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ANALYSIS FACTORS AFFECTING OPPORTUNISTIC INFECTIONS IN WOMEN HIV IN DR SOETOMO HOSPITAL

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Abstract

Background: Human Immunodeficiency Virus (HIV) remains a major global health concern. In Indonesia, women account for 35.1% of HIV cases. In East Java alone, 1,062 new cases were reported between January and March 2023, with Surabaya recording the highest number at 663 cases. Opportunistic infections frequently affect HIV patients due to weakened immune systems. Tuberculosis is the most prevalent OI among HIV patients in Indonesia, accounting for 62.1% of cases, and is commonly found in women, posing a risk of vertical transmission. This study aims to analyze the factors influencing of opportunistic infections in women living with HIV. **Methods:** A quantitative approach with an observational analytic design and retrospective method. Used a total sampling technique involving all female HIV patients diagnosed with opportunistic infections at HIV clinic of Dr. Soetomo Hospital from January-December 2023, meet the inclusion criteria. The research was conducted from December 2023-October 2024. The dependent variable is opportunistic infections, while the independent variables are duration of HIV infection, adherence to antiretroviral therapy, CD4 cell count, and viral load. Data were analyzed using univariate and bivariate methods, with the Chi-Square test. **Results:** The results, duration of HIV infection was not significantly associated with opportunistic infections ($p = 0.402$). However, ARV adherence ($p = 0.003$), CD4 count ($p < 0.001$), and viral load ($p = 0.001$) were significantly associated with increased risk of opportunistic infections. **Conclusion:** In conclusion, ARV adherence, CD4 count, and viral load significantly influence the occurrence of opportunistic infections among HIV-positive women at Dr. Soetomo Hospital.

Keyword : Opportunistic Infections, HIV/AIDS, Women, ARVs, CD4 levels, Viral Load Levels

INTRODUCTION

Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) are serious global health problems, especially in efforts to control the spread of the virus and provide support for People with HIV/AIDS (PLWHA). HIV is a virus that attacks the immune system and can cause AIDS.

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Transmission occurs through direct contact with bodily fluids such as blood, semen, vaginal fluids, and breast milk (Indonesian Ministry of Health, 2023).

According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), the estimated number of PLWHA in Indonesia in 2022 is around 540,000 (range: 490,000–590,000), with women contributing 35.1% of cases, or around 190,000 (range: 170,000–210,000). The Indonesian Ministry of Health reported that HIV cases in Indonesia increased throughout 2023, with the majority of new cases being women. A total of 429,215 confirmed HIV cases have been recorded. Data from the Executive Report on the Development of HIV/AIDS and Sexually Transmitted Infections (STIs) shows that from January to March 2023, 4,188 cases of HIV/AIDS have been reported, with the highest number of cases (1,062) in East Java.

People with HIV who progress to stage 3 experience severe damage to their immune systems, making them increasingly susceptible to serious diseases known as opportunistic infections. Opportunistic infections (OIs) are conditions that generally affect people with compromised immune systems. These infections often occur in patients with low CD4+ cell counts and can be caused by external pathogens or microorganisms that are usually controlled by the immune system.

The Indonesian Ministry of Health reported that by 2014, the cumulative number of AIDS cases (HIV infection with opportunistic infections) in Indonesia had reached 55,799 cases, or 36.7% of all HIV cases in the country (Framasari and Flora, 2020). Opportunistic infections are caused by fungal, parasitic, bacterial, or viral pathogens, which take advantage of weakened immune systems in individuals such as PLWHA.

