

Determinants of the Event Of Drug Resistant Tuberculosis In The City Of Palembang In 2021

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ARTICLE INFO

Keywords:

*Drug-Resistant Tuberculosis;
Case Control;
Determinants; Drug Side Effects*

ABSTRACT

Tuberculosis is still the main infectious disease in the world, Indonesia ranks 2nd with the highest cases of Tuberculosis after India and China. Drug-resistant tuberculosis is still a threat in tuberculosis control and is a public health problem. Purpose: Analyze the relationship between knowledge, patient motivation, previous treatment history, drug side effect status, the role of drug supervisors, stigma, drug swallowing compliance, tuberculosis treatment length, history of nutritional status, distance from home to fasyankes, previous treatment results, and concomitant diseases against the incidence of drug-resistant tuberculosis in Palembang city in 2021. Research conducted using quantitative methods with case control study design. This data is primary and secondary data. The population in this study is all tuberculosis patients in Palembang as many as 5,989. The sample in this study was 140 respondents selected based on the SRS method. Data analysis is carried out by univariate, bivariate and finally multivariate analysis. Results: There are seven variables associated with the incidence of drug-resistant tuberculosis, namely the history of previous treatment (p-value = <0.0001%), the status of drug side effects (p-value = <0.0001%), drug swallowing compliance (p-value = 0.040%), duration of treatment (p-value = <0.0001), distance from home to health care facilities (p-value = <0.0001%), previous treatment results (p-value = <0.0001%) and concomitant diseases (p-value = 0.004%). The results of the multivariate analysis showed that the variable status of bad drug side effects (p-value = <0.0001%), is the most dominant variable affecting the incidence of drug-resistant tuberculosis in the city of Palembang, after being controlled by previous treatment history, drug side effects, duration of treatment, home distance to health facilities, drug swallowing supervisors, concomitant diseases and drug swallowing compliance (PR = 8,085, 95% CI: 2,596-25,183).

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1. Introduction

Tuberculosis (TB) is a direct infectious disease caused by the bacterium *Mycobacterium tuberculosis (Mtb)*. Tuberculosis is transmitted through the air from an infectious TB patient to the people around him. One patient with untreated bacteriologically confirmed TB can infect 10 people per year. Transmission of TB occurs directly through the air in the form of droplets (splashes of phlegm) so that it interferes with public health and causes illness (morbidity) and death (mortality) (Ministry of Health of Indonesia, 2019). Based on the WHO Global TB Report 2020, currently there are still 10 million people in the world who fall ill due to TB and cause 1.2 million people to die from it. Indonesia is one of eight countries that accounts for 2/3 of TB cases worldwide, occupying the second position after India with 845,000 cases with 98,000 deaths or equivalent to 11 deaths/hour. In 2018, WHO stated that TB cases in Indonesia ranked 3rd in the world after India and China with approximately 10% of the total number of pulmonary TB patients

in the world , deaths from TB were 11,993. The discovery of drug-resistant TB cases was 11,463 cases. (Indonesian Ministry of Health , 2021). Drug-resistant tuberculosis (RO TB) is still a threat in TB control and is one of the main public health problems in many countries in the world, including Indonesia. Globally in 2019, an estimated 3.3% of new TB patients and 17.7% of previously treated TB patients were drug-resistant TB patients. In 2019, it was estimated that there were 9.96 million TB incidents worldwide, of which 465,000 were drug-resistant TB/RR TB. (Indonesian Ministry of Health , 2020).

Mycobacterium tuberculosis (Mtb) resistance is caused by spontaneous mutations in chromosomes. Drug Resistant TB is divided into 2, namely in new patients and patients who have been treated. Resistance among new patients is resistance to OAT in patients who have never received TB treatment before or have received OAT for less than 1 month. This patient was infected from a person with resistant TB bacteria. Meanwhile, resistance among patients who had been treated was resistance that occurred in patients who had received TB treatment for > 1 month, including patients who failed treatment, relapsed or returned after dropping out of treatment. These patients can acquire resistant bacteria during treatment, or experience reinfection/primary infection from people with resistant TB germs (Muhammad and Fadli, 2019) . Drug-resistant TB cases in South Sumatra Province have always increased from 2016 to 2019. In 2018 there were 224 confirmed cases of drug-resistant TB, and 72 cases treated. In 2019 there was an increase in the most cases, as many as 391 confirmed cases of drug-resistant TB, and 127 cases being treated (South Sumatra Provincial Health Office, 2019).

