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Mortality Profile of COVID-19 Co-Infection in HIV/AIDS Patients at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia

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ABSTRACT

Introduction: Human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) is an immune system disease caused by the HIV infection, making individuals susceptible to various diseases, including coronavirus disease (COVID-19). Co-infection in HIV/AIDS patients can worsen the severity of the diseases, especially in those with comorbidities, complications, and opportunistic infections, potentially leading to death. This study aimed to determine the mortality profile of COVID-19 co-infection in HIV/AIDS patients at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia, from January 2020 to December 2022.

Methods: This study employed a descriptive cross-sectional method, utilizing secondary data from 48 medical records of COVID-19 co-infection in HIV/AIDS patients at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia, from January 2020 to December 2022, collected through a total sampling technique.

Results: Of the 105 total HIV/AIDS patients with COVID-19 co-infection, 48 were selected in this study based on predefined inclusion and exclusion criteria. The mortality profile showed a predominance of males (75%), with an average age of 36.5 years old. The most common comorbidity was bacterial infection (38.6%), with the highest complication being anemia (55.6%), and the most prevalent opportunistic infection being tuberculosis/TB (50%).

Conclusion: The mortality profile of COVID-19 co-infection in HIV/AIDS patients indicated a higher occurrence among males, with an average age of 36.5 years old. The most common comorbidity was a bacterial infection, whilst the most prevalent complications include anemia, with TB being the most frequent opportunistic infection.

Highlights:
1. The majority of HIV/AIDS patients who succumbed to the effects of co-infection at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia, were of productive age, with the predominant complications being anemia and bacterial infections.
2. Tuberculosis was listed as the most common opportunistic infection that exacerbated the condition of HIV/AIDS patients and caused death during the ongoing pandemic of COVID-19.

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Introduction

Human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) are unresolved global issues. Human immunodeficiency virus is a dangerous disease. According to the World Health Organization (WHO), there were 37.7 million HIV-positive individuals worldwide in 2020.[1] Considering the significant number of HIV-positive cases, Indonesia must be cautious and vigilant about the spread of this infection. According to the Ministry of Health of the Republic of Indonesia, there were 466,978 cases of HIV/AIDS, with East Java ranking second among five provinces with 71,909 cases.[1] This virus targets white blood cells to weaken the host's immune system. Various bodily fluids from infected individuals, such as blood, breast milk, semen, and vaginal fluids, can transmit HIV/AIDS. Unprotected anal or vaginal sex, the use of contaminated needles, and non-sterile blood transfusions all increase the risk of HIV transmission.[1]

The WHO stated that Wuhan in Hubei province, China, was the first place where coronavirus disease (COVID-19) emerged in December 2019.[2] The new virus was identified in 2019 and had not previously infected humans. It was officially declared a pandemic on 11 March 2020.[2] The Ministry of Health of the Republic of Indonesia reported that on 6 April 2022, there were 145,722 deaths and 6,123,753 confirmed positive cases of COVID-19.[2] Cytokine storm syndrome, mediated by immune dysfunction and lymphopenia, is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections and leads to pathological disorders in the liver, heart, lungs, and other organs.[3]

People with HIV/AIDS are those diagnosed as HIV-positive or suffering from AIDS. Many HIV-positive individuals have one or more comorbidities, which can increase the likelihood of COVID-19 becoming more severe. Individuals with HIV/AIDS have weakened immune systems, making them more susceptible to various severe diseases that can cause issues or infections, such as COVID-19. The impact of SARS-CoV-2 infection on individuals with HIV-1 infections remains unclear. There have been 61 cases of COVID-19/HIV co-infection recorded, with a death rate of 9% and a recovery rate of 91%.[4] The difference in the prevalence of comorbidities and socio-economic health variables appears to have a greater influence on COVID-19 incidence among individuals living with HIV compared to the presence of HIV infection.[5] In critically ill patients, the likelihood of death is influenced by age, comorbidities, and the severity of the underlying disease.[6]

There are significant challenges in the treatment of HIV/AIDS during the COVID-19 pandemic. People are afraid to leave their homes and go to hospitals. In addition, the nationwide lockdown in Indonesia hinders patients' access to hospitals. Based on the two cases previously mentioned, COVID-19, HIV/AIDS, and their co-infections are common. Dr. Soetomo General Academic Hospital, Surabaya, Indonesia, is one of the hospitals that has treated patients with HIV/AIDS and COVID-19 infections.[7] To date, there has been no in-depth research on the death profile of COVID-19 infections in HIV/AIDS patients at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia. Therefore, the findings of this study are expected to provide data and be beneficial.