Some common types of opportunistic infections include candidiasis, invasive cervical cancer, coccidioidomycosis, cryptococcosis, encephalopathy, herpes simplex virus, lymphoma, tuberculosis, pneumocystis pneumonia, and toxoplasmosis. In Indonesia, the most common opportunistic infections found in HIV patients are pulmonary tuberculosis, cryptosporidiosis, and candidiasis/syphilis (Ministry of Health of the Republic of Indonesia, 2022). A study conducted in East Jakarta found that tuberculosis (TB) is the most common

infection in HIV patients in Indonesia. Almost half of all tuberculosis cases occur in women, because women with advanced HIV are at higher risk of developing opportunistic infections, which can cause severe illness and death. In addition, pregnant women with HIV and opportunistic infections are at risk of transmitting the virus to their unborn children (Rostina et al., 2019). This study aims to analyze the factors contributing to opportunistic infections in women with HIV at the HIV Clinic of Dr. Soetomo Hospital.

METHOD

The study utilized a quantitative approach with an observational design and a retrospective method. This involved reviewing the medical records of female HIV patients at Dr. Soetomo Hospital who experienced opportunistic infections. The population included all female HIV patients treated at the hospital's HIV clinic from January to December 2023. A total sampling method was applied, meaning all patients who met the inclusion criteria, such as those with late-stage HIV and complete medical records were included, while those with incomplete records or early-stage HIV were excluded.

Data collection relied on secondary data from medical records, which were processed through steps such as editing, coding, data entry, and tabulation. Univariate analysis was used to describe the characteristics of each variable, while bivariate analysis, using chi-square tests, explored the relationships between variables like ARV adherence, CD4 levels, viral load, and the occurrence of opportunistic infections. The research followed ethical guidelines, including obtaining informed consent (where required), ensuring patient anonymity, and maintaining the confidentiality of all collected data.

RESULT AND DISCUSSION

Table 1 Frequency distribution of opportunistic infections

Characteristics	Frequency (f) N = 94	Percentage(%)
Infection		
Infected	48	51,1
Not Infected	46	48,9

Types of Infection		
Candidiasis	3	3,2
Hepatitis	2	2,1
Tuberculosis	16	17,0
Toxoplasmosis	5	5,3
Pneumonia	4	4,2
Herpes	1	1,1
Condyloma Acuminata	4	4,2
Cytomegaloviral	2	2,1
Septicaemia	2	2,1
Respiratory Infection	2	2,1
Acute Pharyngitis	1	1,1
Chronic Pansinusitis	1	1,1
Cyst of Bartholin's Gland	1	1,1
Chronic Tubotympanic	1	1,1
Conjuctivitis	1	1,1
Bisitopenia	1	1,1
Gastroenteritis	1	1,1
Without Infection	46	48,9

Table 2 Frequency distribution of predominant factors

Respondent Characteristics	**Frequency of Infection N = 94**		**Percentage(%)**
	Infected	not infected	
Age			
<20	3	0	3,2
20-35	24	23	50,0
>35	21	23	46,8
Work			
Employees	12	15	28,7
Housewife	28	23	54,3
Student	4	1	5,3
Other	4	7	11,7
Duration of Infection			
≥ 5 year	10	13	24,5
< 5 year	38	33	75,5
Compliance ARV consumption			
Low	24	9	35,0
Medium	12	12	25,6
High	12	25	39,4
CD4 cell Level			
≤ 350 cell (at Risk)	34	15	52,1
>350 cell (no Risk)	14	31	47,9
Viral Load Level			
>100.000 (High)	13	0	13,9
10.000-100.000 (Medium)	4	3	7,4
50-10.000 (Low)	6	5	11,7
<50 (not detected)	25	38	67,0

Table 1 provides an overview of the distribution of opportunistic infections among female HIV patients. A total of 48 patients (51.1%) had opportunistic

infections, compared to 46 patients (48.9%) without such infections. Tuberculosis was the most common opportunistic infection, affecting 16 patients (17.0%).These findings indicate that opportunistic infections affect more than half of female HIV patients, with tuberculosis being the most prevalent. According to the World Health Organization (WHO, 2024), individuals with HIV have a 14-fold higher risk of developing tuberculosis due to the decline in CD4 cell count, which compromises the immune system's ability to suppress *Mycobacterium tuberculosis*. As a result, latent tuberculosis infections are more likely to progress to active disease in HIV-infected individuals.