The management of drug-resistant TB is more complex and requires more costs than the management of non-drug-resistant TB. Drug-resistant TB cases require more expensive treatment and treatment that takes a relatively long time. However, if drug- resistant TB is not treated, it will indirectly affect the economy because the costs incurred are quite large. Treatment failure is one of the causes of drug- resistant TB which is influenced by the length of treatment, patient compliance and regularity for treatment, body resistance, and socio-economic factors of the patient. Medications that are interrupted or that do not comply with DOTS standards also cause drug-resistant TB . The management of drug- resistant TB is more complicated and requires more attention than the management of non-resistant TB (Widiastuti, Subronto and Promono, 2017) . In an effort to prevent and control disease, it is necessary to do both in terms of patients themselves, health services, and the environment to prevent drug- resistant TB cases . To make maximum efforts, it is necessary to know the factors that cause drug- resistant TB .

2. Methods

This research uses observational analytic with *case control study* design , which is an analytic study that concerns how risk factors are studied using a *retrospective approach*. The population in this study were all tuberculosis patients in the city of Palembang as many as 5,989. The sample in this study was 140 respondents were selected based on *simple random sampling method* with 70 respondents in the case group and 70 respondents in the control group. Data analysis was carried out using univariate analysis, bivariate analysis and finally using multivariate analysis using multiple logistic regression risk factor models. This research uses observational analytic with *case control study* design , which is an analytic study that concerns how risk factors are studied using a *retrospective approach* . In other words, effects (disease or health status) are identified at this time, then risk factors are identified as existing or occurring in the past (Notoatmodjo, 2010). In this study, the independent variables to be studied were knowledge, patient motivation, previous treatment history , drug side effect status , role of drug swallowing supervisor, stigma, drug swallowing compliance, duration of treatment, history of nutritional status, distance from home to health facilities, results of previous treatment and comorbidities. In this study as a group of cases, namely drug-resistant TB patients who were examined at the health facilities in the city of Palembang .

The population in this study were all patients with drug-resistant TB in the city of Palembang in 2019-2021, the source population was all patients seeking treatment at the health facilities in the city of Palembang. Meanwhile, the study population for the cases in this study were patients diagnosed with Drug-Resistant TB based on the results of the Rapid Molecular Test (TCM) as seen from the medical records of patients at the Palembang City Health Facilities who started treatment

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from January 2019 – December 2021 as many as 104 patients and the study population. for controls are patients with suspected negative Drug Resistant TB based on the results of the Microscopic examination and Molecular Rapid Test (TCM) seen from the medical records of patients at the Palembang City Health Facilities who started treatment in January 2019 – December 2021 as many as 5,885 patients

The technique of taking health facilities as respondents in this study was purposive sampling, namely 4 health facilities from 7 health facilities that had Molecular Rapid Tests in the city of Palembang which were selected randomly. The health facilities selected in this study were Mohammad Hoesin Hospital Palembang, Sematang Borang Health Center, Dempo Health Center, Nagaswidak Health Center. The data collection instrument used was a questionnaire. The questionnaire has question items consisting of 20 questions related to knowledge about drug-resistant TB, 11 questions related to motivation, 2 questions about previous treatment history, 9 questions about drug side effects, 11 questions about the role of drug-taking supervisors, 10 questions about stigma, 4 questions about compliance, 2 questions related to the distance from home to health facilities. The ethical letter was obtained from the Ethics Commission of the Faculty of Public Health, Sriwijaya University No. 326/UN9.FKM/TU.KKE/2021.

