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Original Research Article

To Study Pulmonary Complications in Patients Living with HIV (PLH) in a Tertiary Care Hospital in India

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ABSTRACT
Background: *Pulmonary disease is one of the most frequent complications of HIV infection. Three of the 10 most common AIDS-defining illnesses are recurrent bacterial pneumonia, tuberculosis, and pneumonia due to the unicellular fungus P. jirovecii[1]. Pneumocystis jirovecii pneumonia is hallmark of AIDS[2].*
Aims and Objectives: *To study pulmonary complications in people living with HIV and radiological findings in lungs of PLHIV with pulmonary disease by Digital chest X-ray, HRCT (High resonance computed tomography) Thorax.*
Material and Methods: *Study period for this cross sectional study was from December 2018 to January 2019 and the total number of HIV patients admitted on IPD and OPD basis who fulfil inclusion and exclusion criterion was 60 in this duration with pulmonary involvement. The distribution of disease was expressed in proportion.*
Results: *In pulmonary tuberculosis patients with HIV, consolidation was most common finding on both digital chest x- ray and HRCT thorax. Prevalence of Pneumocystis jiroveci pneumonia, tuberculosis and Bacterial pneumonia was maximum in patient having cd4 count <50,200-500, >200/micro litre respectively. In pneumocystis jiroveci pneumonia maximum patients had ground glass haziness on chest X ray, prevalence of lower zone involvement was maximum followed by upper zone.*
Conclusion: *Prevalence of tuberculosis was maximum in patient with HIV followed by bacterial pneumonia and pneumocystis jiroveci pneumonia respectively. Most of the bacterial pneumonia patients had consolidation on digital chest x-ray (PA view) and most of the patients with ground glass haziness on chest x ray have pneumocystis jiroveci pneumonia infection.*
Keywords: *Pneumocystis jiroveci, PLHIV, HRCT, AIDS.*

Introduction

Pulmonary system is most commonly involved system in PLHIV. In PLHIV, immunity is suppressed, hence lungs are prone for infectious and non-infectious pulmonary disease[3].

Pneumonia is most common pulmonary manifestation followed by tuberculosis and pneumocystis jirovecii pneumonia[4]. India is the second most populous country in the world and is ranked first among the 22 high burden countries, which accounts for 80% of all estimated incident cases of TB worldwide[5].

About 1/3 of deaths, all AIDS related death is associated with tuberculosis. Tuberculosis is the primary cause of death in10-12% of HIV infected patients.[6]

About 60-80% patients with tuberculosis have pulmonary disease. MAC (Mycobacterium Avium Complex) infection is the late complication of HIV infection mostly seen in patients with CD4 COUNT<50.[7]

Aims and Objectives

1. To study pulmonary complications in people living with HIV diagnosed by ELISA method.
2. To study relation between CD4 count and pulmonary disease in PLHIV.
3. To study radiological findings in lungs of PLHIV with pulmonary disease by Digital chest X-ray, HRCT (High resolution computer tomography) Thorax

Material and Methods

This cross sectional study was conducted in UPUMS (Uttar Pradesh university of medical sciences) Saifai, Etawah, India. The study period was from December 2018 to January 2019 and the total number of patients admitted on IPD and OPD basis who fulfil inclusion and exclusion criterion was 60 in this duration with pulmonary involvement, after taking written informed consent from patients. Blood sample were tested for anti –HIV antibodies by ELISA method. A detail clinical history and examination was done and relevant information related to each patient was filled in proforma.

Duration of Study

The study period was from December 2018 to January 2019.

Inclusion Criteria

1) HIV positive patient diagnosed by ELISA method.
2) Age >18yrs
3) Patients having pulmonary symptoms.

Exclusion Criteria

1) Age <18yrs
2) PLHIV with only URTI (upper respiratory tract infection).
3) HIV negative patients.
4) Patients not willing to give consent for study.

Following investigations were done.

1) Digital Chest x ray (PA view) for all patients.
2) Routine blood investigations in form of Blood culture, LFT, KFT, CBC, CD4 counts in all patients.
3) Sputum for AFB -1 sample on admission, AFB-2 early morning sample on day 2 of admission.
4) Sputum for gram staining AFB (Acid Fast Bacillus)
5) Sputum for culture and sensitivity for all patients.
6) PAS Stain for MAC (Mycobacterium Avium Complex).
7) Sputum for pneumocystis jiroveci for GMS staining.
8) Pleural fluid study i.e. cyto, biochem and ADA (Adenosine Deaminase) for all patients.
9) HRCT thorax in suspected patient in whom digital chest X-ray (PA view) is normal.
10) FNAC (Fine needle aspiration cytology) of lymph nodes in patients present with lymphadenopathy.
11) Markers of acute inflammations as CRP (C – Reactive Protein), ESR (Erythrocyte sedimentation rate).

Statistical Methods

The data was encoded in MS Excel and analysed using SPSS 23. The distribution of disease was expressed in proportion to know the difference in distribution.

