

Pulmonary Involvement in Peoples Living with HIV (PLHIV)

Shubhangi V Dhadke¹, Vithal Dhadke^{2*}, Reshma Kshirsagar³, Manish Dhadke⁴

Abstract

Background: Pulmonary system is most commonly involved system in PLHIV as lungs are continuously exposed to the infection as they are rich in macrophages, dendritic cells, lymphocytes etc. In PLHIV immunity is suppressed, hence lung are prone for infection and non infectious pulmonary diseases. It is most common complication in HIV patient. Pneumonia is most common pulmonary manifestation followed by tuberculosis and pneumocystis jirovecii pneumonia. Other infection like mycobacterium avium complex (MAC), fungal infection, non specific interstitial pneumonitis, kaposi sarcoma (KS), and lymphoma causes pulmonary involvement. Incidence of bacterial pneumonia is 0.8-2 per 100 person year. Encapsulated organism like streptococci, H. influenzae are responsible for most cases of pneumonia. Incidence of pneumonia increase by 6 times in untreated HIV patient. Pneumocystis jirovecii pneumonia is hallmark of AIDS. Incidence range from 2-3 cases per 100 person- years. Pneumocystis jirovecii pneumonia is most commonly seen in patient having CD4 count <200/micro litre.²

About 1/3 of deaths all AIDS related death are associated with tuberculosis. Tuberculosis is the primary cause of death in 10-12% of HIV infected patients.¹ About 60-80 % HIV infected patient With Tuberculosis have pulmonary disease,

Mycobacterium avium complex infection is late complication of HIV infection mostly seen in patient With CD4 count <50.

Aims and Objectives

1. To study pulmonary involvement in people living with HIV diagnosed by ELISA method.
2. To study radiological findings in lungs of PLHIV with pulmonary disease by chest X-ray, High resonance computed tomography, ultrasonography of thorax etc.
3. To study co-relationship between CD4 count and pulmonary disease in PLHIV.

Methods: This is descriptive clinical study with cross sectional design with 100 HIV positive patients to study pulmonary involvement. The study was conducted in Dr. V.M. Government Medical college, Solapur Present study was carried out on PLHIV with pulmonary involvement. The period was from dec 2012 to Nov. 2014. Present study was conducted after NACO (National AIDS Control Organization) permission.

After pre-test counselling, blood sample were tested for anti -HIV antibodies ELISA method. A detail clinical history and examination was done and information related to each patient was filled in proforma.

After taking written informed consent was taken from patient eligible for this study.

Chi-square/z test has been used to find the significance of study

Results

1. Pulmonary disease maximum in age group of 31-50 yrs of age.
2. In present study male patient to female patient ration was 1.7.
3. In present study prevalence of tuberculosis was maximum in patient followed by bacterial pneumonia and pneumocystis jirovecii pneumonia respectively.
4. Most of the bacterial pneumonia patients had consolidation on chest x-ray PA view.

Conclusion

1. In present study prevalence of bacterial pneumonia was maximum in patient having cd4 count >200cells/micro lit, prevalence of tuberculosis was maximum in patient having cd4 count between 150-500/micro lit, prevalence of Pneumocystis Jirovecii pneumonia maximum in patient having cd4 count <50/micro lit.
2. In pulmonary tuberculosis patient consolidation, pleural effusion, fibro nodular infiltrate, cavity, Pneumothorax, bilateral extensive tuberculosis were common findings on chest X-ray.
3. In pulmonary tuberculosis patient most common radiological findings are consolidation, mediastinal lymphadenopathy, fibro nodular infiltrate, cavity, Pneumothorax on HRCT thorax. .

4. In pneumocystis jiroveci pneumonia maximum patient had ground glass haziness and parahilar opacity. On chest X ray, Prevalence of lower zone involvement was maximum followed by upper zone.
5. In pneumocystis jiroveci pneumonia prevalence of ground glass haziness and cystic lesion was maximum on HRCT thorax.

