Article

Determinants of the Incidence of Multidrug Resistant Tuberculosis (MDR-TB) in the Regional General Hospital dr. M. Yunus Bengkulu Period 2024

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Abstract: Indonesia is in third place with the highest caseload, so 2021 is clearly no better. TB cases in Indonesia are estimated at 969,000 TB cases (one person every 33 seconds). This is a 17% increase from 2020, which was 824,000 cases. The incidence of TB cases in Indonesia is 354 per 100,000 population. A new problem related to tuberculosis is the multiple immunity of germs to anti-tuberculosis drugs (multi-drug resistant tuberculosis/MDR-TB). The study design in this study used analytic observational research with a Cross Sectional research design. The target population in this study were all patients with MDR-TB who received treatment at RSUD Dr. M. Yunus Bengkulu in 2024 and the sample of MDR-TB positive patients recorded in the MDR-TB Service register book at RSUD Dr. M. Yunus Bengkulu who had been proven through laboratory tests and met the inclusion criteria and exclusion criteria that the researchers had set. Data analysis was univariate, bivariate and multivariate with Chi-square analysis technique. This study started from April to May 2024. The incidence of Multidrug Resistant Tuberculosis (MDR-TB) in RSUD Dr. M Yunus Bengkulu mostly occurred in people aged 15-65 years, working status, income less than the minimum wage, had smoked, was not compliant in taking drugs, and had a long distance to the Health Facility category. Based on Bivariate Analysis, all variables of age, employment, income, ever smoked, non-compliance and travel distance to health facilities are highly significant with the incidence of Multidrug Resistant Tuberculosis (MDR-TB) at RSUD dr. M Yunus Bengkulu age (p-value 0.028), Employment Status (p-value 0.007), income (p-value 0.032), smoking history (p-value 0.016), Adherence to Taking Medication (p-value 0.032), travel time to health facilities (p-value 0.003). The most dominant factor affecting the incidence of Multidrug Resistant Tuberculosis (MDR-TB) at RSUD Dr. M Yunus Bengkulu is Travel Distance to Health Facilities after controlling for the variable Smoking Habits. Health workers are expected to be active in the field to educate or remind patients and their families about the treatment schedule and OAT consumption schedule.

Keywords: MDR-TB, medication adherence, distance traveled

1. Introduction

The World Health Organization (WHO) has released a report on Tuberculosis (TB) on a global scale in 2022, including a report on the state of TB in Indonesia in the Global Tuberculosis Report 2022 document. In the report, the Covid-19 pandemic is still one of the factors causing disruption in achievements, especially in case finding and diagnosis,

access to care and TB treatment. The progress that has been made in previous years has continued to slow down and even stopped since 2019. The global TB-free target is now completely "off track" from what was planned. In 2021, TB will also become the second deadliest infectious disease in the world after Covid-19. And ranked thirteenth (13) as the leading cause of death worldwide.

WHO reports that the estimated number of people diagnosed with TB in 2021 globally is 10.6 million cases, an increase of about 600,000 cases from the estimated 10 million cases in 2020. Of these 10.6 million cases, 6.4 million (60.3%) people have been reported and are on treatment and 4.2 million (39.7%) people have not been diagnosed and reported. TB can be suffered by anyone, of the total 10.6 million cases in 2021, at least 6 million cases were adult men, then 3.4 million cases were adult women and the remaining TB cases were children, which amounted to 1.2 million cases. Overall deaths from TB are also very high, at least 1.6 million people died from TB, this figure increased from the previous year, which was around 1.3 million people. Another 187,000 people died from TB and HIV.

Indonesia itself is in second place with the highest number of TB patients in the world after India, followed by China, the Philippines, Pakistan, Nigeria, Bangladesh and the Democratic Republic of Congo respectively. In 2020, Indonesia was in third place with the highest caseload, so 2021 is clearly no better. There are an estimated 969,000 TB cases in Indonesia (one every 33 seconds). This is a 17% increase from 2020, which was 824,000 cases. The incidence of TB cases in Indonesia is 354 per 100,000 population, which means that every 100,000 people in Indonesia there are 354 of them suffering from TB. The death rate from TB in Indonesia reached 150,000 cases (one person every 4 minutes), up 60% from 2020 which was 93,000 cases of death from TB. With a mortality rate of 55 per 100,000 population.

