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Original Article

Opportunistic Infection in HIV Patients at Tertiary Care Hospital in Rawalpindi

Mirza Waseem Javed, Shazia Nisar, Ejaz Ahmad*, Muhammad Iqbal, Muhammad Anwar***, Syed Yasir Abbas******

Department of Medicine, Pak Emirates Military Hospital, Rawalpindi/National University of Medical Sciences (NUMS) Pakistan, *Department of Medicine, Pakistan Air Force Hospital, Islamabad Pakistan, **Department of Medicine, Combined Military Hospital, Lahore/National University of Medical Sciences (NUMS) Pakistan, ***Department of Pathology, Armed Force Institute of Pathology, Rawalpindi/National University of Medical Sciences (NUMS) Pakistan, ****Department of Medicine, Combined Military Hospital, Rawalpindi/National University of Medical Sciences (NUMS) Pakistan

ABSTRACT

Objective: To determine the spectrum of opportunistic infection in human immunodeficiency virus patients at tertiary care hospital.

Study Design: Cross-sectional study.

Place and Duration of Study: Department of Infectious Diseases, Pak Emirates Military Hospital, Rawalpindi, Pakistan from Jan 2024 to Sep 2024.

Methodology: The confirmed cases of human immunodeficiency virus infection of both genders between the age of 18-65 years were included. Patients having any infection before the diagnosis of human immunodeficiency virus infection were excluded from the study. Moreover, those who were not willing to participate and unable to comprehend questions were also excluded. All participants willing to participate were interviewed for demographic details and the clinical examination was done afterwards. Laboratory investigations for the suspected opportunistic infections were done.

Results: Of these eighty-one (n=81) patients 74(91.36%) were males and 7(8.64%) were females with a median age of 29.00 (44.00-35.00) years. The median HIV RNA PCR value was 33000.00 (1529.00 - 903341.00) IU/ml while median CD4 counts were 213.00 (71.00-381.00) cell/mm3. The most common opportunistic infection was pulmonary tuberculosis 20(24.69%) followed by Cytomegalovirus infection 18(22.22%) and Toxoplasmosis 17(20.99%). Syphilis was seen in 7(8.64%) while Cryptococcal Meningitis was seen in 3(3.70%). The least common infections were hepatitis B and Ebstein Bar virus infection having a frequency of 1(1.23%).

Conclusion: Pulmonary tuberculosis, cytomegalovirus infection and toxoplasmosis were the most common infections observed in individuals with human immunodeficiency virus infection.

Keywords: Autoimmune deficiency Syndrome, Human immunodeficiency infection, Opportunistic Infection, Tuberculosis.

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INTRODUCTION

According to WHO Pakistan is having approximately 210,000 people with HIV of which 41,000 are women, 170,000 are men and 4600 are children under age 15. Prevalence of HIV in Pakistan,[1] is low 0.1%. Intravenous drug users (38.4%), Trans genders (7.2%) MSM (5.6%) and female sex workers (2.2%) are key populations with HIV disease. HIV impairs cell mediated immunity by infecting and depleting CD4 T helper lymphocytes and increasing risk of opportunistic infections.[2] AIDS is most advanced stage of HIV in which CD4 count is less than 200 or patient has one or more AIDS defining illnesses including Opportunistic Infections. As the disease progresses incidence of Opportunistic infections is increased.[3] HIV is a retrovirus and most common type in Pakistan and worldwide is HIV-1. HIV-2 is less common and causes a less severe disease with lower risk of opportunistic Infections.[4]

HIV can be diagnosed by a number of tests; these include HIVRNAPCR, p24 antigen detection assay and virus isolation from human lymphocytes. The most cost effective and widely accessible method is HIV antibody detection, this can take few minutes (dot blot assay) to few hours (ELISA).[5] Antiretroviral therapy (ARV) aims to reduce viral load to undetectable level and increase CD4 count to normal (>500). Since introduction of ARVs mortality due to HIV has reduced by 40 %.[6] Even with ARV because of drug resistance and poor compliance risk of Opportunistic Infections exists.