3. Result And Discussion

3.1 Univariate Analysis

The table below shows the frequency distribution in tuberculosis patients as follows:

TABLE 1
CHARACTERISTICS OF DRUG RESISTANT TUBERCULOSIS RESPONDENTS IN PALEMBANG CITY

Variable	Total Respondents	
	n	%
Dependent Variable		
Tuberculosis Incidence		
Drug Resistant TB	70	50
No Drug Resistant TB	70	50
Independent Variable		
Knowledge		
Not enough	92	65.7
Well	48	34.3
Motivation		
Low	72	51.4
Tall	68	48.6
Previous Medication History		
Old Case	44	41.3
New Case	96	68.6
Drug Side Effect Status		
There are Side Effects	83	59.3
No Side Effect	57	40.7
The Role of the Swallowing Drug Supervisor		
No PMO Role	77	55.0
There is a PMO Role	63	45.0
Stigma		
There is	74	52.9
There isn't any	66	47.1
Hemoglobin		
HB Abnormal	76	54.3
Normal HB	64	45.7
Drug Swallowing Compliance		
Not obey	23	16.4
Obey	117	83.6
TB Treatment Duration		
<= 6 months	76	54.3
> 6 months	64	45.7
Nutritional Status History		
Less BMI	66	47.1
Normal BMI	74	52.9
Distance from house to health facility		
Far	76	54.3

Close	64	45.7
Previous Treatment Results		
Drop Out, Fail	24	17.1
Heal, Complete	20	14.3
Healthy	96	68.6
Co-morbidities		
There is	25	17.9
There isn't any	115	82.1

Based on Table 1 above, respondents with drug-resistant and non-drug resistant tuberculosis have the same percentage, namely 50% or respectively. More than half of the total respondents (65.7%) have less knowledge. More than half of the total respondents (51.4%) have less motivation. Almost half of the respondents (41.3%) were old cases who had a history of previous treatment. More than half of the total respondents (59.3%) had drug side effects. More than half of the total respondents (55%) had no PMO role. More than half of the total respondents (52.9%) experienced negative stigma. More than half of the total respondents (54.3%) had abnormal hemoglobin levels. The majority of respondents stated that they were obedient in swallowing drugs (83.6%). More than half of the total respondents (54.3%) had treatment duration <= 6 months. less than half of the total respondents (47.1%) had a history of nutritional status with less BMI. More than half of the total respondents (54.3%) have long distances between their homes and health care facilities. The majority of respondents had healthy results from the previous treatment (68.6%), then continued with the results of the previous treatment dropping out, failed at 17.1% and the last one with the results of the previous treatment was complete (14.3%). In the comorbid disease variable, the majority of respondents stated that there were no comorbidities, namely 82.1%.

3.2 Bivariate Analysis

The relationship between the independent variables to the dependent variable can be seen as follows:

TABLE 2
THE RELATIONSHIP OF EACH VARIABLE WITH THE INCIDENCE OF DRUG RESISTANT TUBERCULOSIS IN PALEMBANG CITY

Variable	Incidence of TB RO		p-value	O R (95%CI)
	Yes	Not		
Knowledge				
Not enough	44	48	0.476	0.776 (0.386 - 1 , 562)
Well	26	22		
Motivation				
Low	37	35	0,735	1,121 (0 , 578 - 2 , 176)
Tall	33	35		
Previous Medication History				
Old Case	38	6	<0.0001	12,667 (0.850 - 33.078)
New Case	32	64		
Drug Side Effect Status				
There is	61	22	<0.0001	14,788 (6,240 - 35,045)
There isn't any	9	48		
The Role of the Swallowing Drug Supervisor				
There isn't any	44	33	0.062	1,897 (0.966 - 3,726)
There is	26	37		
Stigma				
There is	36	38	0.735	0.892 (0.459 - 1.732)
There isn't any	34	32		
Drug Swallowing Compliance				
Not obey	7	16	0.040	0.375 (0.144 - 0.979)
Obey	63	54		
Tuberculosis Treatment Duration				
<= 6 months	20	56	<0.0001	0.100 (0.046 - 0.219)
>6 months	50	14		
Nutritional Status History				
Less BMI	33	33	1,000	1,000 (0.515 - 1.942)
Normal BMI	37	37		
Distance from house to health facility				
Far	51	25	<0.0001	4,832 (2,355 - 9,913)
Close	19	45		

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Previous Treatment Results	20	4		0.100
Drop Out, Fail	18	2	<0.0001	(0.032 – 0.317)
Heal, Complete	32	64	<0.0001	0.056
Healthy				(0.012 – 0.254)
Co-morbidities				
There is	19	6	0.004	3,974
There isn't any	51	64		(1,478 – 10,682)

