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RELATIONSHIP BETWEEN HIV STATUS, DM STATUS, AND PMO PRESENCE WITH THE SUCCESS OF TREATMENT OF PRODUCTIVE-AGE PULMONARY TB PATIENTS

Vita Olivionita*, Suhartono, Bagoes Widjanarko, Onny Setiani, Apoina Kartini
Faculty of Public Health, Universitas Diponegoro, Jl. Prof. Soedarto No.13, Tembalang, Semarang, Central Java 50275, Indonesia
*olivionitavita@gmail.com

ABSTRACT
Data from the Semarang City Health Office shows the treatment success rate at the dr. Adhyatma, MPH Regional Hospital has decreased significantly from 2021 to 2022. Factors that influence TB treatment outcomes are important indicators of the success of the TB control program. Objective: This study aims to see the relationship between HIV status, DM status, and the presence of PMO with the success of treatment of productive-age pulmonary TB patients. Method: This study uses a retrospective cohort study design. The population in the study was 324 patients. The sampling technique used is the total sampling technique. The sample in this study were productive-age pulmonary TB patients undergoing treatment who were recorded in medical records met the inclusion and exclusion criteria totaling 79 patients. Data analysis used is the chi-square test. Results: The results of the study obtained were that there was a significant relationship between HIV status (p-value = 0.007; OR = 1.816; 95% CI = 1.467-2.247), DM status (p-value = 0.027; OR = 1.501; 95% CI = 1.086-2.075), and the presence of PMO (p-value = 0.028; OR = 1.486; 95% CI = 1.043-2.117). Conclusions: From the research that has been conducted, it can be concluded that there is a significant relationship between HIV status, DM status, and the presence of PMO with the success of treatment of productive-age pulmonary TB patients at dr. Adhyatma, MPH Regional Hospital.

Keywords: DM status; HIV status; PMO presence; pulmonary TB success treatment

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INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by Mycobacterium tuberculosis that spreads through droplets.(Pangaribuan et al., 2020) Until now, TB is still a global health problem. In 2022, TB became the second-highest single cause of death in the world with a death toll almost twice that of HIV/AIDS. In 2022, globally, 7.5 million people were newly diagnosed with TB and reported as TB cases. This shows that about a quarter of the world's population has been infected with TB. Indonesia is ranked 2nd as the country with the highest number of TB sufferers in the world with an incidence of 13% compared to all cases in the world (World Health Organization, 2022). Overall, the number of TB cases in Indonesia in 2022 was the highest in the last ten years, reaching 724,309 cases and the number of cases treated only reached 86.3% of the total TB cases found in 2022 (Kemenkes RI, 2023).

Due to its significant impact on quality of life, economy, and mortality rate, Pulmonary TB is a top priority in disease control programs in Indonesia (Ruditya, 2015). TB control efforts in Indonesia in 2020-2024 are intended to accelerate Indonesia's efforts to end the epidemic by 2050. However, the target set in the 2020-2024 RPJMN, which is 272 cases per 100,000 population, has never been achieved (Purnama, 2018). Minister of Health Regulation Number 67 of 2016 stipulates that the TB treatment success rate is one of the main indicators used to assess the achievement of the national TB control strategy at the Regency/City, Province, and

Central levels. WHO has set a treatment success target of at least 90% (Chomaerah, 2020). Achieving this target can reduce TB transmission both in households and communities, and prevent deaths and complications related to tuberculosis. The number of cured tuberculosis cases and total treatment among all treated and reported tuberculosis cases is referred to as the tuberculosis treatment success rate (Kemenkes RI, 2023).