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. Pneumonia is most common pulmonary manifestation followed by tuberculosis and pneumocystis jirovecii pneumonia.

Pneumocystis jirovecii pneumonia is hallmark of AIDS. Incidence ranges from 2-3 cases per 100 person- years. Pneumocystis jirovecii pneumonia most commonly seen in patient having CD4 count <200/micro litre.²

About 1/3 of death all AIDS related death associated with tuberculosis. Tuberculosis is the primary cause of death in 10-12% HIV infection.¹ About 60-80% HIV infected patient With Tuberculosis have pulmonary disease, 30-40% have extra pulmonary involvement.

Aims and Objectives

1. To study pulmonary involvement in peoples living with HIV diagnosed by ELISA method.
2. To study radiological findings in lungs of PLHIV with pulmonary disease by chest x ray, High resonance computed tomography, ultrasonography of thorax etc.
3. To study co-relationship between CD4 count and pulmonary disease in PLHIV.

Material and Methods

Methodology

This is descriptive clinical study with cross sectional design with 100 HIV positive patients to study pulmonary involvement in peoples with HIV (PLHIV) patient.

Source of Data

The study was conducted in Dr. V.M. Government Medical college, Solapur, Maharashtra, India, Present study was carried out on PLHIV with pulmonary involvement. The period is from Dec. 2012 to Nov. 2014. Present study was conducted after NACO (National AIDS Control Organization) permission

Inclusion Criteria

1. Age >13 yrs
2. HIV positive patient diagnosed by ELISA method
3. Patient having pulmonary symptoms

Exclusion Criteria

1. Age <13
2. HIV negative patient
3. PLHIV with only upper respiratory tract infection
4. PLHIV not willing to give consent

After pre-test counselling, blood sample were tested for anti-HIV antibodies ELISA method.

A detail clinical history and examination was done and information related to each patient was filled in proforma.

After taking written informed consent from patient eligible for this study

Following investigations were done.

1. Chest x ray PA view of all patients
2. Sputum for AFB -1 sample on admission, 2 sample on early morning
3. Sputum for gram staining
4. Sputum for pneumocystis jiroveci. for GMS stain.
5. Sputum for culture and sensitivity
6. PAS Stain for mycobacterium avium complex
7. Pleural fluid study i.e. cyto, biochem or in suspected cases pleural fluid ADA
8. Ultrasonography of thorax in case of pleural effusion to rule out pulmonary involvement.
9. HRCT thorax in suspected patient in whom chest X-ray PA view is normal.
10. Fine needle aspiration cytology (FNAC) of lymph node in patient present with lymphadenopathy.
11. Blood culture, LFT, RFT, CBC, CD4 count in All patient.
12. ESR

Statistical Methods

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements were presented on mean \pm SD (mean -max) and results on categorical measurements are presented in number (%). Significance is assessed at 5% level of significance.

Chi-square/z test has been used to find the significance of study parameters on categorical scale between two or more group.

Observations and Results

In this study maximum about 71% were tuberculosis patient, followed by 22% were bacterial pneumonia patient followed by 7% were pneumocystis jirovecii pneumonia this difference is statistically highly significant.

When chia square test was applied to show relationship between CD4 and bacterial pneumonia patient $X^2=12$, DF-2, $P<0.01$ Which is highly significant.

When this test was applied to show relationship between CD4 count and tuberculosis patient $X^2=41.06$, DF=5, $P<0.01$ was highly significant. This test do not show Any significance between CD4 count & no. pneumocystis jiroveci pneumonia Patient.

CXR Findings

In this study in tuberculosis patient following chest x ray findings are seen consolidations in 33.80% patient, pleural effusion 23.94% patient, Fibro nodular infiltrate 16.90% patient, cavitatory lesion in 16.90 % patient, miliary tuberculosis in 14.08%, bilateral extensive tuberculosis 14.08%, Pneumothorax in 8% patient statistically this is significant.