Based on Table 2 above, there are 7 related variables (*p-value* <0.05), namely the variable history of previous treatment (*p-value* = <0.0001) with OR = 12.667 (95% CI: 0.850 - 33.078) which means the respondent who have a history of previous treatment of old cases can increase the risk of drug-resistant tuberculosis by 12.667 times higher than respondents who have no previous treatment history. The variable of drug side effect status (p-value=<0.0001) with OR=14,788 (95% CI: 6,240 – 35,045) which means that respondents who have a drug side effect status can increase the risk of drug-resistant tuberculosis by 14,788 times higher compared to respondents who had no drug side effect status. The variable of adherence to swallowing medication (p-value = 0.040) with OR = 0.375 (95% CI: 0.144 - 0.979) which means that respondents who have non-adherent adherence to swallowing drugs can increase the risk of drug-resistant tuberculosis by 0.375 times higher than respondents who have adherence to swallow medication. Variable length of treatment (p-value = <0.0001) with OR = 0.100 (95% CI: 0.046 – 0.219) which means that respondents who have TB treatment duration <= 6 months can increase the risk of drug-resistant tuberculosis by 0.100 times higher compared with respondents who had TB treatment duration > 6 months. Variable distance from home to health facilities (p-value = <0.0001) with OR = 4.832 (95% CI: 2.355 – 9.913) which means that respondents who have far distances from their homes to health facilities can increase the risk of drug-resistant tuberculosis by 4.832 times higher compared to respondents who have a close distance from their home to health facilities . The previous treatment outcome variable (p-value=<0.0001) with OR=0.100 (95% CI: 0.032 – 0.317) and OR=0.056 (95% CI: 0.012 – 0.254) which means that respondents who had previous treatment results dropped out , failed, cured and complete as a protective factor 0.100 and 0.056 times the incidence of drug-resistant tuberculosis compared with healthy respondents . Variable comorbidities (p-value=0.004) with OR=3.974 (95% CI: 1.478 – 10.682), which means that respondents who have comorbidities can increase the risk of drug-resistant tuberculosis by 3.974 times higher than respondents who do not have comorbidities .

3.3 Multivariate Analysis

Multivariate analysis was conducted to find out which factor is very dominant from the factors that cause drug-resistant tuberculosis. Logistic regression data analysis can be seen in the following table:

TABLE 1
FINAL MODEL OF MULTIVARIATE ANALYSIS OF DETERMINANTS OF DRUG-RESISTANT TUBERCULOSIS
KEJADIAN IN THE CITY OF PALEMBANG

Variable	p- value	OR _{Adjusted}	95% CI
Previous Medication History	0.001	7,764	2,420-24,912
Drug Side Effects	<0.0001	8,085	2,596-25,183
TB Treatment Duration	0.001	0.155	0.052-0.464
Distance from home to health facilities	0.014	3,827	1,318-11.109
Drug Swallowing Supervisor	0.498	1,441	0.501-4.146
Co-morbidities	0.177	2,539	0.657-9.822
Drug Swallowing Compliance	0.109	0.294	0.066-1.316

Based on Table 3, the variables included in the final model are the variables of previous treatment history, drug side effect status, duration of TB treatment, distance from home to health facilities, medication swallowing supervisor, comorbidities and medication adherence. The results of the analysis showed that the most dominant variable influencing the incidence of drug-resistant tuberculosis was the drug side effect status variable. The results of the analysis showed that the drug side effect status variable with a value of OR_{Adjusted} = 8.085 (95% CI: 2.596-25.183) means that respondents with drug side effects have an 8.085 times greater chance of experiencing drug-resistant tuberculosis than respondents who have no drug side effects after controlled by variables

of previous treatment history, duration of TB treatment, distance from home to health facilities, drug swallowing supervisor, co-morbidities and medication adherence. In the general population, it is believed that 95% of respondents with drug side effects are at risk of developing drug-resistant tuberculosis, ranging from 2,596 to 25,183 compared to respondents with no drug side effects.