Based on the 2022 TB Program Annual Report, the success rate of TB treatment in Indonesia from 2019 to 2022 has increased but has not reached the national target of 90% (Kemenkes RI, 2023). In 2022, the success rate of TB treatment in Indonesia is still at 86.5%. The results of TB patient treatment since 2002 have increased the percentage of cure and decreased the percentage of complete treatment, then in 2017-2021 there was an increase in the percentage of complete treatment and a decrease in the percentage of cure. In 2022, TB patients with cured treatment results increased and complete treatment results decreased (Kemenkes RI, 2023).Central Java is one of the provinces with treatment coverage (TC) and success rates (SR) below 90% and is also a priority province for accelerating TB elimination. The treatment success rate for Central Java Province in 2022 is still 85.7%, down from 86.3% in 2021 (Kemenkes RI, 2023). Based on the Health Profile of Central Java Province in 2022, Semarang City is one of the cities in Central Java that has not reached the target treatment success rate (Dinas Kesehatan Jawa Tengah, 2023). Data from the Semarang City Health Office shows that there has been a decrease in the treatment success rate in 2022, where in 2022 the treatment success rate for Semarang City was 79.92%, down from 84.83% in 2021. Semarang City also has a fairly high mortality rate during TB treatment, which is 324 patients in 2022.

TB disease can cause dangerous complications such as coughing up blood, pleural effusion, emphysema, spread of TB to other organs of the body, drug resistance, and even death if left untreated or treatment is incomplete. One effort to control and overcome the high number of TB sufferers is through treatment (Maulidya et al., 2017). TB treatment is a very important and efficient effort to prevent the further spread of TB bacteria. TB treatment is given for a sufficient period consisting of two stages, namely the initial stage and the continuation stage with a total duration of six months, two months in the initial stage and four months in the continuation stage. The goal of TB treatment is to cure patients, stop the spread of infection, and prevent the emergence of new strains. However, these goals are often not achieved due to factors such as the severity of the disease, complications due to HIV and/or other diseases, Multi-Drug Resistance (MDR), poverty, and lack of services provided to patients (Limenh et al., 2024).

Factors affecting TB treatment outcomes are important indicators of the success of TB control programs. Molecular Rapid Tests (MRT) are now a priority in TB diagnosis because they have several advantages, such as high sensitivity, test results can be obtained in about 2 hours, can detect resistance to rifampicin, and a low biological safety level (Kemenkes RI, 2017). A study conducted in Uganda showed that clinically diagnosed TB patients were 20% less likely to have successful treatment outcomes than bacteriologically confirmed TB patients (aRR =0.8, P-value = 0.021; CI: 0.53 - 0.94) (Tumusiime et al., n.d.).A study conducted in Ethiopia showed that complications due to HIV affect the success of TB treatment in patients. This study identified that TB patients who tested negative for HIV were three times more likely to have successful treatment outcomes (Limenh et al., 2024). HIV and TB co-infection can cause various new problems, including misdiagnosis due to difficulties in establishing a diagnosis, high morbidity/mortality rates during treatment, drug resistance, and various social, cultural, and economic problems that require greater attention from various parties (Wijaya, 2019). HIV and TB co-infection can cause various new problems, including misdiagnosis due to difficulties in establishing a diagnosis, high morbidity/mortality rates during treatment, drug

resistance, and various social, cultural, and economic problems that require greater attention from various parties (IK 95%; 1,004-1,01) compared to TB DM patients (Febiola et al., 2020).Yulinda's research (2017) shows that patients who experience PMO tend to be more regular in taking medication and are compliant in undergoing treatment. In this case, the role of PMO who can carry out their duties well greatly influences the success of pulmonary TB treatment. The risk of patients who experience PMO is 13.5 times greater for recovery compared to patients who do not experience PMO (IK 95% OR = 1,955-93,246) (Maulidya et al., 2017).

Pulmonary TB is most often found in productive age. Productive age can more easily transmit the disease to others because of their mobility (Sikumbang et al., 2022). The productive age group more often carries out daily activities outside the home so that the possibility of contact with TB sufferers becomes more frequent (Hermansyah & Fatimah, 2017). At this age, if someone suffers from pulmonary TB, it can cause the individual to no longer be productive and even become a burden for their family (Marlina & Darmansyah, 2021). It is estimated that a TB sufferer at a productive age loses an average of 3-4 months of work time, this results in a loss of household income per year of around 20-30% (Nurjannah et al., 2022). The highest incidence of TB in Indonesia is in young adults where an estimated 75% of TB sufferers are in the productive age group (Sejati & Sofiana, 2015). The composition of the Indonesian population is currently heading towards a demographic bonus composition. The peak of the demographic bonus in Indonesia is estimated to occur in 2035, with the majority of the population being of productive age, where the quality of this group will determine the future of Indonesia. Therefore, health efforts that target productive age are important, in order to create quality human resources so that the demographic bonus can be utilized optimally (Direktorat Kesehatan Usia Produktif Dan Lanjut, 2022).

