

## Tuberculosis in HIV-AIDS patients in Dr. Soetomo general academic hospital Surabaya 2019-2020

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### Abstract

*Human Immunodeficiency Virus* (HIV) is a virus that attacks the immune system. Of the many opportunistic infections, *tuberculosis* (TB) was ranked the most. In 2019, out of 1.4 million TB patients who died 208,000 people were living with HIV. Aims: Knowing the data on the diagnosis of TB in HIV-AIDS patients in Dr. Soetomo General Academic Hospital in 2019-2020 and the relationship between the patient's length of stay and risk factors. Methods: This type of research is a descriptive study with a total sample of 293 patients using secondary data from medical records at Dr. Soetomo General Academic Hospital. Data analysis using the likelihood ratio test. Results: The number of patients was 293 with males gender (76%). Maximum age is >35 years (57.68%). A total of 174 patients (59%) graduated from high school and 68% of patients worked. 139 patients (47.5%) were married, with the most factor being vaginal sex at risk (48.12%). An average of 152 patients (52%) were treated for 5-10 days with a positive TB diagnosis using GeneXpert examination as many as 88 patients (58.7%). It is known that 101 patients died (34%), and a *p-value* is 0.038 for the relationship between the length of the patient being treated with risk factors.

**Keywords:** HIV Infection; Opportunistic infection; Tuberculosis; TB-HIV; Dr. Soetomo General Academic Hospital

### 1. Introduction

Human Immunodeficiency Virus (HIV) is a type of virus that attacks the immune system, this can cause sufferers to experience a decrease in immunity or the immune system so that they are easily infected with other diseases [1]. HIV transmission can occur if there is contact with the body fluids of patients containing HIV such as through breast milk, sexual intercourse, and blood. Transmission that occurs through blood usually occurs due to the use of syringes during drug use, blood transfusions, the mother's blood to the unborn baby, and sharp objects exposed to blood that may contain HIV [2, 3].

In 2018, out of 37.9 people living with HIV globally, 3.8 million people lived in 11 countries in the Southeast Asia region [4]. In Indonesia, the number of HIV infections reported in December 2015 was 32,646 cases, of which (23.3%) died. The number is smaller than what happened. From estimates until 2012 it is estimated that the number of people with HIV-AIDS in East Java reached 57,321 people. East Java Province was ranked the highest with 8,935 people, followed by Jakarta and West Java [1]. In the city of Surabaya, there were also 652 cases of HIV infection with the number of sufferers being 406 men and 246 women [5].

The high incidence of HIV and the nature of HIV that can reduce the body's immunity causes other diseases or other infections to easily enter the body of people with HIV. This phenomenon is called opportunistic infections (OI). Opportunistic infections are all types of infections that affect a low immune system to make a more serious disease [6].

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Opportunistic infections are the main cause of death in AIDS patients with a mortality percentage of 90% [7]. In 2005 many kinds of opportunistic infections appeared, but AIDS patients were dominant, namely pulmonary tuberculosis at as much as 50%, pneumonia at 33%, hepatitis at 30%, candidiasis at 25%, followed by chronic diarrhea, and extra-pulmonary tuberculosis [8].

Of the many opportunistic infections, tuberculosis ranks the most. Tuberculosis is an infectious disease that can be caused by *Mycobacterium tuberculosis* which can attack various organs, especially the lungs. This disease arises due to various environmental factors. The bacteria that cause TB are spread from one person to another through tiny droplets released into the air through coughing and sneezing [9, 10].

HIV cases influence the increase in TB cases throughout the world, which also impacts increasing cases in the community. TB is an opportunistic infection that is the main cause of death in people with HIV-AIDS [11]. TB is one of the top 10 causes of death worldwide and the leading cause of single-agent. In 2019, out of a total of 1.4 million people who died from TB, 208,000 people were living with HIV [12].

Therefore, the existence of a research proposal entitled tuberculosis in HIV-AIDS patients in Dr. Soetomo General Academic Hospital 2019-2020 is one of the latest supporting data to find out HIV-AIDS sufferers who also suffer from tuberculosis in Dr. Soetomo Hospital, so that efforts can be made to reduce cases in Indonesia in general and Surabaya in particular.

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## 2. Material and methods

This research is a retrospective descriptive observational study using secondary data from medical records to determine the profile of tuberculosis in HIV-AIDS patients at Dr. Soetomo General Academic Hospital Surabaya in 2019-2020 and the relationship between the patient's length of stay and risk factors. The population in this study were all medical records of tuberculosis patients on HIV-AIDS Dr. Soetomo General Academic Hospital Surabaya. The sampling technique in this study was a total sampling for 2 years (2019-2020). The research instruments used were Medical record data of tuberculosis patients on HIV-AIDS Dr. Soetomo General Academic Surabaya 2019-2020 with data obtained and processed according to variable components including gender, age, job, education, marital status, number of GeneXpert or Ziehl-Neelsen staining, length of patient hospitalization, and mortality. All data will be processed computerized. The data on the basic characteristics of the collected subjects will be analyzed and presented in a descriptive form including gender, age, job, education, marital status, number of GeneXpert or Ziehl-Neelsen staining, length of patient hospitalization, and mortality.