3.4 Discussion

a. Relationship of Knowledge to the Incidence of Drug Resistant Tuberculosis

Chi Square test results at the 95% confidence level. The *p-value* = 0.476, so that information can be obtained that there is no relationship between knowledge about drug-resistant TB and the incidence of drug-resistant TB in the city of Palembang. Knowledge is a very important domain in the formation of one's actions (*overt behavior*), knowledge is one of the main reasons that causes someone to behave. The knowledge factor of *the host* affects one's behavior, in other words the higher one's knowledge about health, the higher the awareness to participate in health (Notoatmodjo, 2010) . Based on the data analysis conducted by the researcher, it was concluded that there was no relationship between knowledge about drug-resistant TB and the incidence of tuberculosis. This study shows that tuberculosis patients on average have less knowledge about tuberculosis. A person without knowledge does not have a basis for making decisions and determining actions to face problems related to the incidence of TB disease (Notoatmodjo, 2003). From the knowledge they have, they can raise awareness and increase health knowledge on TB disease prevention.

b. The Relationship of Motivation to the Incidence of Drug-Resistant Tuberculosis

Based on bivariate analysis said that the incidence of drug-resistant TB was more in respondents who had low motivation, namely 51.4%, compared to respondents who had high motivation, namely 48.5%. *Chi Square* test results at the 95% confidence level. The *p-value* = 0.735, so that information can be obtained that there is no relationship between motivation and the incidence of drug-resistant TB in the city of Palembang. Based on open-ended questions on the motivational variable of the patient with the question of how the motivation to recover from tuberculosis was, respondents answered that their motivation was the family who became the reinforcement and encouragement to complete the treatment, tuberculosis patients wanted to continue to see and gather with their family. Families play a role in encouraging taking medication according to the guidelines and re-examination of sputum. However, there were also respondents who answered that they had low motivation to recover because of the side effects of tuberculosis drugs and other comorbidities such as gout, diabetes and ulcers. Motivation in taking medication is low, because of the large number of drugs taken, the length of treatment and the side effects experienced sometimes make patients lazy to take medication and despair.

Based on the data analysis conducted by the researcher, it was concluded that there was no relationship between motivation and the incidence of tuberculosis. The results show that the patient has less motivation. The patient's low motivation can also have a bad impact on the sufferer, where low motivation can be an obstacle to the treatment and healing process due to the absence of encouragement that comes from oneself or others for the patient's recovery. The main reason for the failure of treatment is that the patient does not want to take medication regularly in the required time. The length of time for pulmonary TB treatment, which must be carried out for 6 months, can be a burden for sufferers so that they are lazy to continue the treatment process. Patients with a strong motivation to recover from illness will continue to take regular treatment. This lack of motivation and awareness can occur due to the patient's lack of knowledge about the disease and how to treat it

c. Relationship of Previous Medication History to Drug-Resistant Tuberculosis Incidence

Based on bivariate analysis, it was said that drug-resistant TB was more prevalent in respondents who had a history of previous treatment with old cases, which was 86.4%. The results of the *Chi-Square* test value *p value* <0.000. This means that the *p-value* is smaller than alpha (5%), so that information can be obtained that previous treatment history has a significant relationship with the incidence of drug-resistant TB. Drop out or failure of TB treatment is one of the causes of drug resistance. TB treatment is carried out for more than 2 months which can result in patients dropping out because after intensive treatment, patients usually feel healed and stop their treatment. Based on the analysis conducted by the researchers, respondents with old cases had 12,667 times the chance of experiencing drug-resistant tuberculosis compared to respondents with new cases. In the population it is 95% believed that a history of previous treatment is a risk factor

for the occurrence of drug-resistant tuberculosis with a range of 4,850 to 33,078. From the results of the study, it was found that 70 patients with drug-resistant TB were known to be 44 respondents who were old cases.