In this study 95.5 % pneumocystis jiroveci patient showed ground glass haziness on chest x ray out of which 33.33% patient had 1 zone involvement and 66.66% patient had >1 zone involve .83.33% patient had lower zone involvement followed by upper zone 16.66%. Parahilar opacity present in 71.42% patient. Statistically it is not

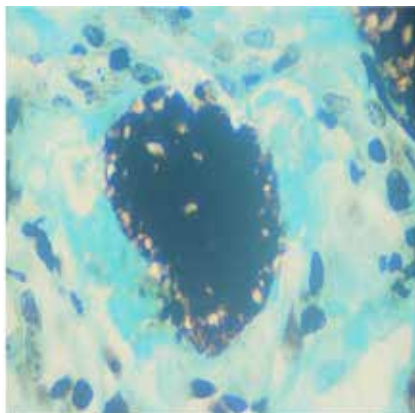


Fig. 1: Gomori methenamine silver staining for pneumocystis jirovecii

significant.

In this study HRCT thorax was done in suspected cases whose chest X-ray was normal, to rule out pleural effusion, pulmonary involvement, suspected pneumocystis jirovecii pneumonia patient. In this study HRCT was done for 56 patients. Consolidation seen in 46.42% patient. Out of 7 patients of pneumocystis jirovecii pneumonia, HRCT thorax showed ground glass haziness in 100% patient who was suspected for pneumocystis jirovecii pneumonia.

HRCT thorax showed mediastinal lymphadenopathy (46.42%), fibro nodular infiltrate (41.07%), consolidation (46.4%), cavitary lesion (8.9%), Pneumothorax (8.9%). Statistically it is highly significant.

Discussion

Pulmonary system is most common system involved in PLHIV. In HIV patient decrease immunity make patient prone for infection. Low CD4 count as responsible for opportunistic infection in PLHIV.

Present study was conducted in Dr. V.M. Government Medical College, Solapur, Maharashtra, India. In this study 100 HIV positive Patient who diagnosed by ELISA method who had respiratory complains were involved. All relevant laboratory investigation including chest x ray, HRCT, ultrasonography (thorax), pleural fluid study, sputum for AFB, sputum for gram staining (Figure 1), Sputum for GMC stain for pneumocystis jirovecii infection, sputum for PAS, sputum for culture sensitivity, FNAC of lymph node, complete blood count, liver

Table 1: Disease wise distribution of study population

Disease	No. of patient	percentage
pneumonia	22	22%
tuberculosis	71	71%
Mycobacterium avium complex	0	0%
Pneumocystis jirovecii pneumonia	7	7%
malignancy	0	0%

($\chi^2=67.22$, DF= 2, $p<0.01$)

function test, renal function test, erythrocyte sedimentation rate were performed.

In present study HRCT was done only in patient who was suspected for pneumocystis jirovecii pneumonia, cases of pleural effusion and patient who was clinically suspected to have pulmonary involvement but chest x-ray was normal.

Table 1 disease wise distribution of patient (Table 1).

In present study incidence of tuberculosis were maximum 71%, followed by bacterial pneumonia 22%, followed by pneumocystis jirovecii pneumonia 7%. Mycobacterial avium complex infection is rare now days because of use of HAART. Statistically this is highly significant ($p<0.01$)

These findings are similar to the study conducted by Asmita A. Mehata et al.¹ In which 72% patient had tuberculosis, 22% patient had bacterial pneumonia. 6% patient had pneumocystis jirovecii pneumonia, 2% patient had cryptogenic meningitis with pulmonary infiltrates.

Table 2 co-relation between cd4 count and incidence of disease.

