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The Relationship Between Compliance in Taking Anti Tuberculosis Drugs and the Results of Acid-Fast Bacteria (AFB) Examination as an Indicator of Recovery of TB Patients in Tanjung Pinang City in 2022-2023

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Abstract
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Tuberculosis (TB) is a chronic infectious disease caused by *Mycobacterium tuberculosis* with a treatment period of 6 to 8 months. *Mycobacterium tuberculosis* can become germ resistant or multidrug resistance (MDR) if you do not comply in taking anti-tuberculosis drugs (ATD), making this disease very difficult to cure. This research uses secondary data from the Tanjung Pinang City Population Control and Family Planning Health Service for 2022-2023. The aim is to determine the relationship between compliance in taking Anti-Tuberculosis Drugs (ATD) and the results of acid-fast bacteria **(AFB)** examinations of TB patients in Tanjung Pinang City. The research methodology was observational analytic using a *cross-sectional* design, with a total sampling technique from pulmonary TB patients with positive **AFB**, negative **AFB** with positive thorax and extrapulmonary, 252 TB patients. Data analysis used the *Fisher Exact* test with a confidence level of 95%. The results of data analysis showed that 91.3% of patients complied in taking drugs, and 87.3% recovered with negative **AFB** results. *Fisher Exact* analysis showed a significant difference in proportion between compliance in taking anti-tuberculosis drugs and the results of **AFB** examination of pulmonary TB patients with a *p-value* of 0.000 (p < $\propto$0.05). The conclusion from this study is that there is a relationship between compliance in taking anti-tuberculosis drugs and the results of **AFB** examinations of pulmonary TB patients in Tanjung Pinang City in 2022-2023.

Keywords: Pulmonary TB, ATD, (AFB), *Ziehl Neelsen*

INTRODUCTION

Tuberculosis or TB is an infectious disease with the bacteria *Mycobacterium tuberculosis* or pulmonary TB. Sufferers experience respiratory problems, such as chronic cough, shortness of breath, night sweats and fever. *Mycobacterium tuberculosis* can also infect other parts of the body such as the kidneys, bones, joints, lymph nodes or lining of the brain, this condition is called extra pulmonary TB[1].

Treatment for tuberculosis usually takes 6-8 months with strict medication regimens to prevent the risk of antibiotic resistance[1]. In Tanjung Pinang City, with an estimated TB case in 2023 of 1428, case notifications up to July 2023 amounted to 375 or 26.2% (target 90%). This shows that there is still a gap between estimates and notifications of TB cases in Indonesia, while the treatment success rate is 196 cases from the target of 308 (63.6%). The utilization rate for the TB Rapid Molecular Test (Gene Expert) has been recorded as continuing to increase[2]. Tanjung Pinang City suspected TB discovery in 2023 from the target of 6067, with an achievement of 5232 or 86.2%[3]. There are two causes, namely TB cases that are not found or detected and TB patients who do not receive complete treatment.

Treatment is given to new patients with positive AFB, new patients with negative AFB but positive chest x-ray and to patients with severe extra-pulmonary tuberculosis. Several factors influence incomplete treatment or non-compliance in taking anti-tuberculosis drugs, such as the patient feeling bored, side effects of the medication, economic reasons and negative stigma[4]. In the intensive stage of treatment for pulmonary TB sufferers, sufferers must take daily anti-tuberculosis medication Rifampicin, INH (isoniazid), pyrazinamide, ethambutol and streptomycin (RHZES) for two months (60 days).

Then, at the end of the second month, an evaluation is carried out in the form of an examination of the patient's sputum so that it can be seen that the patient's sputum AFB has converted (from AFB positive to AFB negative) or has experienced conversion failure (from AFB positive remains AFB positive. After 6-8 months of treatment, patients who adhere to taking medication will recover, and the results of the *Ziehl Neelsen* AFB examination did not reveal Mycobacterium tuberculosis bacteria (AFB Negative).

Patients who do not comply (fail to follow up) taking anti-tuberculosis medication will find Mycobacterium tuberculosis

bacteria on the *Ziehl Neelsen* AFB examination (AFB is still positive) and need to continue treatment and follow up [5].

Pulmonary TB sufferers who regularly seek treatment are 4.92 times more likely to experience sputum conversion than sufferers who do not regularly seek treatment and statistically this effect is significant[6], that regular treatment has an effect on phlegm conversion of pulmonary TB sufferers[7]. Identification of patient non-compliance is seen through Drug Therapy Monitoring (DTM) documents resulting from interviews with patients, drug swallowing supervisors and program holders. Compliance is measured based on the patient's remaining medication at the time of visit [8].