Methods

This study used a descriptive research design. This was an observational study employing a cross-sectional design, utilizing electronic medical record data from the Information and Communication Technology (ITKI) installation of Dr. Soetomo General Academic Hospital, Surabaya, Indonesia. Descriptive research aims to describe only a characteristic of the data being studied.[8] The population or sample for this study consisted of all patients with COVID-19 co-infection in HIV/AIDS patients treated at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia, from January 2020 to December 2022. This study took place between July 2022 and June 2023. Inclusion criteria include patients with a final diagnosis of HIV accompanied by COVID-19 co-infection and inpatient status. Exclusion criteria include living patients and patients with incomplete medical record data.

The sampling technique used in this study was total sampling from secondary data obtained from the medical records of patients with COVID-19 co-infection in HIV/AIDS patients at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia, who met the inclusion and exclusion criteria. This study had received ethical approval from the Research Ethics Committee of Dr. Soetomo General Academic Hospital, Surabaya, Indonesia.

Results

Based on the findings, 105 HIV/AIDS patients with COVID-19 infection were identified. Among them, 48 patients met the criteria. The research findings were tabulated and summarized based on demographic factors (gender and age), comorbidities, complications, and opportunistic infections.

According to Table 1, among HIV/AIDS patients with COVID-19 coinfection who passed away, the total number of male patients was 36 (75%), whilst the total number of female patients was 12 (25%). This data indicates that males were more affected, with a ratio of 3:1. In terms of the age distribution of HIV/AIDS patients with COVID-19 coinfection, based on Table 1, it was categorized into several groups. The highest number of patients was observed in the 30-41 years old age group, with 18 patients (37.5%), followed by the 41-50 years old age group with 11 patients (23%), and the 21-30 years old age group with 10 patients (20.8%). The least common age group was 0-10 years old, with only three patients (6.25%). The average age of patients with COVID-19 coinfection in HIV/AIDS was 36.5 years old. On the other hand, the youngest patient found was 1 year old, while the oldest was 58 years old.

Table 1. Demographic profile of the sample

	Frequency (n)	Percent (%)
Number of patients	48	100
Gender		
Male	36	75
Female	12	25
Age (years old)		
0-10	3	6.2
11-20	0	0
21-30	10	20.9
31-40	19	39.5
41-50	11	22.9
51-60	5	10.45

Source: Research data, processed

Comorbidity data of patients

The distribution of mortality data for COVID-19 coinfection in HIV/AIDS patients with comorbidities at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia, for the period 2020-2022 is presented in Table 2.

Table 2. Patient comorbid data

	Frequency (n)	Percent (%)
Number of patients	44	100
Comorbid		
Bacterial infection	17	38.6
Respiratory failure	8	18.1
Acute kidney injury	3	6.8
Chronic kidney disease	3	6.8
Aplastic anemia	2	4.5
Cholangitis	1	2.3
Diplopia	1	2.3
Lung gedema	1	2.3
Enscphalopaty	1	2.3
Gingivitis	1	2.3
Cerebral infarct	1	2.3
Pneumothorax	1	2.3
Brain injury	1	2.3
Decubitus ulcer	1	2.3
Malnutrition	1	2.3
Hypertention	1	2.3

Source: Research data, processed

Based on Table 2, out of the 48 samples, only four patients (8.4%) with HIV/AIDS and COVID-19 coinfection had no comorbidities, whilst the other 44 patients (91.6%) had comorbidities. The most common comorbidities were bacterial infections, found in 17 patients (38.6%), followed by respiratory failure in 8 patients (18.1%), acute kidney failure in 3 patients (6.8%), chronic kidney failure in 3 patients (6.8%), and aplastic anemia in 2 patients (4.5%). Some patients had unique comorbidities such as cholangitis, diplopia, edema of the extremities, encephalopathy, gingivitis, cerebral infarction, pneumothorax, head trauma, hypertension, malnutrition, and decubitus ulcers, each occurring in 1 patient (2.3%). It can be inferred that among HIV/AIDS patients who succumbed to COVID-19 coinfection, bacterial infection was the most prevalent comorbidity, affecting 17 patients (32.6%).

Patient complications data

The distribution of mortality data for COVID-19 coinfection in HIV/AIDS patients with complications at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia, for the period 2020-2022 is presented in Table 3.