In present study in bacterial pneumonia cases 22.76% patient had CD4 count >500cells/micro lit, 40.9% patient had CD4 count 201-500 cells/micro lit, 13.63% patient had CD4 count 151-200 cells/micro lit, 4.54% patient had cd4 count 101-150 cells/micro lit, 0% patient had CD4 51-100 cells/micro lit, 18.18% patient 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 Sham p. Toshniwal et al.³ 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

In present study in tuberculosis 1.4%

patient had CD4 count >500 micro lit, 36.61% patient had CD4 count 201-500 cells/micro lit, 19.71% patient had CD4 count 151-200 cells /micro lit, 14.08% patient had CD4 count 101-150 cells/micro lit, 16.09% patient had CD4 count 51-100 cells/micro lit, 11.26% patient had CD4 count <50. chi square test applied. $p<0.01$. indicates it is highly significant.

This findings similar to the study conducted by Halgarkar et al.⁴ except instead of getting maximum number of tuberculosis seen in patient having CD4 count 201-500 cell/micro here they get in patient having CD4 count 151-199 cells/micro lit. In this study 19.35% patient had CD4 count 201-500 cell/micro lit, 48.38% patient had cd4 count 151-200 cell/micro lit, 17.74% patient had CD4 count 101-150 cell/micro lit, 11.29% patient had cd4 cont 51-100 cell/micro lit, 3.22% patient had cd4 count <50 cells/micro lit

As immunity decreases incidence of tuberculosis also increases. CD4 T lymphocyte counts an explicit biomarker that provides assessment immune system status of HIV infected patient while pneumocystis jirovecii pneumonia is most common complications of AIDS'

In present study in Pneumocystis jirovecii pneumonia 0% patient had CD4 count >150 cells /micro lit, 14% patient had CD4 count 101-150 cell/micro lit, 14% patient had CD4 count 51-100 cell/micro lit, 71.8% patient had CD4 count <50 cell/micro lit.

This findings similar to the study conducted by Pu-xuan Lu et al.⁵ in this study 80% patient had CD4 count <50 cells micro lit, 8% had CD4 count 50-99 cell/micro lit, 6% had CD4 count 101-200 cell/micro lit, 6% in >200 cells/micro lit.

Table 3 co-relation between chest X-ray finding and pulmonary tuberculosis.

In present study prevalence of consolidations is maximum (33.80%) followed by pleural effusion (23.94%), cavitary lesion (16.90%), fibro nodular infiltrate (16.90%), milliary tuberculosis (14.08%) less frequently. Pneumothorax (8%). chi square test applied $p=0.02$. indicate this finding are highly specific.

Similar findings seen in study conducted by A. Ahidjo et al.² In which consolidation in 25% patient, pleural effusion in 16.7% patient, 20% patient had miliary tuberculosis. Upper zone

Table 2: Co-relation between CD4 count and pulmonary disease

Cd4 count	No. of bacterial pneumonia patient	No. of tuberculosis patient	No. of PJP patient
>500	5	1	0
201-500	9	26	0
151-200	3	14	0
101-150	1	10	1
50-100	0	12	1
<50	4	8	5

Table 3: Chest X-ray findings in pulmonary tuberculosis patient

CXR finding	No. of tubercular patient (%)
consolidation	24 (33.8)
Pleural effusion	17 (24)
pneumothorax	6 (8)
Bilateral extensive tuberculosis	10 (14.1)
Fibro nodular infiltrate	12 (16.9)
Milliary tuberculosis	10 (14.1)
Cavitatory lesions	12 (16.9)

involvement in 15% patient, lower or middle zone involvement in 11.7% patient, lymphadenopathy in 8.3% patient, nodular infiltrates in 3.3%.in patient.

Table 4 co-relation between chest x ray finding in pneumocystis jirovecii pneumonia.

In present study about 95.5 % patient has ground glass haziness on chest x ray. out of which 66.66% patient has more than 1 zone involvement and 33.33% patient has 1 zone involvement. In present study prevalence of upper zone, middle zone, lower zone are 16.66%, 0%, 83.33% respectively. Bilateral parahilar opacity seen in 71.42% patient. Ground glass haziness indicates early stage of pulmonary alveolar infiltration of pneumocystis jirovecii. This one of the marker of AIDS. Chi square test applied. $p>0.01$.

