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Original Article

Incidence of Opportunistic Infections in HIV Patients at Anti-Retroviral Therapy (ART) Adherence Unit, Islamabad Pakistan

Shah Fahad Qayyum[1]*, Hamza Khan[2], Gul Rukh[3]

[1]Lady Reading Hospital Peshawar, Pakistan.
[2]Trainee Medical Officer, Department of General Surgery, MTI, Bacha Khan Medical College, Swabi, Pakistan.
[3]House Officer, Department of General Surgery, MTI, Bacha Khan Medical College, Swabi, Pakistan.
Corresponding Author: Shah Fahad Qayyum; Email: sfask2013@gmail.com

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ABSTRACT

Background: Opportunistic infections (OIs) pose a considerable threat to HIV-infected individuals, especially in regions with varied environmental exposures and healthcare resources. The prevalence and severity of these infections are influenced by factors such as local pathogen profiles, host genetics, and the effectiveness of antiretroviral therapy (ART).

Objective: This study aimed to determine the prevalence and types of opportunistic infections among male HIV-positive patients at an ART adherence unit in Islamabad, Pakistan, and to compare these with regional trends.

Methods: An institution-based cross-sectional study design was utilized, encompassing a review of medical records from 533 male HIV-positive patients over a seven-month period. Data collection focused on demographic details, infection types, and treatment regimens. Exclusion criteria included incomplete files and unspecified OIs. The analysis was performed using SPSS version 25, with frequencies and percentages calculated to assess the prevalence of each infection type.

Results: Out of 533 patients, 149 (27.95%) developed at least one opportunistic infection. Respiratory infections were most common, with tuberculosis (TB) found in 25 (16.77%) patients. Skin-related infections were observed in 37 (24.83%) patients, primarily associated with intravenous drug use. Oral thrush was present in 11 (7.38%) patients. Other infections included urinary tract infections in 5 (3.35%) patients and various less common OIs.

Conclusion: The study revealed that OIs remain a significant health challenge for HIV-positive individuals, with a notable prevalence of respiratory and skin infections. Early and sustained ART, along with preventive healthcare measures, are crucial in managing and reducing OIs.

Keywords: HIV, Opportunistic Infections, Antiretroviral Therapy, Tuberculosis, Oral Thrush, Healthcare Management, Cross-Sectional Study, Pakistan.

INTRODUCTION

Human Immunodeficiency Virus (HIV) is a pathogen that significantly compromises the human immune system by targeting and destroying vital immune cells, leading to a gradual decline in immune competence. This immunodeficiency enhances susceptibility to a broad array of infections, malignancies, and diseases that individuals with intact immune systems could normally resist (1). The virus is transmitted through the exchange of various bodily fluids such as blood, breast milk, semen, and vaginal secretions, and perinatal transmission is also possible. However, it cannot be transmitted through casual contact like kissing, hugging, or sharing utensils. Certain groups, including healthcare and prison workers, as well as intravenous drug users, are at an elevated risk of exposure. Global estimates suggest about 37.7 million people were living with HIV by the end of 2020, with 3.7 million cases reported in South-East Asian countries alone (1-4).

Pakistan, the second-largest country in South Asia in terms of the HIV epidemic, reported its first case of HIV infection in 1987. Despite various reports, a clear national estimate for HIV prevalence within the Pakistani population remains elusive. The prevalence among the general populace is believed to be below 0.1%, equating to approximately 165,000 individuals living with HIV. As of mid-2019, over 24,000 people were registered with the National AIDS Control Program (NACP), a significant increase from 4,500 in 2013. The year 2018 saw an estimated 160,000 people living with HIV in Pakistan, with 6,400 deaths attributed to AIDS-related illnesses.

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Notably, only 14% of people living with HIV were aware of their status, and a mere 10% were receiving treatment (2, 7). The actual number of infected individuals could be much higher with proper screening. Factors such as widespread poverty, gender power imbalances, labor migration, unregulated blood transfusions, the rise in drug addiction, and low condom usage rates contribute to the risk of a rapid HIV spread in the country (8).

