



Research Article

Characteristics of pulmonary tuberculosis patients with HIV in Regional General Hospital Dr. Harjono Ponorogo period January 2018 – December 2022

Anindya Zalfaa Kusuma Dewi¹, Ronald Pratama Adiwino^{2*}, Dody Taruna³, Irmawati M. Dikman⁴, Soedarsono⁵, Yelvi Levani⁶

1) Faculty of Medicine, Hang Tuah University, Surabaya

2) Department of Public Health, Faculty of Medicine, Hang Tuah University, Surabaya

3) Department of Physiology, Faculty of Medicine, Hang Tuah University, Surabaya

4) Department of Biology, Faculty of Medicine, Hang Tuah University, Surabaya

5) Department of Pulmonology, Faculty of Medicine, Hang Tuah University, Surabaya

6) Department of Microbiology, Faculty of Medicine, Muhammadiyah Surabaya University, Surabaya

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***Correspondence:**

adiwinoto.ronald@hangtuah.ac.id

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ABSTRACT

Tuberculosis (TB) is the most common opportunistic infection in people living with HIV/AIDS in Indonesia, and HIV infection promotes Mycobacterium tuberculosis infection. In ODHIV, the probability of contracting TB is 10% per year. According to the Indonesian Ministry of Health, East Java is in second place with 71,909 cases and has the second highest number of AIDS patients and 824,000 TB cases in Indonesia. This study aims to determine the characteristics of pulmonary tuberculosis patients with HIV at DR Harjono Ponorogo Hospital for the period January 2018 - December 2022. This study applied descriptive research methodology with quantitative techniques with secondary data from medical records of pulmonary TB patients with HIV at Dr. Harjono Ponorogo Hospital for the period January 2018 - December 2022. The results showed a total sample of 130 medical records, there were several characteristics of TB patients with HIV, namely the highest age group of 30-39 years by 29.2%, more in male gender 73%. More patients had last high school education 38.5%, more treatment duration in patients who did for 9 months 61.5% and the results showed more patients with poor prognosis 56%. In conclusion, the characteristics of TB patients with HIV with the highest group at the age of 3-39 years, having male gender, more high school education, with more treatment duration of 9 months, and the results showed a poor prognosis.



INTRODUCTION

Patients co-infected with Human Immunodeficiency Virus (HIV) and tuberculosis (TB) pose a significant health challenge, contributing to heightened morbidity and mortality rates (Krisnahari et al., 2018). Tuberculosis, caused by the infectious bacterium *Mycobacterium tuberculosis*, predominantly affects the respiratory system, although it can also target various organs (Mulyadi & Fitrika, 2015; Muna & Cahyati, 2019). Concurrently, HIV compromises the immune system, amplifying susceptibility to diverse diseases, impeding recovery from opportunistic infections, and potentially leading to fatal outcomes (Ismail & Bulgiba, 2013; Muna & Cahyati, 2019). The immunocompromised state in individuals with HIV/AIDS renders them particularly vulnerable to infections, including tuberculosis.

Tuberculosis stands out in Indonesia as the most prevalent opportunistic infection among people with HIV/AIDS, with HIV infection acting as a catalyst for *Mycobacterium tuberculosis* proliferation. Indonesia, notably, bears the burden of being the country with the second-highest TB burden in the world. The likelihood of active tuberculosis (TB) occurrence is notably elevated in individuals with HIV, being 18 times higher compared to non-HIV-infected counterparts. Persons living with HIV (PLHIV) face a 10% annual risk of contracting TB, in stark contrast to the 10% lifetime risk in non-HIV individuals (Muna & Cahyati, 2019).