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## 3. Results and discussion

The research results that will be discussed are the data on tuberculosis patients with HIV-AIDS at Dr. Soetomo General Academic Hospital Surabaya. The period I took was from 2019-2020. I chose a retrospective design study using variables of gender, age, job, education, marital status, number of GeneXpert or Ziehl-Neelsen staining, length of patient hospitalization, and mortality. Based on the data I obtained, it was found that the number of HIV-AIDS patients was 886 people with a composition of 574 patients in 2019 and 312 patients in 2020. While patients with a diagnosis of tuberculosis in HIV-AIDS were 293 people. For more details in 2019, 182 people were found and 111 patients were in 2020.

### 3.1. Demographic Characteristics

Based on data, the gender of TB patients with HIV-AIDS in Dr. Soetomo General Academic Hospital is divided into male and female. Table 1, it is proved that the majority of TB patients with HIV-AIDS were found by males, as many as 76%. For age, the highest results were obtained in patients aged >35 years. Patient distribution is mostly experienced by working patients as much as 68%. Some of the data found related to the education of tuberculosis patients on HIV-AIDS, most of them graduated from high school as many as 174 patients (59%), followed by junior high school graduates as many as 47 patients (16%). Data on the marital status of patients include patients who are married, unmarried, and widowed. With the highest percentage of married patients as much as 47.5%

Data taken in 2019 - 2020, shows that the male sex is more affected by TB disease in HIV-AIDS than women. With the number of men as many as 224 people (76%). The results of statistical analysis from other studies showed that there was a significant effect of gender on TB-HIV co-infection in 2017 ( $p < 0.05$  with an OR of 20.47 and 95% CI: 4.357-96.21). There is a high possibility that men are more at risk for TB-HIV co-infection due to an unfavorable lifestyle [11,13].

However, there is a study that found that the variable for gender showed no significant contribution to cases of tuberculosis coinfection ( $p=0.104$ ) [14].

**Table 1** Distribution of demographic aspects for TB patients on HIV-AIDS in Dr. Soetomo General Academic Hospital Surabaya 2019-2020

	Category	N	%
Gender	Male	224	76.45%
	Female	69	23.55%
Age	<20 year old	4	1.36%
	20-35 year old	120	40.96%
	>35 year old	169	57.68%
Job	Work	198	67.58%
	Doesn't work	95	32.42%
Education	Didn't attend school	4	1.365%
	Not completed in primary school	3	1.02%
	Finished elementary school	40	13.65%
	Finished middle school	47	16.04%
	Finished high school	174	59.39%
	Undergraduate	21	7.1%
	others	4	1.365%
Marital Status	Married	139	47.44%
	Not Married	110	3.54%
	Widower	44	15.02%

The group with the highest age range of tuberculosis patients in HIV-AIDS was found by the age group >35 years, namely 169 cases (58%). The youngest patient was 18 years old in 3 cases. While the oldest patient was 78 years with 1 case. This is to journal data, where the most HIV cases occurred in the age group >35 years with a risk of 1.12 times (95% CI: 0.90-1.38) of developing TB compared to younger ages, namely 15-35 years [11]. From different studies, more patient characteristics were found at the age of 15-35 years, 18 people (85.7%) compared to >35 years, namely 3 (14.3%) [14].

This study shows that the majority of patients have a job or work, with a total of 198 cases (68%). The patient's occupation dominates is as a private employee as many as 144 people. While the data for patients who do not work as many as 95 patients. A statement from The National AIDS Fund says HIV patients are at a higher risk of developing tuberculosis in the workplace and becoming a source of [15]. Another study said the biggest risk factor was patients who did not work as many as 51 cases (53%). Found to have risk (OR = 2.53) and (95% CI: 1.26–5.03) [16].

Grouped based on education, the last education was high school graduates being the largest case with a total of 174 cases (59%). Cases obtained at least 3 cases (1%) based on education Did not finish elementary school. In contrast to other studies, the most data were obtained in cases with an equivalent elementary education as many as 11 people (55%). Mostly at the basic education level due to a lack of awareness of health problems at risk of TB co-infection with HIV [17]. So it was concluded that education was the most influential factor in the incidence of TB-HIV co-infection (OR = 3,609) [18].