Opportunistic infections (OIs) are infections caused by organisms that are typically non-pathogenic but can cause disease when the immune system is compromised. These infections are often more severe or unusual due to the weakened immune response of the host or alterations in the microbiota (9, 10). The range and frequency of opportunistic infections vary regionally, potentially contributing to mortality, especially in areas with limited healthcare access (10, 11). Common opportunistic infections include Tuberculosis (TB), diarrheal diseases, candidiasis, cryptococcosis, cryptosporidiosis, cytomegalovirus (CMV) infections, herpes simplex, mycobacterium avium complex (MAC), pneumocystis pneumonia (PCP), and others such as progressive multifocal leukoencephalopathy (PML), cryptococcal meningitis, and Kaposi's sarcoma (8, 9, 14). The risk of developing these infections closely correlates with the level of immunosuppression, demographic characteristics, geographic factors, and the use of prophylaxis against common HIV-associated infections (15-18).

This study focuses on determining the prevalence of various opportunistic infections among male HIV-positive patients attending an Anti-Retroviral Therapy (ART) adherence unit in Islamabad. It seeks to identify which opportunistic infections are most prevalent and to assess the risk factors associated with increased incidence rates. Through examining the occurrence of a range of opportunistic infections, the research aims to delineate which infections are more commonly presenting in this population, thereby contributing valuable insights into the regional epidemiology of opportunistic infections among HIV-infected individuals.

MATERIAL AND METHODS

The study employed an institution-based cross-sectional design, conducted from June 1, 2023, to December 31, 2023, at the Antiretroviral Therapy (ART) Adherence Unit in Islamabad. This design was chosen to evaluate the prevalence of opportunistic infections among male HIV-positive patients attending the facility within the specified timeframe. Ethical approval for the study was granted by the ART Islamabad's ethical committee, ensuring all research activities were in alignment with the ethical standards of the institution's research committee and adhered to the principles outlined in the 1964 Helsinki declaration and its subsequent amendments (3, 19).

The inclusion criteria specified male HIV-positive patients of any age or background who presented themselves to the ART adherence unit during the study period. Conversely, the study excluded female patients, those with incomplete medical files, missing essential data, or instances where the opportunistic infection was not explicitly identified, to maintain a focused and relevant dataset for analysis.

Data collection was systematically carried out through the review of patient files made available by the ART Unit Islamabad, covering admissions from June 1, 2023, to December 31, 2023. The files provided comprehensive information on HIV status, age, gender, file number, date of admission, residential address, the type of infection presented, appropriate antibiotic therapy administered, and symptoms observed. This data was meticulously organized in Microsoft Excel 2018 to facilitate detailed analysis (7, 19-24).

Following the collection phase, the study encountered the need to exclude 13 patients due to either the lack of specificity regarding the infection or inadequate documentation, resulting in a final sample size of 533 patients. Data extraction focused on recording detailed information from each patient's file, including identification, demographic details, diagnosed infection, the commencement of Highly Active Antiretroviral Therapy (HAART), and the antibiotics used for treating the opportunistic infections (25-26).

The analytical process utilized SPSS version 25 for a quantitative examination of the collected data. The analysis aimed to compute the frequency of each identified opportunistic infection, subsequently expressing these frequencies as percentages of the total cases of opportunistic infections observed within the study population. This approach facilitated a comprehensive understanding of the prevalence and distribution of opportunistic infections among the surveyed cohort.

RESULTS

The histogram analysis reveals a concentration of HIV patients, particularly those with Opportunistic Infections (OI), within the 20-40 age range. Specifically, the 25-30 age group has the highest overall patient count, while the 30-35 age group presents the most OI cases. Despite the lower absolute numbers of OI patients across all ages, their distribution mirrors that of the total patient population, indicating a higher incidence of OIs among younger and middle-aged adults. A notable decline in OI cases is observed post-45 years, with minimal occurrences in older age groups.