A new problem related to tuberculosis is the multiple immunity of germs to anti-tuberculosis drugs (multidrug resistant tuberculosis (MDR-TB). MDR-TB is a "man-made" phenomenon resulting from inadequate treatment of patients and transmission from MDR-TB patients. Inadequate patient management can be viewed from the perspective of providers/health workers, patients and control programs (Aini & Rufia, 2019). Globally, there are an estimated 450,000 cases of MDR-TB in 2021. This is a 3.1% increase compared to 2020. This is thought to be related to the COVID-19 pandemic causing barriers to early detection of tuberculosis. An estimated 191,000 deaths from MDR-TB occurred in 2021.

The burden of Drug Resistant Tuberculosis (DR-TB) in Indonesia is one of the highest in the world. The trend in the number of DR-TB patients found and treated has increased every year, although in 2020 and 2021 there was a significant decline due to the Covid-19 pandemic. In 2022, the number of patients with DR-TB found increased again, higher than in the previous year. 2019 (before the pandemic) which is as many as 12.531 patient TB-RO (Program Tuberculosis Control of the Indonesian Ministry of Health, 2023).

The incidence of MDR-TB is influenced by several risk factors including treatment history, treatment non-compliance, age, gender, side effects of Anti-TB Drugs.

Tuberculosis (OAT), no supervision during treatment, knowledge about MDR-TB and DOTS plus, household income and BCG immunization status (Asriati & Kusnan, Adius, Alifariki, 2019; Budiati & Khoirina, 2018) family support also determines whether treatment will be successful [1].

Treatment failure is one of the causes of MDR-TB which is influenced by the length of treatment, compliance and regularity of patients to seek treatment, endurance, and socio-economic factors. Treatment that is interrupted or not in accordance with DOTS standards also causes MDR-TB cases (Butiop et al., 2015; Izzati et al., 2015). The management of MDR-TB is more complicated and requires more attention than the management of non-resistant TB (Janan, 2019), (Tukatman et al., 2021).

Dr. M. Yunus Regional General Hospital Bengkulu is a service center for MDR-TB patients, where services are carried out in a special room for MDR-TB Services or Matahari Room. MDR-TB services began in 2014. Based on medical record data, MDR-TB patients who were detected and treated at the MDR TB Polyclinic at Dr. M. Yunus Bengkulu Hospital in 2020 were 4 people, in 2021 there were 9 people, in 2022 there were 24 people and in 2023 the number of patients with confirmed MDR-TB was 39 people.

2. Materials and Methods

The study design used in this research is to see the determinants of the incidence of Multidrug Resistant Tuberculosis (MDR-TB) at RSUD dr. M. Yunus Bengkulu. The study design in this study used analytic observational research with a Cross Sectional research design where in this research design consists of independent variables (Age, Status, Employment Status, Level Income, Smoking Habit, Adherence to taking medication, and Distance to Health Facilities) and the dependent variable (Incidence of Multidrug Resistant Tuberculosis).

3. Results

The results of univariate analysis to describe each variable used in this study include (Age, Employment Status, Income Level, Smoking Habits, Adherence to taking medication, and Distance to Health Facilities) and the dependent variable (Multidrug Resistant Events).

Bivariate analysis to see the relationship between the independent variables (Age, Employment Status, Income Level, Smoking Habits, Adherence to taking medication, and Distance to Health Facilities) with the dependent variable (Incidence of Multidrug Resistant Tuberculosis). The test used in the bivariate analysis was the Chi-Square X2) test with a value of 0.05. This analysis aims to obtain the probability of occurrence. If P value > 0.05 then Ho is rejected and Ha is accepted which means there is no relationship between the two variables. Conversely, if the P value ≤ 0.05, Ho is rejected and Ha is accepted, which means there is a relationship between the two variables (Askhary, 2017). Multivariate analysis to determine which factor is the most dominant that affects other variables.

Table 1. Frequency Distribution of Multidrug Resistant Tuberculosis (MDR-TB) Incidence

			Frequency	Percentage
1		Incidence of MDR-TB		
		Positive	39	60.0
		Negative	26	40.0
2		Age		
		Not Productive	20	30.8
		Productive	45	69.2
	3	Jobs		
		Not Working	18	27.7
		Work	47	72.3
	4	Revenue		
		Less than 2.4 million	47	72.3
		More than 2.4 million	18	27.7

5	Smoking History		
	Never	17	26.2
	Ever	48	73.8
6	Medication Adherence		
	Non-compliant	47	72.3
	Compliant	18	27.7
7	Distance to Yan.Kes		
	Near	15	23.1
	Deep	50	76.9

Based on Table 1 above, the incidence of people with a history of ever smoking positive MDR-TB was 39 people by 48 people with drinking compliance with productive age by 45 people and non-compliant drugs by 47 people with an average of working by 47 people with a long distance to the facility income less than 2.4 million by 47 health by 50 people.