Based on marital status, 139 people (47.5%) were married. The second rank is unmarried cases as many as 110 people (37.5%), and the last data on marital status are widowers/widows as many as 44 people (15%). Supported by research that shows data on the marriage category of as many as 132 people (73.7%) [19]. Meanwhile, another study stated that patients who did not have a partner received data from as many as 382 people (54.6%), compared to patients who had a partner with a total of 318 people (45.4%) [20].

### 3.2. Risk Factors

Table 2 shows that vaginal sex had the highest risk of yielding 141 patients (48.12%). Followed by risky anal sex with a total of 59 patients (20.14%). While the data of the least risk factor is blood transfusion in as many as 2 patients (0.68%)

**Table 2** Distribution of risk factors for TB patients on HIV-AIDS in Dr. Soetomo General Academic Hospital Surabaya 2019-202

	Category	N	%
Risk Factors	Vaginal sex at risk	141	48.12%
	Anal sex at risk	59	20.14%
	Blood transfusion	2	0.68%
	Injectable drugs	8	2.73%
	Tattoos on the body	3	1.02%
	Heterosexual	52	17.75%
	Homosexual	11	3.75%
	Bisexual	4	1.37%
	No description	13	4.44%

These results are in line with the research that obtained the most results from risk factors, namely risky vaginal sex with several cases 212 (71.4%). While anal sex has the risk of getting 13 cases (4.4%), which is the fourth most risk factor after other risk factors (7.7%) and no risk (6.1%) [21]. In contrast to other studies which say the highest percentage of risk factors is risky sex with MSM (Men Sex Men) or can also be called homosexual with several cases as much as 28%, then followed by heterosexual cases (24%) [22].

### 3.3. Diagnostic Results

In tuberculosis, the presence of bacteria can be detected through various examination procedures. GeneXpert examination and Ziehl-Neelsen staining from symptomatic HIV-AIDS patients were examined to diagnose tuberculosis patients under study. Table 3 is the data regarding the results of the diagnosis in the patients who did the examination. These data show that from 293 patients, only 150 patients were diagnosed with the GeneXpert or Ziehl-Neelsen staining examination. From the most data, it was found that 88 HIV patients (58.7%) were diagnosed with tuberculosis by examining the GeneXpert.

**Table 3** Distribution of diagnosis results of TB patients on HIV-AIDS in Dr. Soetomo General Academic Hospital Surabaya 2019

	Category	N	%
Diagnostic Results	GeneXpert (+)	88	58.7%
	GeneXpert (-)	15	10%
	ZN Stain (+)	1	0.7%
	ZN Stain (-)	16	10.6%
	GeneXpert (+) ZN Stain (+)	6	4%
	GeneXpert (-) ZN Stain (-)	5	3.3%
	GeneXpert (+) ZN Stain (-)	19	12.7%

The diagnosis of tuberculosis patients was carried out by an examination of the GeneXpert / Ziehl-Neelsen staining. The GeneXpert test detects tuberculosis bacteria and bacterial resistance to rifampin. This examination is more effective than microscopic examination which can only detect 67.1%. While the GeneXpert can detect 90.3% of culture-confirmed cases of tuberculosis [23]. Another matter with sputum microscopy is an examination to establish a diagnosis,

evaluation, and follow-up treatment from the examination of 3 sputum specimens in the morning. This examination is very important in the prevention of tuberculosis. The first choice for early detection of TB infection is the microscopic examination method with Ziehl-Neelsen staining. This technique is considered cheaper, more efficient, easier to perform, and has high specificity for detecting acid-fast bacteria in sputum [24]. The results showed that HIV-AIDS patients in Dr. Soetomo General Academic Hospital were more diagnosed with tuberculosis by examining the GeneXpert which was considered more effective than the Ziehl-Neelsen staining.

### 3.4. Outcomes Distribution

The obtained from medical record data of tuberculosis patients on HIV-AIDS at Dr. Soetomo General Academic Hospital Surabaya, for the distribution of length of stay and mortality are in the table below (Table 4). The data shows 5-10 days is the longest time the patient is hospitalized with a percentage of 51.88%, with the average day being 6 days. Mortality data of tuberculosis patients with HIV-AIDS is divided into patients who died and patients who not died. These results showed as many as 101 patients died with a percentage of 34.47%.

**Table 4** Outcome distribution of TB patients on HIV-AIDS in Dr. Soetomo General Academic Hospital Surabaya 2019-2020

	Category	N	%
Length of the patient being treated	<5 days	97	33.11%
	5-10 days	152	51.88%
	>10 days	44	15.01%
Mortality	Died	101	34.47%
	Alive	192	65.53%

Studies have proven that the average length of stay in TB patients is 6 days with a range of 2-13 days [25]. In HIV patients, the average duration of hospitalization for male patients is 9 days and for female patients is 7 days. Based on age the average length of stay is in the age range of 36-45 years [26]. Meanwhile, from the data taken in 2019-2020 at Dr. Soetomo General Academic Hospital Surabaya, based on the length of time the patient was treated, the majority of patients stayed for 5-10 days. With an average overall patient stay of 6 days. The longest patient stay was 37 days, and 1 person died. At least the length of time the patient was treated was 1 day as many as 8 people died and 3 people recovered. This is due to the accompanying patient risk factors.