Table 2 presents the frequency distribution of factors influencing opportunistic infections by age. Patients aged 20–35 years constitute the majority, with 47 individuals (50.0%), followed by those over 35 years (44 individuals, 46.8%), and those under 20 years (3 individuals, 3.2%). Previous studies suggest no significant relationship between age and HIV incidence, as all age groups are at risk. However, Rahmawati et al. (2023) report that individuals under 40 years are 7.3 times more likely to contract HIV. The highest prevalence of HIV infection occurs in the productive age group (20–24 years), largely due to risky behaviors, including unprotected sexual activity (Oktaseli et al., 2019).

When examining the occupational background of respondents, housewives comprise the largest group, with 51 individuals (54.3%), followed by private-sector employees (27 individuals, 28.7%), students (5 individuals, 5.3%), and those with unknown occupations (11 individuals, 11.7%). Of the 48 respondents with opportunistic infections, 28 were housewives, a finding consistent with previous studies indicating that housewives constitute a significant portion of HIV patients (Sianturi & Aprianingsih, 2021). The lack of access to information on HIV/AIDS due to household responsibilities may contribute to their vulnerability. Furthermore, 85% of HIV transmission among housewives is linked to sexual contact with infected partners.

Regarding the duration of HIV infection, most patients (71 individuals, 75.5%) had been diagnosed for less than five years, while 23 individuals (24.5%) had been infected for more than five years. In terms of antiretroviral (ARV) therapy

adherence, 37 patients (39.4%) demonstrated high adherence, 33 patients (35.0%) had low adherence, and 24 patients (25.6%) exhibited moderate adherence. CD4 cell count distribution indicates that 49 individuals (52.1%) had CD4 levels ≤ 350 cells/mm³, placing them at higher risk, while 45 individuals (47.9%) had CD4 levels > 350 cells/mm³.Lastly, viral load analysis reveals that 63 patients (67.0%) had undetectable viral loads (<50 copies). In contrast, 13 patients (13.9%) had high viral loads (>100,000 copies), 11 patients (11.7%) had low viral loads (50–10,000 copies), and 7 patients (7.4%) had moderate viral loads (10,000–100,000 copies).

Table 3 Bivariate analysis with chi square statistical test

Variables	Opportunistic Infection Occurrence			*P Value*
	Infected	Not Infected	Total	
	f (%)	f (%)	f (%)	
Duration of Infection				
≥ 5 year	10(10,6)	13(13,9)	23(24,5)	0,402
< 5 year	38(40,5)	33(35,0)	71(75,5)	
Compliance ARV consumption				
Low	24(25,5)	9(9,5)	33(35,0)	**0,003**
Medium	12(12,8)	12(12,8)	24(25,6)	
High	12(12,8)	25(26,6)	37(39,4)	
CD4 cell Level				
≤ 350 cell (at Risk)	34(36,2)	15(15,9)	49(52,1)	**<0,001**
>350 cell (no Risk)	14(14,9)	31(33,0)	45(47,9)	
Viral Load Level				
>100.000 (High)	13(13,9)	0(0)	13(13,9)	
10.000-100.000 (Medium)	4(4,2)	3(3,2)	7(7,4)	**0,001**
50-10.000 (Low)	6(6,2)	5(5,3)	11(11,7)	
<50 (not detected)	25(26,6)	38(40,4)	63(67,0)	

Based on the results of statistical tests, the p-value for the variable *duration of HIV infection* was 0.402, exceeding the significance level (α = 0.05). Therefore, it can be concluded that the hypothesis (H1) is not supported, indicating that there is no significant effect of the duration of HIV infection on the occurrence of opportunistic infections in women living with HIV. This finding is consistent with a cross-sectional study conducted by Teeka, Mutai, and Kangogo (2019) in Kenya involving 196 HIV patients aged 18 and above, which also reported no significant effect of the duration of HIV infection on the occurrence of opportunistic infections (Teeka et al., 2024). However, this result contrasts with a retrospective cohort study by Melkamu et al. (2020) involving 408 HIV-infected patients, which demonstrated a higher risk of opportunistic infections among patients with longer infection duration.

