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# Study of HIV Related Opportunistic Infections and its Correlation with CD4 Counts

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**Abstract:** ***Introduction: Number of HIV cases increasing in poor countries like India despite of successful implementation of control programs. Mortality in HIV cases because of OIs and other malignancy. This is retrospective study to evaluate HIV related OIs and its correlation with CD4 counts. Methods: A retrospective study was conducted for 6 month period in ART centre, Hamidia hospital, Gandhi medical college Bhopal from February 2017 to August 2017 after taking informed consent. All participants underwent detailed clinical examination and clinical sample were collected from HIV positive patients and performed various staining and culture methods.CD4 count were estimated by FACS. Results: In this study most common OIs was tuberculosis (65% ) in HIV positive patients followed by candidiasis ( 57.5%), respiratory tract infections (47.5% ), gastro intestinal infections (40% ) and meningitis (35% ). Most of mortality was recorded in Hiv positive cases with CD4 counts <50 cells/ µl. Conclusion: This study concluded that incidence of HIV related OIs high in low CD4 counts so early diagnosis and early treatment of HIV related OIs can increase or improve life expectancy of HIV patients.***

**Keywords:** AIDS, CD4 counts, HIV, Opportunistic infections, tuberculosis.

## 1. Introduction

Human immunodeficiency virus (HIV) is pandemic world wide that was isolated and identified as RNA containing retrovirus in 1983 that infects cells of immune and central nervous system. HIV patients are more prone for Opportunistic infections caused by pathogens which are usually noninvasive but invade the body when its immunity hampered. OIs lead to morbidity and mortality in AIDS patients which vary from region to region.[1] OIs and other malignancies are most common cause of mortality in HIV positive patients.[2] CD4 count is an important predictor of disease progression and treatment outcome in HIV seropositive patients. Early diagnosis and effective treatment can improve the quality of life and can prevent hiv related OIs like tuberculosis.[3]

The type of infections and the spectrum of pathogens responsible have been documented in many studies conducted in China, Thailand ,Africa, Korea and Bangladesh. Studies about the distribution of opportunistic pathogens among people living with HIV in India have been reported and are limited to place and region. This study was aimed to evaluate the different type of opportunistic infections and identify the frequent pathogens affecting the HIV patients who are attending ARTcentre bhopal. The clinical profile of these patients was studied and proportion of CD4 counts with respect to their type of infection is also evaluated.

## 2. Methods

This prospective observational study was conducted in ART centre, Hamidia hospital, Gandhi Medical College Bhopal for a period of 6 month from February 2017 to August 2017. Details of the study were informed and written consent was obtained from all the participants in the study after explaining the details and were treated as per the guidelines.

Total number of 80 patients were taken who fulfilled the inclusion criteria. A predesigned protocol was followed for evaluation including the Socio demographic and biodata, clinical examination, mode of transmission, presenting complaints were noted.

***Inclusion criteria***
1) Age above 18 years
2) HIV seropositive patients with OIs
3) No history of other co morbidities like Diabetes, Hypertension, tuberculosis etc.

Diagnosis of OIs depends upon the system and organ involvement, clinical features as decided by the physician. Various specimens were collected which included swabs, pus, sputum, CSF, blood, stool, CSF, oral swab, lymph node aspirates & skin scrapings.

Candidacies was diagnosed by taking oral swab specimens and was cultured on Sabourad's Dextrose agar and suspected colony was identified by Germ tube test. Cryptococcal meningitis was diagnosed by using India ink preparation of CSF. Herpes infection was diagnosed by taking impression smears from vesicular lesions.

## 3. Results

In this study, total 80 HIV positive AIDS patients were included. Out of these patients, 53 were males (66.25%) and 27(33.75%) were females. Male to female ratio was found to be 3: 1.Most of the patients (92.5%) belonged to 18-48(years) age group (Table No.1).


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**Table 1:** Age & Sex wise distribution of the total patients (n=80)

| Age group(years) | Male | Female | Total | Percentage |
|---|---|---|---|---|
| 18-28 | 7 | 3 | 10 | 12.5% |
| 29-38 | 32 | 16 | 48 | 60% |
| 39-48 | 10 | 6 | 16 | 20% |
| 49-58 | 3 | 2 | 5 | 6.25% |
| 59 & above | 1 | 0 | 1 | 1.25% |
| Total | 53 | 27 | 80 | 100% |

In this study we found comprising of bacterial, fungal, parasitic & viral infections. Among different opportunistic infections, bacterial infection tuberculosis were seen in 65% (pulomary tuberculosis, extrapulmonary and both ) patients, followed by candidiasis in 57.5% ( oral thrush and esophageal candidiasis), respiratory tract infection in 47.5% (bacterial,fungal), gastrointestinal infection in 40% (bacterial and parasitic) , meningitis in 35% cases (bacterial, fungal and parasitic) and Viral infections in 10% cases included Herpes zoster ,genital herpes, Molluscum contagiosum, Venereal warts. (table no2)