Table 3. Patient complication data

	Frequency (n)	Percent (%)
Number of patients	9	100
Complication		
Anemia	5	55.6
Mycosis	2	22.2
Wasting syndrome	2	22.2

Source: Research data, processed

Based on Table 3, out of the 48 samples of COVID-19 coinfection in HIV/AIDS patients, only nine patients were identified with complications. Among them, five (55.6%) patients experienced anemia, two (22.2%) had mycosis, and two (22.2%) suffered from wasting syndrome. The most common complication among patients was anemia, affecting five (55.6%) patients.

Table 4 presents data on opportunistic infections in patients. The distribution of mortality data for COVID-19 coinfection in HIV/AIDS patients with opportunistic infections at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia, for the period 2020-2022 is shown in Table 4.

Table 4. Patients' opportunistic infections data

	Frequency (n)	Percent (%)
Number of patients	24	100
Opportunistic infection		
Tuberculosis	12	50
Pneumonia pneumocystis	8	33.3
Candidiasis	4	16.7

Source: Research data, processed

Based on Table 4, patients with opportunistic infections most commonly experienced tuberculosis (TB) with 12 patients (50%), followed by pneumocystis pneumonia in 8 patients (33.3%), and candidiasis in 4 patients (16.7%). This indicates that the most prevalent opportunistic infection among patients was TB, affecting 12 patients (50%).

Discussion

Demographic profile based on gender and age of patients

A total of 48 patient death cases were used as the research sample population. Table 1 indicates that males constituted the majority of COVID-19 coinfections in deceased HIV/AIDS patients, accounting for 38 cases or 75% of the total cases. This aligns with a previous study involving 31 samples of HIV-positive COVID-19 patients.[9] Of these samples, 24 were males (77.4%), and 7 were females (22.6%).[9] This is also consistent with another study that reported a predominance of male cases among individuals with HIV and COVID-19 co-infection.[10] This corresponds with the overall research results on HIV patients with COVID-19 co-infection, where 65.5% were

reported to be males.[3] A previous study also found that out of 252 COVID-19-HIV coinfection cases, 14 of the 36 deceased patients (14.3%) were males (85.7% of patients).[11] In previous studies, gender has been a focus due to different lifestyles between males and females. Males are more likely to have their activities outdoors, have more social interactions, smoke, and engage in free association, making them more vulnerable to the exposure of HIV/AIDS and COVID-19.[12]

This study also identified the age of COVID-19 coinfection patients with HIV/AIDS. The highest age group was 31-40 years old, comprising 19 individuals, or 39.5% of the total cases, with an average age of 36.5 years old. In recent findings, COVID-19 in HIV-positive patients showed that 0.9% of patients were under 30 years old, 87.85% were 31-59 years old, and 11.25% were over 60 years old.[3] The average age was 47.9 years old (ranging from 19 to 86 years old).[3] In another previous study summarizing socio-demographic variables across 22 studies, the average age of patients included in the research was 56 years old.[13] A previous study on COVID-19-HIV co-infection involving 36 patients with a total of 21 deceased patients reported that 38.1% were over 65 years old, 52.4% were between 50 and 65 years old, and 9.5% were under 50 years old.[11]

It is clear from the research findings that the majority of HIV/AIDS patients fall within the 21-50 years old age group, which is considered the productive age group. Typically, it takes between 5 and 10 years for an individual infected with HIV to develop AIDS. The majority diagnosed with AIDS are adults and adolescents. Young adults are more likely to contract HIV as they are more susceptible to engaging in risky sexual behavior, which can transmit the virus, compared to older individuals. Sexual experimentation, having sex with multiple partners without using condoms, and consuming alcohol and illegal drugs are all considered unsafe and risky sexual behaviors.[14]

Comorbid patient data

Comorbidity is when an individual has two or more health problems simultaneously, or if one arises due to a pre-existing medical condition. In this study, among patients with comorbidities, 17 patients (38.6%) experienced bacterial infections, eight patients (18.1%) had respiratory failure, three patients (6.8%) had acute kidney failure, and other comorbidities were also reported.[15] According to a study involving 29 articles on HIV patients with COVID-19, the most common accompanying diseases were hypertension (77%) and diabetes mellitus (29.7%).[3] However, a different study supports the results of this study, with 43 individuals (19.7%) reported to have experienced bacterial infections.[13] Patients with bacterial infections in COVID-19 studies had more extended hospital stays, a higher percentage of respiratory failure, required intensive care unit (ICU) care, and more frequently used ventilators.[13] COVID-19 patients with bacterial infections had a higher mortality rate (16.28%) compared to COVID-19 patients without bacterial infections (8%).[13]