Observations and Results

In present study 77% were tuberculosis patient, followed by 20% were bacterial pneumonia patient followed by 3% were pneumocystis jirovecii pneumonia.

Digital Chest X- Ray Findings

In present study, tuberculosis patients with following chest x ray findings are seen- Consolidations in 36.6% patient, pleural effusion 26.66% patients, Fibronodular infiltrate 7.8% patients, cavitatory lesion in 7.8 % patients, miliary tuberculosis in 13.33%,bilateral extensive tuberculosis 5%, Pneumothorax in 1.6% patients statistically this is significant.

In present study all pneumocystis jiroveci affected patients have ground glass haziness on digital chest x ray out of which 33.33% patients had 1 zone involvement and 66.66% patient had >1 zone involvement .

HRCT Thorax Findings

In present study HRCT thorax was done in suspected cases whose digital chest X-ray was normal, to rule out, pulmonary involvement, pleural effusion, suspected pneumocystis jirovecii pneumonia. In present study HRCT was done for 34 patients. Consolidation seen in 56% patient. Out of 5 patients of pneumocystis jiroveci pneumonia, HRCT thorax showed ground glass Haziness in 100% patient who were suspected of pneumocystis jiroveci pneumonia. HRCT thorax showed mediastinal lymphadenopathy in (17.64%) patients, fibronodular infiltrates in (14.70%) patients, consolidation in (55.88%) patients, Pneumothorax in (11.76%) patients.

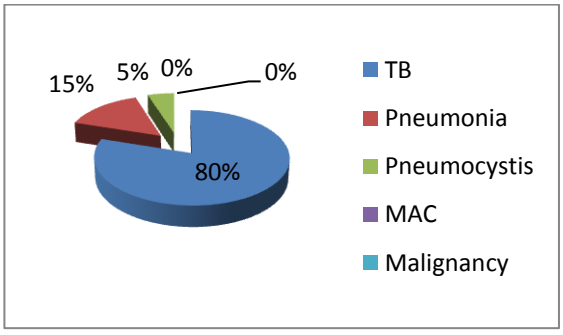
Discussion

Pulmonary system is most common system involved in PLHIV. In HIV patients decreased immunity make patients more prone for infection. Low CD4 count is responsible for opportunistic Infections in PLHIV. Present cross sectional study was conducted in UPUMS (Uttar Pradesh university of medical sciences) Saifai, Etawah. India, with 60 HIV positive patients in specified duration of time with pulmonary involvement who fulfil exclusion and inclusion criterion, after taking written informed consent from patients.

All relevant laboratory investigations including digital x ray chest, HRCT thorax, sputum for AFB, sputum for gram staining day 1 and day 2, pleuralfluid study, Sputum for GMS stain for pneumocystis jiroveci infection, sputum for PAS, sputum for culture sensitivity, FNAC of lymphnode, complete blood count, liver function test, renal function test, erythrocyte sedimentation rate were performed .In present study HRCT thorax was done only in patient who were suspected for pneumocystis jirovecii pneumonia, cases of pleural effusion and patients who was clinically suspected to have pulmonary involvement but chest x-ray was normal.

In present study incidence of tuberculosis was highest 80%, followed by bacterial pneumonia 15%, followed by pneumocystis jirovecii pneumonia 5%. Mycobacterial avium complex infection is rare now days because of use of HAART as mentioned in pie chart.

Table 1 Disease wise distribution of study population



These findings are similar to the study conducted by Asmita A. Mehata et al.[8] in which 72% patient had tuberculosis, 22% patient had bacterial

pneumonia.6% patient had pneumocystis jirovecii pneumonia, 2% patients had cryptogenic meningitis with pulmonary infiltrates.

In our study in bacterial pneumonia cases 15% patients had CD4 count >500cells/micro lit, 44.4% patients had CD4 count 201-500 cells/micro lit, 33.33% patients had CD4 count 151-200 cells/micro lit,11.11% patients had cd4 count 101-150 cells/micro lit,11.11% patients had CD4 count <50 cell/ micro lit.chi square test applied to it p<0.01 indicates this findings highly significant. Similar findings found in study conducted by Toshniwal SP et al[9] in which 17.64% patient had CD4 count >500 cells/ micro lit, 50.9% patient had CD4 count 200-500 cells /micro lit,31.37% in <200cells/micro lit.

Table 2 Co-relation between cd4 count and incidence of diseases

CD4 Count (cells/micro lit.)	Bacterial pneumonia Pt.(%)	Tuberculosis pt.(%)	PJP pt.(%)
>500	15	4.16	0
201-500	44.4	37.5	0
151-200	33.33	16.66	0
101-150	11.11	20.83	33.33
51-100	0	12.5	0
<50	11.11	8.33	66.66

In our study in 4.16% tuberculosis patients have CD4 count >500 micro lit, 37.5% tuberculosis patients had CD4 count 201-500 cells/micro lit, 16.66 % tuberculosis patients had CD4 count 151-200 cells /micro lit, 20.83% tuberculosis patients had CD4 count 101-150 cells/micro lit, 12.5% tuberculosis patients had CD4 count 51-100 cells/micro lit,8.33% tuberculosis patients had CD4 count <50. chi square test applied. p<0.01indicates it is highly significant.