Regional General Hospital (RSUD) dr. Adhyatma, MPH is one of the TB referral hospitals in Semarang City. Based on data from the Semarang City Health Office, the success rate of treatment at RSUD dr. Adhyatma, MPH experienced a significant decline from 2021 to 2022. The success rate of treatment at RSUD dr. Adhyatma, MPH from 2019 to 2022 was 56.79%, 63.60%, 69.53%, and 58.33%, respectively. Based on these figures, the success rate of treatment at RSUD dr. Adhyatma, MPH experienced a fluctuating trend. The success rate of treatment at RSUD dr. Adhyatma, MPH was recorded as having the lowest rate in Semarang City in 2022. The decline in the success rate of treatment prompted the author to examine what factors were related to the success of treatment in productive-age pulmonary TB patients at RSUD dr. Adhyatma, MPH. The purpose of this study was to determine the relationship between HIV status, DM status, and the presence of PMO with the success of treatment of productive-age pulmonary TB patients at dr. Adhyatma Regional Public Hospital, MPH, Central Java Province.

METHOD

This study uses an observational analytical research type with a retrospective cohort study design. Retrospective cohort research is a research design whose observations start from past exposure status and observe the outcome status. This study was conducted from May to October 2024. This study was conducted at RSUD dr. Adhyatma, MPH, Central Java Province. Information was obtained from the medical records of the DOTS Polyclinic of RSUD dr. Adhyatma, MPH, Central Java Province during January 2023 to April 2024. This study has obtained approval from the Health Research Ethics Committee (KEPK) of RSUD dr. Adhyatma, MPH, Central Java Province with the issuance of ethical clearance number No.081/KEPK.EC/IX/2024 and the researcher complies with research ethical standards. The population in the study was all pulmonary TB patients undergoing treatment at the dr. Adhyatma Regional Hospital, MPH, Central Java Province during the period January 2023 to

April 2024, totaling 324 patients. The sampling technique used was the total sampling technique. Total sampling is a sampling technique where the number of samples is the same as the research population. So the sample in this study was all productive-age pulmonary TB patients undergoing treatment at the dr. Adhyatma Regional Hospital, MPH, Central Java Province, recorded in medical records during the period January 2023 to April 2024.

Determining the minimum sample size in a population uses the Slovin formula. Based on the sample calculation, the minimum number of samples needed in this study is 77 respondents. The sampling technique used is the total sampling technique. So the sample in this study were productive-age pulmonary TB patients undergoing treatment at the Dr. Adhyatma Regional Hospital, MPH, Central Java Province, who were recorded in medical records during the period January 2023 to April 2024 and met the inclusion and exclusion criteria totaling 79 patients. Bivariate analysis is used using the Chi square test. The Chi square test is one type of non-parametric comparative test that is carried out on two variables, where the data scale of both variables is nominal. The requirement for this test is that the frequency of respondents or samples used is large. The basis for taking the hypothesis is based on a significance level of 0.05.

RESULT

Research Subject Selection Flow

This study examined 324 patients with Pulmonary TB who underwent category I treatment from January 2023 to April 2024. Patients who did not meet the inclusion criteria were then excluded, including patients aged less than 15 years and over 55 years as many as 128 people, 3 patients who relapsed, 6 patients who moved health facilities, 29 patients who discontinued treatment, and 19 patients who died. After removing patients who did not meet the inclusion criteria, 139 patients remained. Then the medical records of these 139 patients were viewed one by one. Of the 139 medical records, 60 medical records did not contain some of the variables studied, so the final number of samples studied was 79 patients, 31 patients had successful treatment results and 48 patients had failed treatment results.