Regarding the variable *adherence to antiretroviral (ARV) therapy*, the statistical test yielded a p-value of 0.003, which is below the significance threshold ($\alpha = 0.05$). Consequently, the hypothesis (H1) is accepted, affirming that ARV adherence significantly affects the occurrence of opportunistic infections in women living with HIV. This result aligns with findings from a systematic review and meta-analysis by Low et al. (2016), which demonstrated a reduction in opportunistic infection risk among HIV patients with good ARV adherence. Similarly, a study by Woldegeorgis et al. (2022) identified poor ARV adherence as a critical factor contributing to the development of opportunistic infections. Low adherence levels are influenced by factors such as limited knowledge, challenges in maintaining routine medication schedules, and insufficient social support. Muchtar et al. (2023) highlighted the impact of patient knowledge and social motivation on adherence, emphasizing the importance of family involvement in medication supervision to enhance ARV compliance (Suryanto & Nurjanah, 2021).

Statistical tests for the variable *CD4 cell count* produced a p-value of <0.001, which is significantly lower than the α level of 0.05. Therefore, the hypothesis (H1) is accepted, indicating that CD4 levels significantly influence the occurrence of opportunistic infections in female HIV patients. This finding is corroborated by a study conducted by Kurniawati et al. (2022) involving HIV/AIDS patients at Dr. Moewardi Hospital, where CD4 levels were found to significantly affect the incidence of opportunistic infections, with a p-value of 0.002. Similarly, research by Letissia et al. (2019) at Dr. Mohammad Hoesin Hospital in Palembang concluded that declining CD4 levels are associated with an increased risk of opportunistic infections in HIV patients.

The statistical analysis of *viral load levels* revealed a p-value of 0.001, lower than the significance level of $\alpha = 0.05$. This supports the acceptance of the hypothesis (H1), indicating that viral load levels significantly affect the incidence of opportunistic infections in female HIV patients. This conclusion is consistent with research by Paramadika et al. (2023) at Sanglah Hospital, Denpasar, which demonstrated that lower viral loads correspond to a reduced risk of opportunistic infections. However, conflicting findings were reported by Siagian (2023) in a study conducted at Dr. H. Abdoel Moeloek Hospital, where no significant

relationship between viral load levels and opportunistic infections was observed, as evidenced by a p-value of 0.539, exceeding the significance threshold.

CONCLUSION

Based on the findings of this study, it can be concluded that among the 94 female patients living with HIV, the majority were between the ages of 20 and 35 years and primarily engaged in domestic work as housewives. Most patients experienced opportunistic infections, with tuberculosis being the most prevalent. The duration of HIV infection did not have a statistically significant effect on the occurrence of opportunistic infections. Conversely, adherence to antiretroviral (ARV) therapy, CD4 cell count, and viral load levels were found to have a significant impact on the development of opportunistic infections.

DECLARATION

Conflict of Interest

Authors declare no conflict of interest regarding the publication of this research.

Authors' Contribution

All authors contributed significantly to the research, analysis, and writing of this article. Author designed the study and supervised data collection, performed statistical analysis, and contributed to data interpretation and manuscript preparation. All authors reviewed and approved the final version.

Ethical Approval

Ethical approval for this study was obtained from the Institutional Review Board of Universitas Airlangga Hospital, ensuring that all protocols complied with the hospital's ethical guidelines (177/KEP/2023). Informed consent was acquired from all participants prior to inclusion in the study.

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Data Availability

The data supporting the findings of this study are available upon reasonable request from the corresponding author, with restrictions due to participant confidentiality.

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