Data of Opportunistic Infections is important in procuring relevant drugs and diagnostic requirements. The most common infection and most common cause of mortality among HIV patients is Tuberculosis (50%). PCP pneumonia (26.3%), Cryptococcal meningitis (8.3%),[7] cerebral toxoplasmosis, oral

Correspondence: Dr Mirza Waseem Javed, Department of Medicine, Pak Emirates Military Hospital, Rawalpindi Pakistan

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candidiasis are some other opportunistic infections in HIV patients. The rationale of this study is to highlight the frequency of opportunistic infections in HIV patients and their pattern of occurrence in our community.

METHODOLOGY

This cross-sectional analytical study was carried out at the Department of Infectious Diseases, Pak Emirates Military Hospital, Rawalpindi, Pakistan from January 2024 to September 2024. The ethical approval was taken from hospital's ethical committee vide certificate # A/28/ERC/81/24. The sample size was calculated using the Open Epi Sample Size Calculator with a margin of error of 5%, a confidence interval of 95% and a prevalence of HIV of 0.1%.[8] The informed consent was taken from all participants before inclusion into the study. Non-probability consecutive sampling technique was used.

Inclusion Criteria: The confirmed cases of HIV of both genders between the age of 18-65 years were included.

Exclusion Criteria: Patients having any infection before the diagnosis of HIV/ AIDS were excluded from the study. Moreover, those who were not willing to participate and unable to comprehend questions were also excluded.

All participants willing to participate were interviewed for demographic details and clinical examination findings were noted. Anti HIV Ab test was performed by ELISA, and a real-time Polymerase chain reaction was performed for HIV RNA. Laboratory investigations for the suspected opportunistic infections were done. The blood samples were collected by trained nursing staff and were processed as per institutional guidelines for HIV/AIDS patients in the hospital's laboratory. Polymerase chain reaction (PCR) was done for CMV and EBV, serological markers were sent for Toxoplasmosis, syphilis and viral hepatitis. PCR studies later confirmed viral hepatitis. PCP was diagnosed using chest imaging, i.e., Chest X-ray, high-resolution computed tomography, and India ink stain test. Tuberculosis was diagnosed clinically assisted by Chest X-ray, Mantoux test, sputum AFB smear or molecular methods. The meningitis in suspected cases was diagnosed using cerebrospinal fluid studies, including CSF Cyptococcal antigen and india ink stain, and brain imaging i.e. CT scan brain and MRI brain.

The Statistical Package for Social Sciences (SPSS) version 25.0 was used for data entry and analysis. The mean, median, interquartile ranges and standard deviation were calculated for quantitative variables as per the results of normality tests. The qualitative variables were represented using percentages and frequencies. The Shapiro-Wilk Test was used to check the normality of data.

RESULTS

In a sample of Eighty-one (n=81) individuals, there were 74(91.36%) males and 7(8.64%) females with a median age of 29.00(44.00-35.00) years. The median HIV RNA PCR value was 33000.00 (1529.00-903341.00) IU/mL, while the median CD4 count was 213.00 (71.00-381.00) cells/mm^3. The maximum number, 33(40.74%) patients, had CD4 counts between 200 and 499 cells/mm^3, while only 11(13.58%) had CD4 counts ≥500 cells/mm^3. Similarly, 33(40.74%) patients had a viral load greater than 100,000 IU/ml, while only 17(20.99%) had a viral load less than 50 IU/ml. The details are shared in Table-I. The most common opportunistic infections were pulmonary TB (20, 24.69%), followed by CMV infection (18, 22.22%) and toxoplasmosis (17, 20.99%). The least common infections were HBV and EBV, having a frequency of 1 (1.23%). PCP pneumonia and Cryptococcal Meningitis were observed in 3(3.70%) cases each. Details are shown in Table-II.

Table-I: Basic Demographic Features (n=81)

Variable	Values
Median Age (Years)	29.00 (44.00-35.00)
Median HIV RNA PCR IU/ml	33000.00 (1529.00-903341.00)
Median CD4 Count cells/mm3	213.00 (71.00-381.00)
Gender n(%)	
Males	74(91.36%)
Females	7(8.64%)
Age Groups n(%)	
25-49 Years	63(77.78%)
50+ Years	18(22.22%)
PCR Groups n(%)	
<50 IU/ml	17(20.99%)
50-999 IU/ml	1(1.23%)
1000-9999 IU/ml	9(11.11%)
10000-99999 IU/ml	21(25.93%)
>100000 IU/ml	33(40.74%)
CD4 Count Groups	
< 100 cells/mm3	23(28.40%)
100-199 cells/mm3	14(17.28%)
200-499 cells/mm3	33(40.74%)
≥500 cells/mm3	11(13.58%)