Who estimates that in 2017 the population affected by TB-HIV was 36,000 cases per year or 14 per 100,000 population and the death rate is 9,400 or 3.6 per 100,000 population [27]. From other research data, 31 patients (75.6%), who died showed that there were 10 patients (24.4%) who died [28]. This study showed that most patients with confirmed TB in HIV at Dr. Soetomo General Academic Hospital Surabaya in 2019-2020 were declared not dead. The data obtained for patients who did not die were 192 people (66%), while for patients who died as many as 101 people (34%). In 2019 data were obtained from 62 patients who died and this decreased in 2020 to as many as 37 people. This can also be due to the COVID-19 pandemic, which causes patients to rarely visit hospitals, resulting in inaccurate patient data collection

### 3.5. Relationship between Length of Hospitalization and Risk Factors

In this section, the results of the relationship between the risk factors for the length of stay the patient was treated with the accompanying risk factors were obtained (Table 6). First, the distribution of the number of tuberculosis patients with HIV-AIDS is described, namely how long they have been treated and the risk factors (Table 5).

**Table 5** Number of TB Patients in HIV-AIDS Based on Length of Hospitalization and Risk Factors in Dr. Soetomo General Academic Hospital Surabaya 2019-2020

		<5 hari	5-10 hari	>10 hari	Total
Vaginal sex at risk	N	46	73	22	141
Anal sex at risk	%	16.4%	26.1%	7.9%	50.4%

Blood transfusion Injectable drugs	N	14	36	9	59
	%	5%	12.8%	3.2%	21%
Tattoos on the body Heterosexual	N	0	0	2	2
	%	0%	0%	0.7%	0.7%
Homosexual	N	3	5	0	8
	%	1.1%	1.8%	0%	2.9%
Vaginal sex at risk Anal sex at risk	N	0	3	0	3
	%	0%	1.1%	0%	1.1%
Blood transfusion Injectable drugs	N	22	23	7	52
	%	7.9%	8.2%	2.5%	18.6%
Tattoos on the body Heterosexual	N	7	3	1	11
	%	2.5%	1.1%	0.3%	3.9%
Homosexual	N	1	3	0	4
	%	0.3%	1.1%	0%	1.4%
<b>Total</b>	N	93	146	41	280
	%	33.2%	52.2%	14.6%	100%

**Table 6** The Relationship of TB Patients with HIV-AIDS Based on Length of Hospitalization and Risk Factors at Dr. Soetomo Surabaya 2019-2020

Chi-Square			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26,041 <sup>a</sup>	14	0.026
Likelihood Ratio	24,674	14	0.038
Linear-by-Linear Association	3,208	1	0.073
N of Valid Cases	280		

2 cases (0.7%) of the risk factor for blood transfusion were treated >10 days, 73 cases (26.1%) of risk factors for vaginal sex were treated for 5-10 days, and 7 cases (2.5%) were risk factors homosexuals who were treated <5 days. From the results of the chi-square statistical test which aims to determine the relationship between the length of stay the patient was treated with comorbid risk factors through SPSS software, it is known that the p-value of the likelihood ratio test is 0.038 ( $p < 0.05$ ). this shows that length of stay is associated with risk factors. Based on research, the length of hospital stay is based on the number of opportunistic infections present in each patient and the severity associated with early detection. The increase in the number of people living with HIV-AIDS is the result of risky behavior that is very active in transmission in certain subpopulations. This means that the number of HIV and AIDS cases continues to increase every year, despite prevention efforts [8].

#### 4. Conclusion

Characteristics of tuberculosis patients on HIV-AIDS in Dr. Soetomo General Academic Hospital Surabaya for the 2019-2020 period mostly occurred in the male sex with the most age range >35 years. The level of education is high school graduation with the average patient being a worker and married. The results of the diagnosis of TB patients with HIV are mostly by examination of the GeneXpert. Based on the length of time the patient was treated, the most results were 5-10 days. A total of 101 cases of death of TB patients on HIV-AIDS in Dr. Soetomo General Academic Hospital Surabaya

in 2019-2020. There is a relationship between the length of time TB patients with HIV were treated at Dr. Soetomo General Academic Hospital Surabaya with risk factors ( $p=0.038$ ).

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### Compliance with ethical standards

#### *Disclosure of conflict of interest*

The authors report no conflicts of interest.

#### *Statement of ethical approval*

The study was approved by the health research ethics committee (No. 0676/LOE/301.4.2/XI/2021) on 2 November 2021.

#### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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