The World Health Organization (WHO) projects alarming statistics, anticipating tuberculosis to be the second leading cause of death after COVID-19, with an estimated toll of up to 1.5 million lives by 2020, including 214,000 individuals co-infected

with HIV (Chakaya et al., 2022). Pertinently, East Java, as reported by the Indonesian Ministry of Health, holds a significant position, ranking second with 71,909 TB cases and emerging as the second-highest province for AIDS patients, following Papua, based on comprehensive statistics spanning from 2010 to 2022. Hence it is of utmost importance to do a study on the features of tuberculosis (TB) patients who also have HIV co-infection at Dr. Harjono Hospital in Ponorogo City, East Java Province, Indonesia. Gaining insight into the intricacies of this simultaneous infection within a particular geographical area is essential for formulating focused therapies. The findings of this study will not only enhance the scientific comprehension of the simultaneous occurrence of HIV and TB, but will also provide valuable guidance for healthcare practices designed specifically for patients with both infections. The results of this study offer significant insights for public health interventions, enhancing diagnostic and treatment approaches, ultimately seeking to alleviate the burden of this simultaneous epidemic on the community at large. Therefore, this study aimed to enhance the array of interventions aimed at mitigating the burden of this concurrent epidemic on the local community.

METHODS

This study employs descriptive research methodologies and quantitative techniques, utilizing secondary data extracted from medical records that meet the specified inclusion and exclusion criteria. The inclusion criteria for this study encompassed patients diagnosed with both pulmonary tuberculosis and HIV infection, aged 18 years and above. Patients with incomplete medical records or a diagnosis of other concomitant illnesses were excluded from the analysis. The choice of this methodology aligns with the goals of this research, which



aim to identify the features of individuals with both pulmonary tuberculosis and HIV infection. The collection of data took place at RSUD Dokter Harjono Ponorogo by extracting medical records of patients diagnosed with pulmonary tuberculosis and HIV infection. The data collection period spanned from January 2018 to December 2022.

There were a total of 130 medical records that satisfied both the inclusion and exclusion criteria. The ethical feasibility of this research has been assessed by the health research ethics commission of the RSUD Dokter Harjono Ponorogo, with reference number:

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RESULTS

The data collected reveals that the age group with the highest percentage of individuals is 30 - 39 years, accounting for 29.2% of the total. The majority of individuals were male, accounting for 73%. The majority of patients had completed high school as their highest level of education (38.5%). The longest treatment period reported was 9 months (61.5%), and a significant proportion of patients had a bad prognosis (56%).

Table 1. Characteristic distribution of age, gender, education, treatment duration, prognosis

Variable	Patient Characteristics	Frequency	Percentage
Age	0 – 9	1	0.8%
	10 – 19	5	3.8%
	20 – 29	17	13%
	30 – 39	38	29.2%
	40 – 49	35	27%
	50 – 59	25	19.2%
	60 – 69	9	7%
Total		130	100%
Gender	Male	95	73%
	Female	35	27%
Total		130	100%
Education	Primary school	34	26.1%
	Junior high school	26	20%
	Senior high school	50	38.5%
	Bachelor's degree	20	15.4%
Total		130	100%



Total		130	100%
Treatment duration	6 Month	50	38.5%
	9 Month	80	61.5%
Total		130	100%
Prognosis	Good	57	44%
	Poor	73	73%
Total		130	100%

Table 2. Characteristic distribution of other opportunistic infections

Variable	Patient Characteristics	Frequency	Percentage
Opportunistic infections	Candidiasis	50	68.4%
	<i>Cryptosporidium parvum</i> diarrhea (Cryptosporidiosis)	13	18%
	<i>Pneumocystis carinii</i> pneumonia (PCP)	8	11%
	<i>Herpes zooster</i>	1	1.3%
	Hepatitis	1	1.3%
Total		73	100%

Table 3. Characteristic distribution comorbid

Variable	Patient Characteristics	Frequency	Percentage
Comorbid	Diabetes mellitus	75	100%
Total		75	100%

Table 4. Overview of baseline CD4 count (before ARV therapy)

CD4 count (sel/mm ³)	Frequency	Percentage
< 200	64	80%
200 - 499	14	17.5%
≥ 500	2	2.5%
Total	80	100%



Table 5. Overview of baseline CD4 count (after 6 months ARV therapy)