DISCUSSION

HIV/ AIDS is the most dreaded infection with moral and ethical implications in a country like Pakistan due to its association with homosexuality and

Table-II: Frequency of Opportunistic Infections (n=81)

Variable	Values
Tuberculosis n(%)	
Pulmonary TB	20(24.69%)
Disseminated TB	5(6.17%)
TBM	3(3.70%)
Latent TB	2(2.47%)
Potts Disease	1(1.23%)
CMV Infection n(%)	18(22.22%)
Toxoplasmosis n(%)	17(20.99%)
Syphilis (VDRL) n(%)	7(8.64%)
Cryptococcal Meningitis n(%)	3(3.70%)
PCP Pneumonia n(%)	3(3.70%)
Malignancy n(%)	2(2.47%)
Hepatitis n(%)	
HBV	1(1.23%)
HCV	2(2.47%)
EBV n(%)	1(1.23%)

prostitution. Mortality of HIV infection has decreased after ARV medicine however HIV patients still acquire opportunistic infections despite being on ARVs because of certain factors which include patients whose marital status is single, being on an antiretroviral regimen with efavirenz, having a CD4 lymphocyte count <350 cells/mm3 and WHO clinical stage 3 and 4 disease.[9-11] This study was conducted to see the spectrum of opportunistic infections in patients who are diagnosed with HIV/ AIDS infection. In this research study, there were 74(91.36%) males and 7(8.64%) females with a median age of 29.00(44.00-35.00) years. The median HIVRNAPCR value was 33000.00 (1529.00-903341.00) IU/ml while median CD4 counts were 213.00 (71.00-381.00) cell/mm3. A study was conducted in Oman which showed mean CD4 count of 72 cells/µL.[12] The most common opportunistic infection was pulmonary TB 20(24.69%). This is consistent with other studies establishing tuberculosis as most common opportunistic infection in HIV patients.[13] Rifampicin, Protease Inhibitor drug interactions and Immune Reconstitution inflammatory syndrome are important considerations in TB & HIV co-infections. Optimal treatment of Opportunistic infection before starting ARV prevents IRIS. All HIV patients who have positive TB skin test and negative active TB should receive Isoniazid preventive therapy. CMV infection was positive in 18(22.22%) cases. HIV and CMV co-infection is almost a universal co-existence.[14] CMV can cause retinitis, colitis, ventriculo-encephalitis, myelitis, adrenalitis & rarely pneumonitis. Toxoplasmosis was seen in 17(20.99%). In other studies toxoplasmosis has been recognized as most common cerebral opportunistic infection in HIV patients.[15] Past exposure to toxoplasmosis as indicated by positive toxoplasma IgG, cerebral space occupying lesion & CD4 count less than 100 are almost diagnostic of CNS toxoplasmosis. Co-trimoxazole prophylaxis is used in HIV patients with CD4 count less than 350 and WHO clinical stage 3 and 4 disease to prevent PCP, toxoplasmosis and bacterial infections. 3(3.70%) had Cryptococcal meningitis. In advanced HIV disease (CD4 count less than 50) Cryptococcus is the most common organism causing meningitis.[16,17] In Cryptococcal meningitis patient may have only subtle symptoms initially and fever and headache may wax and wane over weeks to months. PCP pneumonia was noted in 3(3.70%) cases. PCP has gradual onset of symptoms progressing to hypoxemia. After the initiation of antiretroviral medicine, the incidence of this pneumonia has decreased in HIV patients.[18] The least common infections were HBV and EBV having a frequency of 1(1.23%).

LIMITATIONS OF STUDY

The study has certain limitations, like a small sample size and shorter duration of study. Moreover, outcomes of cases with respect to mortality and morbidity were not seen. We suggest a large multicenter study with a bigger sample size should be done.

CONCLUSION

In this cohort, pulmonary TB was the most common opportunistic infection followed by Cytomegalovirus infection and Toxoplasmosis. The Hepatitis B and Ebstein Bar Virus infections were the least common.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

MWJ & SN: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

EA & MI: Data acquisition, data analysis, approval of the final version to be published.

MA & SYA: Critical review, concept, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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