**Table 2:** Correlation of OIs with CD4 cell counts

| 0pportunistic infections | | No. Of cases | CD4+ count (cells/µl) range | | | | |
|---|---|---|---|---|---|---|---|
| | | | <50 n=18 | 50-99 n=25 | 100-149 n=19 | 150-199 n=14 | <200-500 n=4 |
| Tuberculosis (n=52) 65% | Pulmonary T.B. | 36 | 2 | 4 | 9 | 14 | 7 |
| | Extra pulmonary T.B. | 16 | 1 | 2 | 3 | 7 | 3 |
| | Both | 6 | - | 3 | 2 | 3 | - |
| Meningitis (n=28) 35% | Bacterial | 20 | 1 | 3 | 4 | 10 | 2 |
| | Fungal | 6 | 4 | 1 | - | 1 | - |
| | Parasitic (toxoplasmosis) | 2 | 1 | 1 | - | - | - |
| Respiratory infections (n=38) 47.5% | Bacterial | 23 | 2 | 5 | 10 | 5 | 1 |
| | Fungal | 15 | 2 | 4 | 6 | 3 | - |
| Candidiasis (n=46) 57.5% | Oral thrush | 41 | 3 | 5 | 7 | 14 | 1 |
| | Oesophageal candidiasis | 5 | 1 | 1 | 2 | 1 | - |
| Gastrointestinal infections (n=32) 40% | Bacterial | 6 | 1 | 2 | 2 | 1 | - |
| | parasitic | 26 | 3 | 10 | 12 | 5 | 2 |
| Viral (n=8) 10% | Herpes zoster | 4 | 1 | 1 | - | 2 | - |
| | Genital herpes | 1 | - | 1 | - | - | - |
| | Molluscum contagiosum | 1 | 1 | - | - | - | - |
| | Venereal warts | 2 | - | - | 1 | 1 | - |

**Table 3:** Correlation of opportunistic infections with CD4 count

| CD4 counts (cells / µl) | Opportunistic infections |
|---|---|
| 200 – 500 | T.B. Candidacies |
| 51 – 200 | TB, Cryptosporidiosis,Candidacies, other parasitic diarrhoea, bacterial pneumonia |
| < 50 | Cryptococcal meningitis, cryptosporidiosis, candidacies, |

Table no. 3 showing we divided cases into three groups based on CD4 cell counts (cells / mm3) that is <50, 51-200, and 201- 500 cells / mm3. TB and candidacies were found in range of 201-500 cell/ mm33.In this study, CD4 cell count range of 51-200, we found TB, candidacies and parasitic diarrhoea and other bacterial infections. We also found cryptococcal meningitis in patients of CD4 cell count range 50-100 cells /mm38. When severe immunodeficiency occur that is CD4 cell count less than 50 cell / mm3, almost all OIs become manifest at this terminal stage of AIDS.

## 4. Discussion

The present study of 80 HIV patients infected with opportunistic infections and their correlation with CD4+ cell counts. The age of the cases ranged from 18 to ≥59 years. Majority of the patients (92.5%) belonged to 18-48 years age group which is similar to what has been reported by Kumarasamy N et al[4]. In the present study males (66.25%) Out of numbered the females (33.75%).Male to female ratio was found to be 3:1 which is quite near to the ratio reported by Uzgare R et al.[5] and Singh A et al. In the study of opportunistic infections, we found bacterial infections as prominent opportunistic infection followed by fungal, parasitic and viral in decreasing order. Among bacterial infections, tuberculosis was found to be most common bacterial infection. It was seen in 65% of all the 80 patients out of which 45% were of pulmonary tuberculosis and 20% were of extrapulmonary tuberculosis.

Fungal infection candidiasis were the second common infection (57.5%) in all the 80 patients after bacteria infections in the present study. Among all the fungal infections which is in accordance with the range (12-93%) as reported by Greenspan.[7] Next common respiratory tract infection in 47.5% (bacterial,fungal), gastrointestinal infection in 40% (bacterial and parasitic), meningitis in 35% cases (bacterial, fungal and parasitic). Though the Toxoplasma gondii has been described as one of the most common opportunistic infection in AIDS patients, in the present study we found only one case of cerebral toxoplasmosis (2.5%) which is in accordance with findings reported by Ponniah P et al[8],Sanjeev Sinha et al.[9]

Coming to the association between CD4 count and OIs, it was observed that CD 4 count was significantly associated with presence of opportunistic infection in the study group. Among 80 subjects with opportunistic infection 18 had CD 4 count <50, 25 had CD 4 count 50-99, 19 cases had CD 4 count 99-149, 14 subjects had CD 4 count 149-199 and 4


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had cd4 count 200-500. When CD4+ cell count <50 cells/mm3 then almost all opportunistic infections become manifest at this terminal stage of AIDS. In this condition, the existing infections are seen with increasing frequency and in disseminated form.

## 5. Conclusion

Study highlights the importance of understanding the type of OI prevalent in the region and CD4 counts associated with the infections. This study helps the clinicians to make early diagnosis and early response to manage the patients in resource poor countries like India.

Out of many opportunistic infections in our study the most common were tuberculosis followed by candidiasis . We conclude that CD4 count is significantly low in opportunistic infection. It has been observed lower the CD4 count more the severity of the opportunistic infection so CD4 estimation is considered the backbone of AIDS control program in developing countries. It has been studied as a marker of progression of HIV infection and related opportunistic infections.

## 6. Acknowledgment

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