study showed higher prevalence of HIV in laborers and transporters because majority of them stay away from their home and may indulge in promiscuous sex behavior. Our study includes 7.22% commercial sex workers comparable with Annual Report NACO 2008-09<sup>15</sup>. 47 districts (48 sites) have shown >5% HIV prevalence among commercial sex workers (CSW), which also include CSW sites in low prevalence states namely West Bengal, Bihar and Gujarat. CSW sites in Pune, Mumbai and Thane have shown >30% HIV prevalence among CSW. Among CSW, there is a decline in South Indian States reflecting the impact of interventions, while rising trends are evident in the North East suggesting a dual nature of the epidemic. In various

studies conducted in India, it has been seen that cases are predominantly heterosexual contact with multiple partner. In the present study, among 97% patient's similar finding of heterosexual behavior was noted. However, in western countries homosexual contact and injection drug user was most common mode of transmission due to difference in sexual practice. Also many people in our country don't disclose history homosexual contact. The heterosexual mode continues to be the major mode of transmission, though transmission through injecting drug use and men having sex with men are on the rise in many new pockets (metro cities) in India<sup>6,13</sup>. In our studies HIV patients with pulmonary infection weight loss (86.59%) was most common symptom followed by fever (65.98%), dyspnoea (56.70), cough with expectoration (53.61%), chest pain (51.55%) and a dry cough (41.24%), while hemoptysis (08.25) is rare which is comparable to various studies in literature<sup>14,17</sup>. Opportunistic infections involving lungs include mycobacterium, bacterial, fungal, viral, etc. In our study the most common opportunistic lung infection found was tuberculosis followed by bacterial pneumonia followed by *P.carini* pneumonia. This finding confirms the re-emergence of tuberculosis due to the HIV/AIDS epidemic in India. Our results consistent with the reports of various Indian studies<sup>7,10,18-20</sup> which shows TB is the commonest opportunistic infections in India whereas in western setting<sup>21</sup> PCP is most common. In India, Udwardia *et al*<sup>22</sup> and Rajasekaran S *et al*<sup>11</sup> reported *P.carini* pneumonia in 32% and 42.36% cases respectively. There have been various postulated reasons for the low incidence of PCP reports from India and the developing world including the absence of PCP from the environment, differences in host susceptibility to the organism and death at an earlier stage from more pathogenic organisms like *M. tuberculosis*<sup>23</sup>. Udwardia *et al*<sup>22</sup> suggested that lack of the availability of improved diagnostic facilities and lack of the availability of expensive immunofluorescent staining techniques may be reason for low incidence. To conclude, the respiratory system is very commonly involved in HIV infected patients. The spectra of respiratory infections include mild community acquired pneumonia to severe life threatening infections. Considering the demographic factors in this study, there is still a need to raise awareness of HIV, its modes of transmission and methods of prevention especially among the poorly educated, low socioeconomic strata, CSWs and other high-risk groups.

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