The previous treatment history variable can be related to the incidence of drug-resistant tuberculosis, researchers assume that previous results such as drop out can show how TB patients are non-adherent in carrying out TB treatment, so the risk of becoming drug-resistant TB will be very high, while the results of previous treatment such as recovery and treatment Complete data can show the compliance of TB patients in treatment so that the risk of developing drug-resistant TB is smaller. Patients with failed treatment results are TB patients whose sputum examination results remain positive or return to being positive in the fifth month or more during treatment or at any time if laboratory results are obtained that show OAT resistance (not conversion) (Ministry of Health, 2014). Incidence of resistance can occur due to inappropriate regimens, irregular drug administration, unsatisfactory treatment from clinicians, weak treatment supervision and weak control.

d. Relationship of Drug Side Effect Status to Drug Resistant Tuberculosis Incidence

Based on the bivariate analysis, it was said that drug-resistant TB was more common in respondents who had drug side effects, which was 73.5%. *Chi-Square* test results p value <0.0001 . This means that the p -value is smaller than alpha (5%), so that information can be obtained that the status of drug side effects has a significant relationship with the incidence of drug-resistant TB. TB drugs have side effects that cause discomfort for those who consume them. The form of side effects felt by respondents such as dizziness, nausea and weakness after consuming OAT. Based on the analysis conducted by researchers, respondents who have drug side effects have a 14,788 chance of experiencing drug-resistant tuberculosis compared to respondents who have no drug side effects. In the population, it is 95% believed that the status of drug side effects is a risk factor for the occurrence of drug-resistant tuberculosis with a range of 6,240 to 35,045.

The variable status of drug side effects can be related to the incidence of drug-resistant tuberculosis, researchers assume that this side effect of OAT can be one of the causes of patients being irregular and causing a feeling of laziness in taking medication. The side effects of TB drugs are one of the reasons for the patient's non-compliance in taking the drug completely. Patients who do not regularly take medication can cause therapy failure in the form of antibiotic resistance, so that the antibiotic drugs used are no longer effective in killing *Mycobacterium tuberculosis* bacteria because they are already resistant to these drugs when consumed. The bacterium *Mycobacterium tuberculosis* that causes TB is a type of acid-fast bacteria that is quite difficult to kill. Resistance of *Mycobacterium tuberculosis* (MTB) to OAT is a condition where the bacteria can no longer be treated with OAT which is effective in eliminating MTB. Cases of drug-resistant TB occur due to low adherence to taking medication which is often caused by drug side effects when viewed from the patient's perspective (Ministry of Health of the Republic of Indonesia, 2014).

e. The Relationship of Drug-taking Supervisors to the Incidence of Drug-Resistant Tuberculosis

Chi Square test results at the 95% confidence level. The p -value = 0.062, so that information can be obtained that there is no relationship between the role of drug-taking supervisors and the incidence of drug-resistant TB in the city of Palembang. PMO is one of the success factors of the DOTS program and its success, but because it will affect the compliance of TB patients in taking OAT so that patients are diligent and motivated to take medicine. PMO is needed to ensure whether the drug is actually taken or not. TB patients who are wrong in carrying out treatment with OAT will have a greater risk of developing drug-resistant TB.

Based on the data analysis conducted by the researcher, it was concluded that there was no relationship between the role of the drug-taking supervisor and the incidence of drug-resistant tuberculosis. PMO still does not understand about his duty to always accompany and motivate patients during treatment. This is thought to be related to PMO's knowledge of TB disease and its treatment. The role of the family as PMO is very important, namely as a motivator who always provides motivation and encouragement to the patients he supervises in carrying out his treatment, oversees the availability of drugs and the regularity of taking drugs and supports patient behavior in the treatment process, regularity of treatment, and willingness to recover. There is no relationship between the role of PMO and the incidence of drug-resistant tuberculosis because the

role of PMOs, both those who accompany patients with drug-resistant TB and those who accompany non-drug-resistant TB patients, have played a good role in carrying out their obligations.

f. Stigma Relationship to Drug Resistant Tuberculosis Incidence

Chi-Square test at the 95% confidence level, p value = 0.735. This means that the p-value is greater than alpha (5%), so that information can be obtained that stigma does not have a significant relationship with the incidence of drug-resistant TB. Stigma is a variety of views of people who judge us negatively, the things we do are negative until our thoughts are negative. Stigma is any form of physical and social attribute that reduces a person's social identity, disqualifying that person from acceptance of a person. Stigma can lead to discrimination that greatly affects a person's life in carrying out their activities.