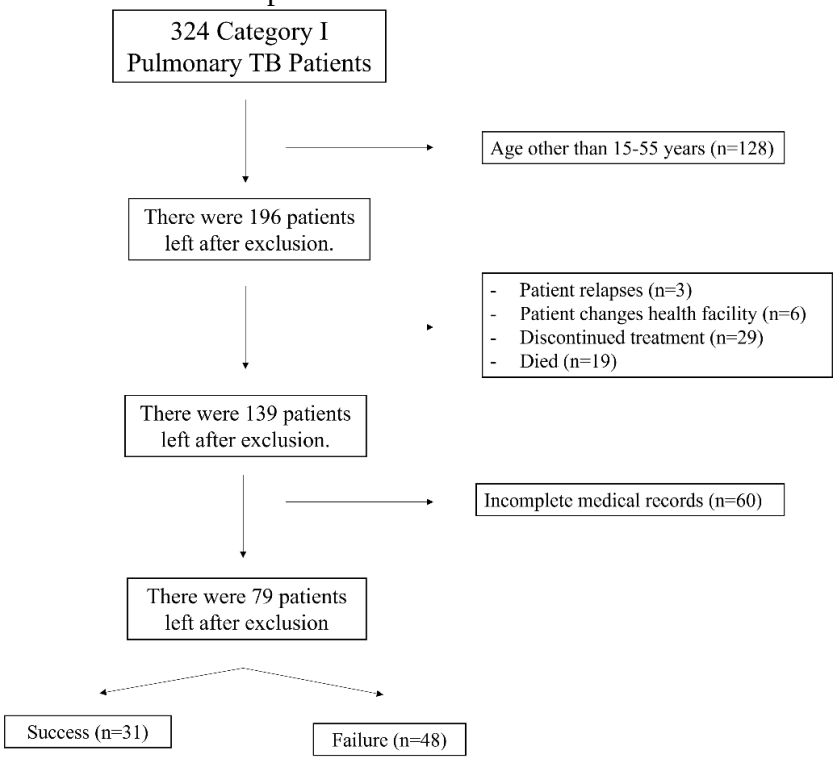

Figure 1. Research Subject Selection Flow

Factors Related to the Success of Treatment of Pulmonary TB Patients of Productive Age

To determine whether there is a relationship between HIV status, DM status, and the presence of PMO with the success of TB treatment in productive age, a bivariate analysis was conducted using the chi-square test. The test results obtained can be seen in Table 1.

Table 1.
Factors Related to the Success of Treatment of Pulmonary TB Patients of Productive Age

Variabel	Treatment Result						p	RR	CI (95%)
	Failure		Succes		Total				
	f	%	f	%	f	%			
HIV status							0,007	1,816	1,467-2,247
Reactive	10	56,3	0	0	10	100			
Non-reactive	38	55,1	31	44,9	69	100			
DM status							0,027	1,501	1,086-2,075
Positive	19	79,2	5	20,8	24	100			
Negative	29	52,7	26	47,3	55	100			
Presence of PMO							0,028	1,486	1,043-2,117
Don't have	26	74,3	9	25,7	35	100			
Have	22	50	22	50	44	100			

Based on the bivariate analysis used to determine the relationship between HIV status and the success of treatment of productive-age pulmonary TB patients, the p-value was obtained at 0.007 (p-value <0.05). So it can be stated that there is a significant relationship between HIV status and the success of treatment of productive-age pulmonary TB patients. Most patients who experienced treatment failure were patients with non-reactive HIV, namely 38 patients (55.1%).Based on the bivariate analysis used to determine the relationship between DM status and the success of treatment of productive-age pulmonary TB patients, the p-value was obtained at 0.027 (p-value <0.05). So it can be stated that there is a significant relationship between DM status and the success of treatment of productive-age pulmonary TB patients. Most patients who experienced treatment failure were patients with negative DM status, namely 29 patients (52.7%).Based on the bivariate analysis used to determine the relationship between the presence of PMO and the success of treatment of productive-age pulmonary TB patients, the p-value result was 0.028 (p-value <0.05). So it can be stated that there is a significant relationship between the presence of PMO and the success of treatment of productive-age pulmonary TB patients. Most patients who experienced treatment failure were patients who did not have PMO, namely 26 patients (74.3%).