CD4 count (sel/mm ³)	Frequency	Percentage
Increased	60	75%
Remain	13	16.25%
Decreased	7	8.75%
Total	80	100%

Table 6. Overview of BTA test results (before and after therapy)

Variable	BTA test result	Frequency	Percentage
Before therapy	BTA +	87	100%
	BTA -	-	
Total		87	100%
After therapy	BTA +	12	13.7%
	BTA -	75	86.3%
Total		87	100%

DISCUSSION

The findings of this study are corroborated by research conducted at Al-Ihsan Hospital (Riany, Sundari, Tursina, & Siddiq, 2023), which indicates that a significant proportion (40%) of HIV-positive Tuberculosis patients fall within the age range of 30-35 years. Furthermore, other studies (Pratama, Darwinata, & Hendrayana, 2021) have demonstrated that the age group of 45-65 years ranks first in terms of prevalence. A study undertaken by Sundari in 2023 Likewise, a total of 270 individuals (51%), which represents the bulk of cases where persons had both TB and HIV, were aged 31 years or older.

The process of aging is consistently influential in the development of old age. In individuals with tuberculosis, this issue leads to a gradual deterioration in lung capacity. Age-related physiological alterations encompass diminished

respiratory muscle strength, lowered chest wall compliances, and reduced lung recoil or elastic strength. Elderly individuals with age-related inflammatory disorders, such as pulmonary fibrosis and chronic obstructive pulmonary disease (COPD), have a higher susceptibility to infections, including tuberculosis. This is mostly owing to an increased likelihood of inhaling liquids or solids into the lungs, which can lead to aspiration (Caraux-Paz, Diamantis, de Wazières, & Gallien, 2021). With advancing age, individuals have a heightened susceptibility to infection, particularly severe infections, hence increasing their vulnerability to the reactivation of tuberculosis. The heightened susceptibility of the elderly is attributed to a range of anatomical and physiological alterations associated with aging, malnutrition, and comorbidities (Caraux-Paz et al., 2021).



The research conducted by Riany, Sundari, Tursina, & Siddiq (2023) supports the outcomes of this investigation. Out of the total number of patients with HIV and TB at Al-Ihsan Hospital between 2017 and 2021, 46 (74%) were male and 16 (26%) were female. Furthermore, this study demonstrates that males have a higher propensity for co-infection risk factors, such as smoking and promiscuity, which are two behavioral traits that elevate the probability of tuberculosis co-infection with HIV/AIDS. Prolonged smoking and excessive cigarette use can lead to pulmonary dysfunction, impairing the function of macrophages, a kind of cell capable of engulfing germs and increasing the vulnerability of patients to tuberculosis. (Sasmita, Prasetyowati, & Wahjudi, 2019). Furthermore, HIV patients who engage in smoking have a lower likelihood of survival compared to HIV patients who abstain from smoking. In terms of physical activity, those with lower levels of physical activity face a higher likelihood of co-infection. Insufficient physical activity is linked to a decline in functional capacity, rendering them more vulnerable to infection (Sylvani et al., 2019). Moreover, according to the Indonesian Ministry of Health, males exhibit a higher susceptibility to contracting pulmonary tuberculosis compared to females. A study conducted by Abdallah & Ali (2019) found that women have a lower propensity for habitual smoking compared to men. Smoking elevates the likelihood of acquiring pulmonary tuberculosis (TB) by impairing the functioning of cilia in the respiratory tract.

Existing knowledge underscores that a significant proportion of individuals afflicted by the dual burden of HIV and tuberculosis (TB) constitute high school graduates, comprising 68% of the cohort based on educational parameters (Krisnahari et al., 2018). In a separate investigation, it was

revealed that a notable majority of those experiencing co-infection hailed from a middle-class educational background, accounting for 58.2% of the studied population (Muna & Cahyati, 2019). Interestingly, a divergent perspective emerged from the work of Karima et al., highlighting that individuals with HIV-TB co-infection were predominantly associated with primary education, encompassing 69% of the cases (Kridaningsih et al., 2021).