Table 2. Relationship between Age and the Incidence of MDR-TB in Dr.M. Yunus Hospital Bengkulu Year 2024 MDR-TB

Umur	Incidence						P
	Positif		Negatif		Total		
	n	%	N	%	N	%	
Not Productive	8	40.0	12	60.0	20	100.0	0.028
Productive	31	68.9	14	31.1	45	100.0	
Total	39	60.0	26	40.0	65	100.0	

In Table 2 above, it can be seen that respondents who have an unproductive age with the incidence of MDR-TB are 8 people (40.0%) and those who have a productive age are 31 people (68.9%), with a p-value of 0.028 <0.05.

Table 3. Relationship between Occupation and the Incidence of MDR-TB in Dr.M. Yunus Hospital Bengkulu Year 2024 MDR-TB

Pekerjaan	Incidence						P
	Positif		Negatif		Total		
	n					%	
		%	N	%	N		
Not Working	6	33.3	12	66.7	18	100.0	0.007
Work	33	70.2	14	29.8	47	100.0	
Total	39	60.0	26	40.0	65	100.0	

In Table 3 above, it can be seen that respondents who did not work with the incidence of MDR-TB were 6 people (33.3%) and those who worked were 33 people (70.2%), with a p-value of 0.007 <0.05.

Table 4. Relationship between Income and the Incidence of MDR-TB Lung at Dr.M. Yunus Hospital Bengkulu Year 2024

Pendapatan	Kejadian MDR-TB						P
	Positif		Negatif		Total		
	n	%	n	%	n	%	
Less than 2.4jt	32	68.1	15	31.9	47	100.0	0.032
Over 2.4m	7	38.9	11	61.1	18	100.0	
Total	39	60.0	26	40.0	65	100.0	

In Table 4 above, it can be seen that respondents with an income of less than 2.4 million with the incidence of MDR-TB were 32 people (68.1%) and respondents with an income of more than 2.4 million were 7 people (38.9%), with a p-value of 0.032 <0.05.

Table 5. Relationship between Smoking Habits and the Incidence of MDR-TB in Dr.M. Yunus Hospital Bengkulu in 2024

Kebiasaan Merokok	Kejadian MDR-TB						P
	Positif		Negatif		Total		
	n	%	n	%	N	%	
Never	6	35.3	11	64.7	17	100.0	0.016
Ever	33	68.8	15	31.3	48	100.0	
Total	39	60.0	16	40.0	65	100.0	

In Table 5 above, it can be seen that respondents who have never had a smoking habit are 6 people (35.3%) and respondents who have had a smoking habit are 33 people (68.8%), with a pvalue of 0.016 <0.05.

Table 6. The Relationship between Adherence to Taking Medication with the Incidence of MDR-TB Lung at Dr.M. Yunus Hospital Bengkulu in 2024

Kepatuhan Minum Obat	Incidence						P
	Positif		Negatif		Total		
	n	%	n	%	N	%	
Non-compliant	32	68.1	15	31.9	47	100.0	0.032
Patuh	7	38.9	11	61.1	18	100.0	
Total	39	60.0	27	40.0	65	100.0	

In Table 6 above, it can be seen that respondents who were not compliant with taking medication were 32 people (68.1%) and respondents who complied with taking medication were 7 people (38.8%), with a p-value of 0.032 <0.05.

Table 7. Relationship between Distance to Health Facilities and the Incidence of MDR-TB in Dr.M. Yunus Hospital Bengkulu in 2024

Distance Traveled to Facilities Health	MDR-TB Incidence						P
	Positive		Negative		Total		
	n	%	n	%	N	%	
Near	4	26.7	11	73.3	15	100.0	0.003
Away	35	70.0	15	81.2	50	100.0	
Total	39	59.0	26	41.0	65	100.0	

In Table 7 above, it can be seen that there are 4 respondents who have a short distance to the health facility (26.7%) and 4 respondents who have a long distance to the health facility 35 people (70.0%), with a p-value of 0.003 <0.05.