Based on the open-ended questions on the stigma variable with the question of how stigma is received from the environment where they live, study environment and work environment, respondents answered that the negative stigma received was very little. Patients' awareness of tuberculosis causes them to limit themselves to attending events that involve many people, so they are more often at home and other family members who attend events that involve many people. Some respondents also said that they continued to attend events that involved large crowds but by taking care not to infect others by wearing masks and not eating and drinking at the event venue. The majority of respondents said they did not tell their colleagues about their illness status because they were ashamed, afraid of transmitting the disease to people around them and were dismissed from work. However, their school students only tell their closest friends about their illness, the patient's closest friends do not isolate and encourage the patient to get well soon from tuberculosis.

g. The Relationship between Compliance with Swallowing Drugs and the Incidence of Drug-Resistant Tuberculosis

Chi-Square test results p value = 0.040. This means that the p-value is smaller than alpha (5%), so that information can be obtained that adherence to swallowing drugs has a significant relationship with the incidence of drug-resistant TB. TB patients often stop the treatment program before the course of treatment is completed on the grounds that the patient is feeling better and does not feel the need to continue treatment. Compliance criteria include the right dose, type, amount of medication and the right time to take medication, supported by regular visits to health services to check phlegm and take regular medication every 2 weeks.

Based on the analysis conducted by the researcher, non-adherent respondents have a 0.375 times chance of experiencing drug-resistant tuberculosis compared to obedient respondents. In the population, it is 95% believed that adherence to medication is a risk factor for the occurrence of drug-resistant tuberculosis with a range of 0.144 to 0.979. Irregularity or non-compliance with TB patients during the treatment period will result in genetic mutations of the *Mycobacterium tuberculosis* bacteria so that anti-TB drugs are not effective against TB germs. When anti-TB drugs are no longer effective against TB germs, the chances of becoming MDR-TB will be even greater.

h. The Relationship between the Length of TB Treatment and the Incidence of Drug Resistant Tuberculosis

The results of statistical tests obtained p - value = <0.0001, which means there is a relationship between the duration of TB treatment and the incidence of drug-resistant tuberculosis. This result is in line with the research conducted by Wahyuni 2020 entitled *Multidrug Resistant Tuberculosis (MDR)* which showed that 18 respondents (54.5%) in the case group had previous TB treatment duration > 6 months. From the statistical test results, it is known that the variable duration of TB treatment has a p-value of 0.002, which means that there is a relationship between the duration of TB treatment and the incidence of MDR TB. The OR of respondents who had previous TB treatment >6 months was 25.714, which means that the respondent had a 25,714 times risk of developing MDR TB compared to respondents whose previous TB treatment was <2 months. Based on the analysis conducted by the researcher, respondents with TB treatment duration <= 6 months had a 0.100 times chance of experiencing drug-resistant tuberculosis compared to respondents with treatment duration > 6 months. In the population, it is 95% believed that the duration of TB treatment is a protective factor for the occurrence of drug-resistant tuberculosis with a range of 0.046 to 0.219.

i. The Relationship between Nutritional Status History and the Incidence of Drug-Resistant Tuberculosis

Statistical test results obtained p - value = 1,000, which means that there is no relationship history of nutritional status with the incidence of drug-resistant tuberculosis. (BMI) that is less or poor is related to poor nutritional status, the immune reaction will also decrease so that the body's ability to defend itself against infection also decreases, this is also related to if a person has a chronic infection then the nutritional status will decrease because of that endurance the body will also decrease. Based on the data analysis conducted by the researcher, it was concluded that there was no relationship between the history of nutritional status and the incidence of tuberculosis. Decreased nutrition or malnutrition will have a low immune system and are very susceptible to disease so that the immune response to infectious diseases decreases (Depkes RI, 2011).

j. Relationship between distance from home to health facilities on the incidence of drug-resistant tuberculosis

Statistical test results obtained a p - value of <0.0001 , which means that there is a relationship between the distance from home to health care facilities and the incidence of drug-resistant tuberculosis. Distance is one of the factors that cause sufferers to not complete treatment or monitor treatment progress, such as taking medication and re-examining phlegm. Based on the analysis conducted by the researcher, respondents who are far from their homes to health care facilities have 4,832 times the chance of experiencing drug-resistant tuberculosis compared to respondents who are close to their homes. In the population, it is 95% believed that the distance from home to health care facilities is a risk factor for the occurrence of drug-resistant tuberculosis with a range of 2.355 to 9.913.