The educational attainment of individuals holds significance in shaping their behaviors and comprehension of information about HIV-TB prevention. Higher educational levels are posited to exert an influence on the attitudes and understanding of co-infected individuals. According to (Kurniawati, 2022), individuals with elevated educational backgrounds are more likely to possess comprehensive knowledge about various aspects of life, including health-related information and skills. This heightened awareness enables them to anticipate and avert diseases effectively, including the risk of HIV-TB transmission.

This nuanced perspective suggests that the comprehension of TB-HIV co-infection may diverge contingent on an individual's educational background. Those with higher educational achievements are presumed to exhibit greater awareness regarding HIV and TB prevention and transmission. Consequently, this enhanced awareness empowers them to adopt preventive measures and avoid actions that may elevate the risk of HIV-TB transmission (Riany et al., 2023). The intricate interplay between education and the understanding of co-infection dynamics necessitates further exploration for a comprehensive grasp of these relationships within the context of public health.

Certain strains of tuberculosis bacteria are resistant to a single type of medication and can resurface if the body's immune system weakens



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or if the medication is not taken consistently. To effectively treat tuberculosis, patients must adhere to a regular and consistent regimen of OAT (anti-tuberculosis drugs) for a minimum of six months to completely eradicate the germs responsible for causing TB. Both HIV-positive and HIV-negative patients have comparable responses to anti-tuberculosis treatment. However, individuals with HIV infection may experience a higher incidence of pharmacologic adverse effects (Purnomo, Kusmiati, & Soedarsono, 2020). Tuberculosis patients who are co-infected with HIV experience a higher mortality rate compared to tuberculosis patients undergoing therapy.

The results of this study suggest an unfavorable prognosis and align with other research indicating that DM negatively impacts all aspects of the prognosis under investigation. According to Han et al., (2016), individuals with both tuberculosis (TB) and diabetes mellitus (DM) have a 1.6 times greater likelihood of experiencing treatment failure and mortality compared to TB patients without DM. Additionally, DM patients have a 1.88 times higher probability of death compared to TB patients without DM. Further research indicates a significant association between the occurrence of adverse consequences and diabetes mellitus. Diabetes mellitus correlates with treatment outcomes in patients with pulmonary tuberculosis and can also lead to negative effects (Soedarsono, Kusmiati, & Permatasari, 2021). The occurrence of tuberculosis in individuals with HIV is mostly attributed to infection, reactivation, and the development of new infections. The decline in CD4 count following HIV infection leads to the reactivation of TB germs (Mulyadi & Fitrika, 2015). During the advanced phases of HIV infection, when there is a decrease in CD4 T cell numbers, macrophages can serve as a significant location for ongoing viral replication (Teweldemedhin,

Asres, Gebreyesus, & Asgedom, 2018).

In the context of compromised immune systems, infections are markedly predisposed to manifest. The progression of HIV/AIDS is intricately linked to the depletion of CD4 cells, a subset of T lymphocytes. The consequential reduction in CD4 T cells significantly heightens the vulnerability to infections (Ladyani & Kiristianingsih, 2019). The manifestation of fungal infections typically precedes acute infection, heralding an asymptomatic phase characterized by a gradual decline in CD4 count, followed by a precipitous decline in later stages. A pivotal gauge of immune system health is the CD4 count, which serves as a crucial indicator. The HIV/AIDS-associated demise of CD4 cells results in a concomitant reduction in the CD4 count. The extent of harm inflicted by HIV is directly proportional to the decrement in the CD4 count. Initiation of Antiretroviral (ARV) treatment commonly leads to a rapid increase in the CD4 count, signifying a positive response to intervention (de Resende et al., 2023; Dewi, Tinggi, & Riau, 2022). This intricate interplay between HIV and the immune system underscores the significance of vigilant monitoring and timely therapeutic interventions to mitigate the immunological repercussions associated with HIV/AIDS.