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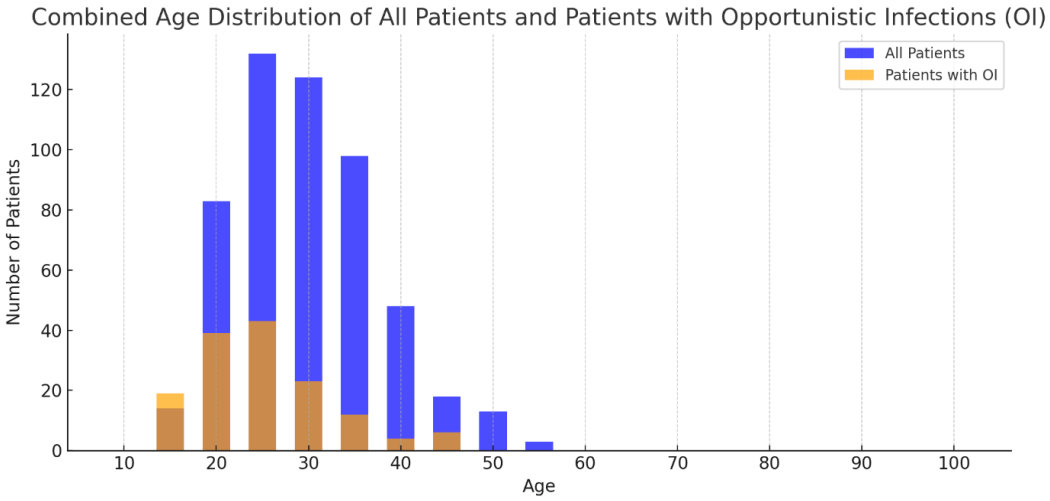

Figure 1 Age Histogram

The pie chart represents the tuberculosis (TB) test results among patients. A significant majority, 89%, tested negative for TB, which is the largest portion of the chart, depicted in light blue. In contrast, a smaller segment, comprising 6% of the patients, tested positive for TB, indicated by the pink slice. Additionally, there is a green slice representing 5% of the patients for whom the TB test results were not available, referred to as 'empty tb test'. The chart effectively illustrates the distribution of TB test results within the patient population, with a clear predominance of negative results.