This findings similar to the study conducted by Halgarkar CS et al.[10] except instead of getting maximum number of tuberculosis seen in patients having CD4count 201-500 cell/micro here they get

in patients having CD4 count 151-199cells/micro lit. In this study 19.35% patients had CD4 count 201-500 cell/micro lit,48.38% patients had cd4 count 151-200 cell/micro lit,17.74% patients had CD4 count 101-150 cell/micro lit,11.29% patients had CD4 count 51-100 cell/micro lit, 3.22% patients had cd4 count<50 cells/micro lit.

As immunity decreases incidence of tuberculosis also increases.CD4 T lymphocyte counts an important biomarker that provides assessment of immune system status of HIV infected patients while pneumocystis jiroveci pneumoniais most common complications of AIDS. In present study in Pneumocystis jirovecii pneumonia (PJP) 0% patients hadCD4 count >150 cells /micro lit,33.33% patients with pneumocystis jirovecii infection had CD4 count 101-150 cell/micro lit, 66.66% patients with pneumocystis jiroveci infection had CD4 count <50 cell/micro lit.

Table-3 Chest X-ray finding in study population

CXR Finding	Number of pt.(%)
Consolidation	36.66
Pleural effusion	26.66
Miliary TB	13.33
Cavitary lesion	7.8
Fibronodular infiltrate	7.8
Bilateral extensive TB	5
Pneumothorax	1.6

In present study prevalence of consolidations is maximum (36.66%)followed by pleural effusion (26.66%), milliary tuberculosis (13.33%) cavitatory lesion (7.8%), fibro nodular infiltrate (7.8%), bilateral extensive tuberculosis 5% and Pneumothorax (1.6%) less frequently. chi square test applied p=0.02 indicate this finding are highly specific.

Similar findings seen in study conducted by A. Ahidjo A et al.[11] In which consolidation in 25% patient, pleural effusion in 16.7% patient, 20% patient had miliary tuberculosis.

Table 4 co-relation between chest xray finding in pneumocystis jirovecii pneumonia patients

CXR Finding	PJP pt.(%)
1 Zone	33.33
>1 Zone	66.66
Upper Zone	33.33
Middle Zone	0
Lower Zone	66.66

In present study about all patients with ground glass haziness on chest x ray 66.66% patient has more than 1 zone involvement and33.33% patient has 1 zone involvement. In present study prevalence of upper zone, middle zone, lower zone are 33.33%, 0%, 66.66% respectively. Ground glass haziness indicates early stage of pulmonary alveolar infiltration of pneumocystis jirovecii. This one of the marker of AIDS. Chi square test applied. p>0.01.

Table 5 HRCT finding in Tuberculosis and PLHIV patients.

HRCT Finding	TB Pt.(%)
Consolidation	56
Mediastinal Lymphadenopathy	53
Fibronodular infiltrate	40
Cavitary lesion	16
Pneumothorax	12

In present study prevalence of consolidation, mediastinal lymphadenopathy, fibro nodular infiltrate, cavitary lesion, Pneumothorax in tubercular patient are 56%, 53%, 40%, 16%, 12% respectively. Chi square test applied which comes out to be highly significant (p<0.01).Similar findings were observed in study carried out by Pu-xuan liu et al[12] in which 56% patient had ground glass haziness, consolidations in 12% patient, 20% patient had lung cyst, mixed lesion in 6% patient.

Summary and Conclusion

Present study is cross sectional study with60 HIV positive patients admitted in UPUMS Saifai hospital during time period December 2018-January 2019 on OPD and IPD basis . This study is done to know pulmonary complications among PLHIV.

Following observation were noted and conclusions were drawn.

1) In present study prevalence of tuberculosis was maximum inpatients followed by bacterial pneumonia and pneumocyst isjiroveci pneumonia respectively.
2) In present study prevalence of bacterial pneumonia was maximum in patients having CD4 count>200cells/micro lit, prevalence of tuberculosis is maximum inpatient having CD4 count between201-500/micro lit, prevalence of pneumocystis jiroveci pneumoniais maximum in patient having CD4count <50/micro lit.
3) In pneumocystis jiroveci pneumonia maximum patients had ground glass haziness. On chest X-ray, prevalence of lower zone involvement was maximum followed by upper zone and more than one zone involvement in digital chest x ray was significant finding.
4) In pulmonary tuberculosis patients with HIV most common finding was consolidation followed by pleural effusion, military TB, Cavitary lesion, fibro nodular infiltrate, bilateral extensive tuberculosis, pneumothorax on chest X-ray.
5) In pulmonary tuberculosis patients with HIV most common HRCT findings was also consolidation followed by mediastinal lymphadenopathy, fibro nodular infiltrate, cavitary lesion, Pneumothorax.

Limitations of Study

1) Small sample population.
2) We could not follow up our discharged patients.

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