Tuberculosis is the prevailing opportunistic infection among individuals with HIV (de Resende et al., 2023; Tiberi et al., 2017). PLHIV have a significantly higher chance of getting TB compared to individuals who are HIV-negative, with the likelihood being up to 20 times greater. Out of the forty HIV patients included in this study, ten individuals (25%) were found to have tuberculosis that showed a positive reaction, as reported by Teweldemedhin et al. in 2018. Candidiasis is a prevalent condition that serves as a prominent clinical indicator of HIV infection initiation.



Oral candidiasis symptoms manifest at stage 3 of HIV infection. Furthermore, this fungus is a regular component of the microbiota in 50% of the oral cavities of healthy individuals (Saktina & Satriyasa, 2017). Individuals with a CD4+ T count below 200 have a threefold higher risk of tuberculosis compared to those with a CD4+ T count above 200. Diminished immune response results in susceptibility to infection, proliferation, and dissemination of Mycobacterium TB. HIV-positive individuals are at a heightened risk of getting tuberculosis due to their compromised immune systems (Cui, Lin, Nie, & Lan, 2017; Sileshi, Deyessa, Girma, Melese, & Suarez, 2013). The CD4 counts of patients, which reflect their adherence to ARV drugs within the initial six months of treatment, are There are several CD4 counts, some of which remain constant, while others are increasing or decreasing. This phenomenon arises because the physical state of each patient varies, resulting in unequal efficacy of antiretroviral (ARV) medicine therapy. Effective utilization of antiretroviral (ARV) drugs and strict adherence can enhance the expected CD4 count (Dewi et al., 2022).

Although our study offers useful insights into the features of tuberculosis (TB) patients who are also infected with HIV, it is important to acknowledge several limitations. The majority of the sample consisted of persons aged between 30 and 39 years, which may restrict the applicability of the results to other age groups. Furthermore, the disproportionate number of male participants (73%) may lead to gender bias, necessitating caution when generalizing the findings to a broader range of individuals. Moreover, the emphasis on a particular geographical area, namely Dr. Harjono Hospital in Ponorogo City, East Java Province, Indonesia, would limit the generalizability of our results to wider regional settings. Despite these constraints, our study

illuminates important characteristics including co-infected persons' educational levels and treatment outcomes. These findings highlight the necessity for personalized treatments and educational programs, especially for different educational levels. A more diverse and representative sample from different age groups and countries could strengthen our findings in future investigations. Longitudinal research on co-infection and treatment results would be useful. Exploring socio-economic factors affecting educational backgrounds and their effects on co-infected people could further improve our understanding. These factors will help us understand TB patients with HIV co-infection and develop better healthcare treatments.

CONCLUSION

Our study elucidates essential characteristics of individuals with pulmonary tuberculosis (TB) and HIV co-infection, notably highlighting a higher prevalence among males aged 30-39. Moreover, we found a significant correlation between educational level, particularly high school education, and prolonged treatment durations, often lasting 9 months or more, indicative of unfavorable prognoses. Additionally, the monitoring of CD4 count post-antiretroviral (ARV) therapy demonstrated substantial immune system restoration, suggesting positive treatment outcomes.

Advocacy efforts are crucial to address these findings by urging decision-makers and government agencies to prioritize comprehensive screening and integrated treatment programs for individuals at risk of or diagnosed with TB and HIV co-infection. These initiatives could potentially improve early detection, enhance access to care, and ultimately lead to better treatment outcomes, thus alleviating the burden of this dual epidemic on public health.



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For future research directions, longitudinal studies are warranted to evaluate the long-term outcomes and treatment responses among individuals with pulmonary TB and HIV co-infection. Additionally, exploring innovative approaches to enhance treatment adherence and mitigate the social determinants contributing to health disparities within affected populations should be prioritized. These endeavors will contribute to advancing our understanding and management of TB and HIV co-infection, ultimately improving patient outcomes and reducing the burden on healthcare systems and communities.

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