DISCUSSION

Based on the results of statistical tests, a p-value of 0.007 was obtained (p-value <0.05). So it can be stated that HIV status has a significant relationship with the success of treatment of productive-age pulmonary TB patients. This study is in line with research conducted at the National Hospital Abuja Nigeria that there is very strong evidence of the relationship between HIV status and the rate of cure and failure with a p-value of less than 0.001 in treatment outcomes. With a p-value of 0.01, the evidence of the relationship between HIV status and treatment failure is very strong. The chance of achieving treatment cure, with TB/HIV co-infection, is 0.3 compared to if the patient is not infected with HIV. If a patient is HIV positive, he is three times more likely to experience treatment failure and three times more likely to fail, compared to if he is HIV negative (Ofoegbu & Odume, 2015).HIV-positive patients are at higher risk of experiencing unsuccessful treatment outcomes compared to HIV-negative TB patients. Reasons for unsuccessful treatment outcomes may be due to inadequate support provided to people with TB/HIV co-infection to ensure high adherence, late HIV diagnosis, pill burden, and drug interactions (Safwat et al., 2019). The difficult nature of TB diagnosis and lack of initiation of HIV testing may also contribute to the low TB treatment success rate among HIV-infected TB patients. The HIV pandemic poses a major challenge to

TB epidemic control by altering the natural progression of latent TB to active TB, which in turn affects its clinical outcomes. The management of HIV-TB co-infection is complicated by several factors, including drug interactions, overlapping drug toxicities, exacerbation of side effects, concerns about adherence, and immune reconstitution inflammatory syndrome (Mekonen, 2024).

Based on the results of the chi-square test, the p-value was obtained as 0.027 (p-value <0.05). So it can be stated that there is a significant relationship between DM status and the success of treatment of productive-age pulmonary TB patients. This study is in line with the study conducted by Zeni (2017) with the results of statistical tests using logistic regression with the enter method obtained a p-value = 0.012 (p-value <0.05) which means there is a relationship between DM disease and the success of pulmonary TB treatment at the Tanah Kalikedinding Health Center, Surabaya (Yanti, 2017). Likewise, Ahmad's research (2020) stated that DM shows a strong relationship with unsuccessful TB treatment results among significant risk factors.(Ahmad et al., 2020) Likewise, Ahmad's research (2020) stated that DM shows a strong relationship with unsuccessful TB treatment results among significant risk factors (Wulandari & Sugiri, 2013).

Based on the results of the statistical test, a p-value of 0.028 was obtained (p-value <0.05). So it can be stated that there is a significant relationship between the presence of PMO and the success of treatment of productive-age pulmonary TB patients. The study had the same results as the study conducted at RSU Karsa Husada Batu which found that there was a relationship between the presence of PMO and the success of pulmonary TB treatment (Panggayuh et al., 2019). The presence of a PMO is important in the intensive treatment phase (the first 2 months) to ensure that the drugs are taken in the right combination and according to the specified schedule. Through direct treatment supervision, the level of patient compliance in taking medication can be determined so that treatment can be carried out completely according to the scheduled treatment program. The Indonesian Ministry of Health (2016) also stated that for TB patients to recover and not develop drug-resistant germs, it is very important to ensure that patients complete all their medication according to recommendations, so a PMO is needed who can carry out direct supervision so that the level of fulfillment of patient drug intake is by medical instructions (Kemenkes RI, 2017).

CONCLUSION

Based on the research that has been conducted, it can be concluded that there is a significant relationship between DM status, HIV status, and the presence of PMO with the success of treatment of Pulmonary TB in productive age at RSUD dr. Adhyatma, MPH. This study uses secondary data sourced from patient medical records, so it is recommended for other researchers who will study similar topics to be able to see directly how the relationship between DM status, HIV status, and the presence of PMO on the success of treatment of Pulmonary TB patients.

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