k. The Relationship of Previous Treatment Results to the Incidence of Drug Resistant Tuberculosis

Based on bivariate analysis, p value <0.0001 , which means that there is a relationship between the results of previous treatment and the incidence of drug-resistant tuberculosis. Based on the analysis conducted by the researcher, respondents with treatment outcomes drop out, fail, recover and complete as protective factors 0.100 and 0.056 times the incidence of drug-resistant tuberculosis compared to healthy respondents. Therefore, for health workers at the Puskesmas who hold the TB program, they must always be able to dig up complete information from TB patients who will seek treatment at the Puskesmas. Complete information obtained from patients will greatly assist officers in classifying patients, whether TB has relapsed, or even MDR TB. This will be very helpful in establishing the diagnosis and giving the right medication to patients (Kemenkes RI, 2014).

l. The Relationship of Comorbidities to the Incidence of Drug Resistant Tuberculosis

The results of statistical tests obtained p - value of 0.004 which means there is a relationship between comorbidities and the incidence of drug-resistant tuberculosis. Based on the analysis conducted by researchers that comorbidities have a 3,974 times chance of experiencing drug-resistant tuberculosis compared to respondents who do not have comorbidities. In the population, it is 95% believed that comorbidities are risk factors for the occurrence of drug-resistant tuberculosis with a range of 1,478 to 10,682.

4. Conclusion

The most dominant factors influencing the incidence of drug-resistant tuberculosis in the city of Palembang in 2021 are drug side effects after being controlled by variables of previous treatment history, drug side effect status, medication swallowing compliance, length of treatment, distance from home to health care facilities, results of previous treatment and disease. attendant. Suggestions from research include: For Health Facilities. The status of drug side effects is the most significant factor associated with the incidence of drug-resistant tuberculosis in the city of Palembang, so it is hoped that the activity of health workers to educate and motivate patients to continue treatment despite experiencing drug side effects, in order to achieve patient recovery and minimize the spread of tuberculosis in the community. Drug-resistant tuberculosis patients are in various types of work so that the transmission of the disease is wider, it is necessary for the role of health workers to disseminate information and education related to strategies for preventing and

transmitting TB and drug-resistant TB to the wider community, including the importance of using masks both for patients and their families who are in direct contact with the patient. Patients to reduce the acceleration of disease transmission. Health workers should carry out active surveillance so that they can detect suspected TB and patients who are likely to suffer from drug-resistant TB so that there is no delay in diagnosis, health workers should also monitor the side effects felt by patients in drug-resistant TB treatment in order to prevent the possibility of patients being lost to follow-up. treatment for side effects. For health workers conducting contact investigations on drug-resistant tuberculosis patients and drug-sensitive patients who are in household contact with patients to detect early suspects who have the opportunity to suffer from tuberculosis, to be given Tuberculosis Prevention Therapy (TPT) to toddlers who are in contact with smear positive TB patients but are not infected TB and children infected with TB but not sick with TB. Hospitals can increase knowledge by providing a reading room that has reading materials, distribution of SOPs and pocket books that can be given to each health worker. PP RI Number 67 of 2019 Article 95 regarding supervision explains that supervision is carried out on compliance with the implementation of procedures and enforcement of discipline as well as the imposition of administrative sanctions (Ministry of Health RI, 2019). For Institutes of the Faculty of Public Health The Faculty of Public Health and Sriwijaya University can improve understanding and reference materials related to the determinants of the incidence of drug-resistant tuberculosis. FKM can contribute to this drug-resistant tuberculosis, such as conducting research on the factors that influence the success of drug-resistant tuberculosis treatment. For Further Researchers, Further research is expected to use a larger population and number of health facilities so that the size of the respondents is wider. Can discuss factors of family support. Analyze environmental factors or external factors that can influence the incidence of drug-resistant tuberculosis. Further researchers can conduct research using qualitative methods and mix methods so that they can interview patients and health workers to see differences in data from the answers of health workers directly. Interviews can also be conducted with the Department of Health, the director of the hospital concerned and the manager of the tuberculosis program.

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