In this study, to assess patient recovery and eliminate potential transmission, sputum examination was carried out based on recommendations from the World Health Organization (WHO). For patients who adhere to taking anti-tuberculosis medication and patients who do not comply with taking anti-tuberculosis medication, the *Ziehl Neelsen* method of AFB examination is carried out to see *Mycobacterium tuberculosis* bacteria.

MATERIALS AND METHODS

The research used an analytical observational cross-sectional design from secondary data recorded at the Tanjung pinang City Population Control and Family Planning Health Service for 2022-2023. Data in the form of examination results of sputum specimens from patients with pulmonary tuberculosis which were confirmed to be AFB positive, AFB negative chest positive and extra pulmonary. The independent variable of the study was compliance (compliance and non-compliance) with pulmonary TB sufferers taking anti-tuberculosis medication for 6-8 months. The dependent variable is the results of the AFB examination using the *Ziehl Neelsen* method according to the *IUATLD* scale, namely negative, scanty, 1+, 2+ and 3+. The research sample was a total sample from a population of 252 sufferers. Data analysis used the *Fisher exact* test with a confidence level of 95%.

Description of Ethical Exemption

Information on the feasibility of research ethics from the Ethics and Research Committee of the Muhammadiyah University of Purwokerto No.046/KEP/ETIK/III/2023.

RESULTS

The results of research and secondary data analysis can be presented as follows:

1. Distribution of Characteristics of Pulmonary Tuberculosis Patients with Diagnosis Results

An overview of the characteristics of pulmonary TB sufferers based on diagnosis can be seen in table 1 below:

Table 1. Distribution of Pulmonary TB Patients   Diagnosis Results for 2022-2023

TB Diagnosis	2022		2023		Total	
	Freq (n)	(%)	Freq (n)	(%)	n	%
AFB +	94	61.4	65	65.7	159	64.3
AFB -Thorax +	51	33.3	31	31.3	82	32.5
Extraparu	8	5.2	3	3.0	11	3.2
Total	153	100	99	100	252	100

In table 1, the number of pulmonary TB sufferers in 2022-2023 is 252 sufferers. The diagnosis of pulmonary TB sufferers was mostly obtained from AFB Positive (AFB +) results, 159 sufferers (64.3%).

2. Distribution of Compliance in Taking Anti-Tuberculosis Drugs

The distribution of patient characteristics based on compliance in taking anti-tuberculosis drugs can be seen in table 2 below:

Table 2. Pulmonary TB sufferers Based on

Compliance	2022		2023		Total	
	(n)	(%)	(n)	(%)	n	%
Compliant	136	88.9	94	94.9	230	91.3
Not Compliant	17	11.1	5	5.1	22	8.7
Total	153	100	99	100	252	100

Compliance In Taking Tuberculosis Drugs

In table 2, it was found that 230 (91.3%) patients with pulmonary TB were compliant with taking medication in 2022-2023, and 22 patients (8.7%) were non-compliant.

3. Distribution of Recoveries of Pulmonary TB Patients Based on Age and Gender

Table 3. Distribution of Recoveries of Pulmonary TB Patients in 2022 – 2023

Age (Year))	Recoveries (Negatif AFB Result)		
	Frequency (n) / %		
	Man (%)	Women (%)	n (%)
Child (0 – 9)	3 (1.32)	2 (0.88)	5 (2.2)
Teenager (10-18)	4 (1.76)	10 (4.40)	14 (6.16)
Mature (19-59)	103 (45.37)	72 (31.71)	175 (77.08)
Elderly ((≥60)	22 (9.69)	11 (4.84)	33 (14.53)
Total	132 (58.14)	95 (41.86)	227 (100)

Distribution of recovery of pulmonary TB sufferers, both those who comply and do not comply with taking anti-tuberculosis medication based on age and gender, can be seen in table 3.

Most of the patient's recovery occurred in adulthood, amounting to 175 people (77.08%).

In table 3, the distribution of recovered pulmonary TB sufferers with AFB negative (AFB -) results, whether compliant or non-compliant with taking medication, was 227 sufferers.