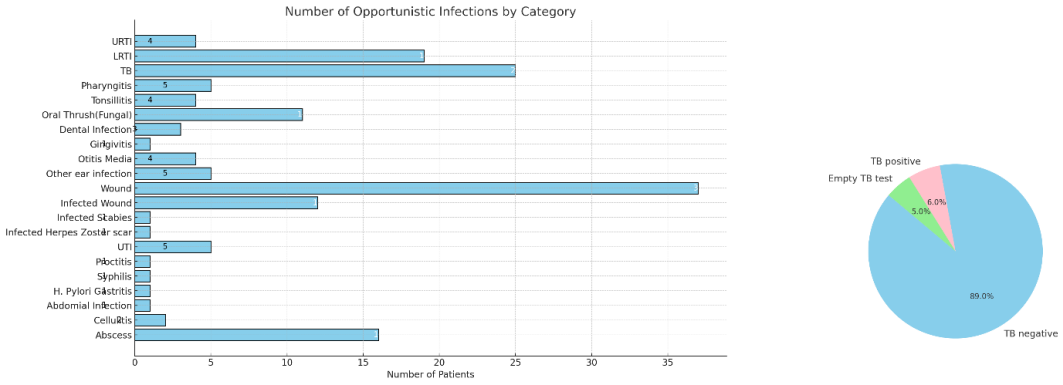

Figure 2 Study Characteristics

The bar graph depicts the frequency of various opportunistic infections categorized by body system in a patient cohort. Respiratory infections were the most common, with tuberculosis (TB) accounting for 25 cases and lower respiratory tract infections (LRTI) for 19 cases. Wound-related ailments were also notable, with non-specified wounds being the most frequent at 37 cases, followed by abscesses (16 cases) and infected wounds (12 cases). Infections of the throat were represented by 11 cases of oral thrush, 5 cases of pharyngitis, and 4 cases of tonsillitis. Genitourinary infections included 5 cases of urinary tract infections (UTI), and single cases of syphilis and proctitis. Gastrointestinal infections were less common, with one case each of abdominal infection and Helicobacter pylori gastritis. Dental infections comprised 3 cases, gingivitis had 1 case, and ear infections were observed with 5 other ear infections and 4 cases of otitis media. The data indicates a predominance of respiratory and wound-related infections among the opportunistic infections in this population.

DISCUSSION

The prevalence of opportunistic infections (OIs) among HIV-infected individuals presents with notable geographic variability, attributable to differences in environmental exposures to pathogens, intrinsic virulence of mycobacteria, fungi, and parasites, as well as host genetic patterns and the nature and timing of iatrogenic immunosuppression. These factors influence not only the likelihood of OIs but also their clinical manifestation. While ART has significantly improved the quality of life for those with HIV, non-adherence, drug resistance, and treatment failures contribute to the persistence of OIs as a serious health concern, accounting for a substantial proportion of morbidity and mortality among this population (9).

In the retrospective analysis of our study, which included 533 HIV-infected patients over a seven-month period, 27.95% developed at least one OI, aligning closely with findings from Northwest Ethiopia. Our study's focus on the regional specificity of OIs in Pakistan revealed respiratory infections, particularly tuberculosis (TB), as the most prevalent. TB, a leading cause of death among HIV-positive individuals, was diagnosed in 16.77% of our patients, surpassing rates observed in similar studies from China and Tanzania. This underscores the critical need for TB preventive therapy, which, despite its proven efficacy in reducing TB/HIV death rates, remains underutilized (13).

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Our findings also indicated a high incidence of wound-related infections, primarily due to IV drug use—a risk factor warranting further investigation. Oral infections, particularly oral thrush, though less prevalent in our cohort compared to data from China, remain a significant concern, as they are often the initial indicator of HIV infection. Contrarily, skin infections such as abscesses were consistent with other studies, yet the incidence of Herpes Zoster was remarkably lower than reported in South India (19).

The study's design, a cross-sectional analysis, inherently limits the comprehensiveness of the data, particularly regarding the development of OIs prior to or after the study period. Additionally, potential selection bias and confounding factors, such as HAART duration, adherence levels, baseline CD4 counts, viral load, nutritional status, co-infections, and socio-demographic characteristics, may have impacted the association between HAART and OIs. Furthermore, the results from a single HAART facility in Islamabad may not fully represent the broader HIV epidemic in Pakistan or other regions (17, 21).

In light of these findings, it is paramount to emphasize the importance of early initiation and adherence to HAART treatment and comprehensive patient care, which can significantly mitigate the occurrence of OIs. Prevention strategies for those living with HIV include maintaining antiretroviral therapy, adherence to prophylactic measures, and lifestyle modifications to reduce exposure to potential pathogens. These interventions, along with enhanced surveillance and patient education, form the cornerstone of improving health outcomes for HIV-infected individuals. Future research should focus on longitudinal studies to capture the entire spectrum of OI development and evaluate the long-term impact of HAART on reducing OI prevalence.

CONCLUSION

In conclusion, the study highlights that opportunistic infections continue to be a significant health issue among HIV-infected individuals, with geographic disparities in prevalence. Early initiation and strict adherence to antiretroviral therapy, coupled with comprehensive patient care, are crucial for reducing the incidence of these infections. The findings underscore the importance of tailored prevention strategies and healthcare interventions that address local epidemiological trends. For the healthcare community, this emphasizes the need for vigilant monitoring, prophylactic measures, and patient education to mitigate the risk and improve the management of opportunistic infections, ultimately enhancing the quality of life for those living with HIV.

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