Based on a previous study on the causes of death and accompanying diseases in COVID-19 patients, all patients experienced COVID-19-related lung complications before their death.[14] Respiratory failure symptoms were most commonly found in 88.5% cases, whilst bacterial pneumonia was found in 57.7%.[16] Aside from the lungs, acute kidney failure was the second most common organ failure found in 30.8% of patients.[16] The most frequent direct cause of death related to infection included sepsis, septic shock, and sepsis-related multi-organ failure in 61.5% of patients, bacterial infection in 7.7% of patients, and viral pneumonia in 3.8% of patients.[17] The second leading cause of death related to respiration was respiratory insufficiency, hypoxia, and acute respiratory distress syndrome (ARDS), with 15.4%.[17]

The results of this study differ from previous studies as it exclusively included data from HIV/AIDS patients with COVID-19 co-infection who passed away and variations of the study population, resulting in distinguished results from earlier investigations. In this study, bacterial infections predominated among deceased HIV/AIDS patients with COVID-19 coinfection. Among patients with COVID-19 and bacterial infection, a worse prognosis was observed compared to patients without bacterial infection. Bacterial infections are more likely to occur when hospital stays exceed two weeks.[13] The occurrence of COVID-19 in people living with HIV is more influenced by differences in the occurrence of HIV comorbidities and social determinants of health that mediate the risk of COVID-19 exposure rather than by HIV.[4]

Patient complications data

Anemia, a hematological issue, is frequently observed in HIV infections. The morbidity and mortality rates increase in individuals with HIV/AIDS suffering from anemia. According to a study, anemia affected 39.7% of adolescent HIV patients under the age of 15 years old and 46.6% of HIV-positive adults.[14] This aligns with another study, which reported that 27.02% of HIV patients experienced anemia.[18] Malnutrition, coinfection, neoplasms, decreased erythropoietin production, and the use of antiretroviral drugs contribute to inefficient hematopoiesis, causing anemia in HIV infections. Other reasons may include blood loss through gastrointestinal or genitourinary bleeding, as well as increased destructive activity of red blood cells.[19]

Opportunistic infections account for 90% of HIV/AIDS patient deaths. About 50% of people living with HIV/AIDS develop opportunistic infections in the form of TB, exploiting the weakened human immunologic response. According to a study, TB, cryptosporidiosis, and candidiasis each contribute 7.6% to the total of opportunistic diseases, making them the most common.[17] Chronic diarrhea (9%), candidiasis (21%), and TB are identified as the three most common opportunistic diseases experienced by patients, according to a different study.[20] *Mycobacterium tuberculosis* (MTB), a bacterium typically attacking the lungs, is the cause of TB.[21] Since TB is transmitted from person to person through the air, anyone can easily contract it, with HIV/AIDS patients being among those at risk. The declining immune system in HIV/AIDS patients is closely associated with TB infection.[15] Opportunistic TB infection may become more frequent as the HIV stage progresses due to the weakening of the immune system.[21]

Strengths and Limitations

This study is notable for its utilization of authentic data derived from a tertiary referral hospital, with a specific focus on the mortality profile of HIV/AIDS patients afflicted with co-infection of both HIV and SARS-CoV-2. The investigation encompassed the examination of comorbid factors, complications, and opportunistic infections. However, this study is subject to limitations inherent in its descriptive cross-sectional design, which precludes the establishment of cause-and-effect relationships. Furthermore, the sample size of the study was limited, and its reliance on secondary data from medical records could compromise the integrity of the study by introducing information bias. Additionally, the exclusion of crucial clinical variables such as CD4 levels and the status of antiretroviral (ARV) therapy from the study design limit the comprehensiveness and reliability of the findings.

Conclusion

The most affected group comprised males, with an average age of 36.5 years old. Bacterial infection emerged as the most prevalent comorbidity. Anemia was identified as the predominant complication. Additionally, TB, an opportunistic infection associated with immune suppression, contributed significantly to mortality. These results underscore the critical importance of early detection and comprehensive management of co-infections and complications, particularly bacterial infections, anemia, and TB, to reduce mortality among HIV/AIDS patients infected with COVID-19.

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Conflict of Interest

The authors declared there is no conflict of interest.

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Ethical Clearance

This study had received ethical clearance from the Ethical Committee for Health Research, Dr. Soetomo General Academic Hospital, Surabaya, Indonesia (No.1190/ LOE/ 301.4.2/I/2023) on 16-01-2023.

Authors' Contributions

Designed the study and drafted the manuscript, collected data and performed background literature review, performed statistical analysis: CIJ. Supervised results and discussion: MR, JN, DP. All authors reviewed and approved the final version of the manuscript.

Data Availability

N/A.

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