This finding similar to study conducted by Ying Xuan et al.⁵ In this study 56% patient had ground glass haziness. Consolidation in 12% patient, mixed lesion on in 6% patient'. $p<0.05$. Indicates it is highly significant.

Table 5 co-relation between HRCT finding and pulmonary disease.

In present study HRCT done in cases of pleural effusion, patient had normal chest x ray, patient suspected for Pneumocystis jirovecii pneumonia.

In present study 100% ground glass haziness and 71.42 % cystic lesion found in suspected Pneumocystis

Table 4 : Chest X-ray findings in Pneumocystis jirovecii pneumonia

CXR finding	No. of pts. (%)
Ground glass haziness	6 (95.5)
1 Zone	2 (33.4)
>1 Zone	4 (66.7)
Upper zone	1 (16.7)
Lower zone	5 (83.3)
Middle zone	0
B/L lower zone	4 (66.7)
B/L parahilar opacity	5 (71.4)
Ground glass haziness + B/L parahilar opacity	5 (71.4)

jirovecii pneumonia.

These findings similar to the studies conducted by ying xuan et al⁵ in which 56% patient had ground glass haziness, consolidations in 12% patient, 20% patient had lung cyst, mixed lesion in 6% patient.

In present study prevalence of consolidation, mediastinal lymphadenopathy, fibro nodular infiltrate, cavitatory lesion, Pneumothorax in tubercular patient are 53%, 53%, 46.93%, 10.2%, 10.2% respectively. Chi square test applied. These findings are highly significant. ($p<0.01$).

Similar findings present in study conducted by A.Ahidjo et al.² In which consolidation in 25% patient, pleural effusion in 16.7% patient, 20% patient had milliary tuberculosis. Upper zone involvement in 15% patient, lower or middle zone involvement in 11.7% patient, lymphadenopathy in 8.3% patient, nodular infiltrates in 3.3%.

Summary and Conclusion

Present study is descriptive, clinical study with cross sectional design with 100 HIV positive patient admitted in hospital ward during period of 2012-2014. This is done to study pulmonary involvement in PLHIV.

Following observation were noted and conclusions were drawn.

1. In present study prevalence of tuberculosis was maximum in patient followed by bacterial pneumonia and pneumocystis jirovecii pneumonia respectively.
2. In present study prevalence of bacterial pneumonia was maximum in patient having CD4 count >200cells/micro lit, prevalence of tuberculosis is maximum in patient having CD4 count between

Table 5: HRCT thorax findings in study population

HRCT findings	No. of patient (%)
Cases of pleural effusion, had normal CXR, pneumothorax	56 (100)
Consolidation	26 (46.4)
Meditational lymphadenopathy	26 (46.4)
Pneumothorax	5 (10)
Fibro nodular infiltrate	23 (41.1)
Cavitatory lesion	5 (8.9)
Pneumocystis jirovecii pneumonia	7 (100)
Cystic lesion	5 (71.4)
Ground glass haziness	7 (100)

($X^2=37.13$, $DF=6$, $p<0.01$)

150-500/micro lit, prevalence of pneumocystis jirovecii pneumonia is maximum in patient having CD4 count <50/micro lit.

3. In pulmonary tuberculosis patient consolidation, pleural effusion, fibro nodular infiltrate, cavity, Pneumothorax, bilateral extensive tuberculosis were common findings on chest X-ray.
4. In pulmonary tuberculosis patient most common radiological findings were consolidation, mediastinal lymphadenopathy, fibro nodular infiltrate, cavity, Pneumothorax on HRCT.
5. In pneumocystis jirovecii pneumonia maximum patient had ground glass haziness and parahilar opacity. On chest X-ray, Prevalence of lower zone involvement was maximum followed by upper zone.
6. In pneumocystis jirovecii pneumonia prevalence of ground glass haziness and cystic lesion was maximum on HRCT thorax.

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