4. Analysis of the relationship between adherence to anti-tuberculosis medication and patient recovery

The results of the analysis of the relationship between compliance, either compliance or non-compliance with taking anti-tuberculosis medication and AFB negative (AFB -) examination results, as an indicator of recovery

for pulmonary TB sufferers in 2022-2023 can be seen in table 4 below:

Table 4. Relationship between Compliance and AFB Results

	AFB Result			
	Positif	Negatif	Total	P value
Compliance	n (%)	n (%)	n (%)	
Compliant	15 (5.95)	7 (2.78)	22 (8.7)	
Not Compliant	10 (3.96)	220 (87.3)	230 (91.3)	0,000
Total	25 (9.9)	227 (90.1)	252 (100)	

In table 4, the analysis of the relationship between the level of adherence to taking anti-tuberculosis medication and the results of the AFB examination using the *Ziehl Neelsen* method uses the Fisher Exact test, this is because the Chi Square test does not meet the requirements, namely there is 1 cell that has an expected count value of less than 5.

In the Fisher exact test, the result was *p- value* = 0.000, which means $p < \alpha$ 0.05, meaning there is a relationship between compliance with taking anti-tuberculosis medication and the results of AFB examinations in Tanjung Pinang City in 2022-2023.

DISCUSSION

Based on Minister of Health Regulation No. 67 of 2016, it is explained that chest x-rays are important for patients. If used appropriately, RO Thorax has a significant role in detecting pulmonary tuberculosis at an early stage. Tuberculosis is often identified through Thorax RO results which are initially taken for routine health checks or preparation for surgery.

In patients with positive sputum results for acid-fast bacilli (AFB), Thoracic RO becomes critical to evaluate the extent of the lesion and identify possible complications. In addition, in

the final stages of TB treatment, RO Thorax serves to assess the residual or long-term impact on the lungs and pleura[9].

Characteristics of pulmonary TB sufferers based on gender were found to be higher in men compared to women. In accordance with the research results of Rahma et al [9], it was found that 62.79% of pulmonary TB sufferers were men. According to the Indonesian Ministry of Health in 2018, the survey results showed that the prevalence of tuberculosis in men was 3 times higher than in women[10]. According to Mariana[11], men are more likely to experience pulmonary TB compared to women. Men do more activities outside the home, smoking habits, consuming alcohol, these conditions affect the body's immune system so they are more vulnerable and have a greater chance of experiencing pulmonary TB.

The research results showed that the majority of pulmonary TB sufferers were adults (76.2%). Adulthood is a productive age with great opportunities to be able to interact with many people and be in a busy work environment. This condition makes it easier for someone of productive age to suffer more easily and suffer from pulmonary TB [12]. 75% of pulmonary TB sufferers are found at the most economically productive age (15-49 years) [13].

The percentage of compliance with taking anti-tuberculosis medication in 2022 will be 88.9%, while in 2023 it will be 94.9%. There was a significant increase in compliance with taking anti-tuberculosis medication. Recovery of pulmonary TB sufferers in Tanjung Pinang City will increase in 2023.

There is a significant relationship between compliance to taking anti-tuberculosis drug (ATD) and the results of the *Ziehl Neelsen* AFB examination method in Tanjung Pinang City in 2022-2023, *p value = 0.000.* This is in line with Pratiwi [14] research which stated that there was a significant relationship between the level of compliance with taking anti-tuberculosis medication for pulmonary tuberculosis patients at the Rokan Hulu Regional General Hospital with a *p-value* of 0.037 < 0.05.

Non-compliance with TB sufferers in taking medication causes the patient's recovery rate to be low, the death rate to be high, and relapses to increase and what is more fatal is the occurrence of bacterial resistance to anti-tuberculosis drugs or multi-drug resistance, so that TB disease is very difficult to cure. According to the Indonesian Ministry of Health 2018, one of the causes of failure to cure pulmonary TB sufferers is the patient's compliance with treatment and taking anti-tuberculosis medication.

CONCLUSION

1. Frequency of AFB positive pulmonary TB in 2022-2023, as many as 159 sufferers, AFB negative thorax positive pulmonary TB in 2022-2023, as many as 82 sufferers, extra pulmonary TB in 2022-2023, as many as 11 sufferers, and pulmonary TB sufferers are found in men mature age.

2. Compliance with taking anti-tuberculosis medication was 230 compliant patients and 22 non-compliant patients.

3. The recovery of patients with negative AFB examination results (AFB -) was 227 and the majority were men, adults and 25 patients did not recover.

4. There is a significant relationship p value = 0.000 (p < α 0.05) between drinking compliance anti-tuberculosis drugs with AFB examination results in Tanjung Pinang City.

Acknowledgements

Conflict of Interest

None declared

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