Table 8. Multivariate Analysis Candidate Variables

No	Determinants of *MultiDrug Resistant Tuberculosis* (MDR-TB) Incidence	P-value	95% CI	OR
1	Age	0.028	.000-.	4.815
2	Jobs	0.007	.000 - .	7.376
3	Revenue	0.032	.034 - 2.829	4.623
4	Smoking Habit	0.016	.000-.	5.855
5	Medication Adherence	0.032	.000 - .	4.623
6	Travel Distance to Kesht Facilities	0.003	.000-.	9.028

Table 9. Multivariate Analysis Results

No	Determinants of *MultiDrug Resistant Tuberculosis* (MDR-TB) Incidence	P-value	95% CI	OR
1	Travel Distance to Kesht Facilities	0.005	1.759 - 23.413	1.859

Table 9 is the result of the final model analysis with a p value of 0.005 and OR 1.859 at 95% CI (1.759-23.413) which is a factor associated with the incidence of *Multi Drug Resistant Tuberculosis* (MDR-TB) is Distance to Health Facilities.

4. Discussion

Based on the results of this study, it was found that, from the age variable of MDR-TB sufferers, many were found in productive age patients, namely at the age of 15 - 65 years, productive age is more at risk because of more activities than old age. The results of interviews from several respondents in this study said that they had indeed taken treatment 6 months earlier, but because they were busy and did not carry out the direction of health workers to continue taking drugs even though they felt healthy, this resulted in a relapse of the disease, the drugs that should have been consumed until they ran out had become resistant and made the patient after undergoing further examination had to undergo MDR-TB treatment for 20 months.

Various occupations with MDR-TB can transmit it anywhere. This also shows that there is a need to disseminate information about TB or MDR-TB in various places (Putri, 2018). Another study explained that there was no relationship between type of work and the incidence of dropout in TB patients (Mediana, 2002). People who work must have high mobility and busyness, so patients tend to be non-compliant in carrying out treatment using OAT (Salindria, 2011).

The relationship between income and the incidence of MDR TB, families who have income below the minimum wage will consume food with nutritional levels that do not meet the needs of each family member, so that they have poor nutritional status and will be a risk factor for DR-TB infection [2]. The results of research (Suharjo & Girsang, 2015) state that someone with low economic status has 3.619 times to experience DR-TB compared to someone with high economic status. Based on the results of the study, it was found that income is not a risk factor for the incidence of DR-TB.

Smoking can make a person more susceptible to TB infection. Cigarette smoke will also increase airway resistance due to airway obstruction and inhibit the work of macrophages in the alveolus. This makes patients who smoke have a poorer response to TB treatment and may fall into MDRTB (Smit, 2010).

Patient non-compliance in taking OAT includes drug side effects, duration of treatment and patients feeling cured. TB treatment itself takes a long time so that most patients are bored in taking treatment and taking medicine. Some of the patients often feel that they have recovered so they no longer continue treatment. In addition, the OAT taken does not fully guarantee the patient's recovery. If OAT is not taken in accordance with treatment guidelines or with a bad combination, this can lead to resistance.

Distance is one of the factors causing patients to not complete treatment or monitor treatment progress such as taking medicine and rechecking sputum. Research by Retnaningsih (2005) showed that the closer the residence to the puskesmas, the higher the recovery rate. The distance between the patient's place of residence and health services such as health centers often causes non-compliance of patients to take medicine or re-examination, because the long distance to the health service is related to the time and costs incurred for transportation.

5. Conclusion

Based on the characteristics of the respondents, the incidence of Multidrug Resistant Tuberculosis (MDR-TB) at HOSPITAL dr. M Yunus Bengkulu is most common among people aged 15-65 years, employed, earning less than the minimum wage, have ever smoked, are not compliant in taking medication, and have a long distance to health facilities.

Based on Bivariate Analysis, all variables of age, occupation, income, ever smoking, non-compliance and distance to health facilities are highly significant with the incidence of Multidrug Resistant Tuberculosis (MDR-TB) at RSUD dr. M Yunus Bengkulu age (pvalue 0.028), Employment Status (p-value 0.007), income (p-value 0.032), smoking history (p-value 0.016), Adherence to Taking Medication (p-value 0.032), travel time to health facilities (p-value 0.003).

The most dominant factor influencing the incidence of Multidrug Resistant Tuberculosis (MDR-TB) at RSUD Dr. M Yunus Bengkulu is Distance to Health Facilities after controlling for the variable Habit of Health.

Advice

Travel distance to health facilities is the most significant factor associated with the incidence of Multidrug Resistant Tuberculosis (MDR-TB) at RSUD dr. M Yunus Bengkulu so that it is expected that the activeness of health workers to go to the field to provide education or remind patients and families of patients regarding treatment schedules and OAT consumption schedules. The role of health workers to disseminate information and education related to prevention strategies and transmission of TB and MDR-TB to the community.

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