

## TINGKAT KEPATUHAN MINUM OBAT ANTI TUBERKULOSIS TERHADAP PENGETAHUAN PASIEN TUBERKULOSIS DI PUSKESMAS AMPENAN

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### ABSTRACT


Tuberculosis remains a community-based problem that requires addressing. The government has implemented treatment programs and guidelines to address this issue in accordance with national standards. This is due to the high rate of non-compliance with medication among TB patients. Non-compliance with medication is a serious problem because it can lead to resistance, relapse, and increased morbidity and mortality. Poor medication adherence can also pose a risk of community transmission and contribute to the failure of global TB eradication efforts. The purpose of this study was to determine the level of adherence to anti-tuberculosis medication and the knowledge of tuberculosis patients at the Ampenan Community Health Center. This study used a quantitative cross-sectional design. The population was 10 tuberculosis patients at the Ampenan Community Health Center. The research instrument used a questionnaire consisting of 20 questions, the answers of which were determined using the Guttman scale and an interview guide. Data analysis used univariate analysis. The results of the study from 10 respondents showed that TB patients were predominantly male (80%), with 40% being adults (36-45 years old), 60% having an elementary school education, and 80% being married. Regarding knowledge, 80% of TB patients at the Ampenan Community Health Center had sufficient knowledge, while 20% had poor knowledge. Meanwhile, TB patient compliance at the Ampenan Community Health Center was 40% compliant and 60% non-compliant.

### KEYWORDS

Medication Compliance, Knowledge, Tuberculosis (TB)

### INTRODUCTION

Pulmonary tuberculosis (TB) is a directly transmitted infectious disease caused by *Mycobacterium tuberculosis* (Ministry of Health, 2014). Transmission occurs when a person inhales droplet nuclei (sputum particles) that enter through the mouth or nose, upper respiratory tract, and bronchi until reaching the alveoli of the lungs (Ministry of Health RI, 2014). Common symptoms in pulmonary TB patients include fever, productive cough lasting two weeks or more accompanied by hemoptysis, night sweats, shortness of breath, chest pain, fatigue, weight loss, and malaise (Narendran et al., 2016).



Tuberculosis (TB) remains a major public health problem despite the implementation of treatment programs and management guidelines by the government in accordance with national standards. This is due to the persistently high rates of non-adherence to medication among TB patients (Ministry of Health, 2016b). One of the government's strategies in TB management is through treatment. The objectives of this treatment are to cure patients, prevent mortality, reduce relapse, break the chain of transmission, and prevent resistance to anti-tuberculosis drugs (ATDs) (Ministry of Health, 2011).

In 2015, it was estimated that there were 10.4 million new TB cases worldwide, of which 5.9 million (56%) were men, 3.5 million (34%) were women, and 1.0 million (10%) were children (WHO, 2016). In Indonesia, there were 420,994 new pulmonary TB cases in 2017 (data as of May 17, 2018). By gender, the number of new pulmonary TB cases in men in 2017 was 1.4 times higher than in women. Based on prevalence surveys, pulmonary TB cases in men were three times higher than in women. Similar patterns were also observed in other countries. This may be attributed to men being more exposed to pulmonary TB risk factors such as smoking and lower treatment adherence. The survey further revealed that among all male participants, 68.5% were smokers, whereas only 3.75% of female participants smoked (Central Bureau of Statistics, 2017). According to the health profile of West Nusa Tenggara Province in 2016, the total number of pulmonary TB patients reached 5,838, of which 3,860 were newly confirmed smear-positive (BTA+) cases. In 2017, the number of TB patients increased to 6,644, with 4,149 new BTA+ pulmonary TB cases. Compared to 2016, pulmonary TB cases rose by 14.04%.

To achieve recovery, pulmonary TB patients must possess adequate knowledge about their illness (Aditama & Aris, 2013). Furthermore, patients need to have a high level of self-efficacy. Low self-efficacy among patients may lead to treatment failure. Self-efficacy is defined as an individual's belief in their ability to manage certain behaviors in order to achieve recovery. Patients' confidence in recovery is partly derived from cognitive input or knowledge provided by health workers through counseling (Hendiani, Sakti & Widiyanti, 2013). Non-adherence to treatment is a serious concern as it can lead to drug resistance, relapse, and increased morbidity and mortality. Poor adherence also heightens the risk of community transmission and undermines global TB eradication efforts (Volmink et al., 2012).

According to the Mataram City Health Office in 2015, the treatment success rate is defined as the percentage of new smear-positive pulmonary TB patients who completed treatment (whether cured or treatment completed) among all registered new smear-positive pulmonary TB patients. The minimum target rate is 85%. Data indicated that the cure rate in Mataram City had met the minimum target. Among the 11 community health centers (Ampenan, Tanjung Karang, Karang Pule, Mataram, Pagesangan, Cakranegara, Karang Taliwang, Dasan Cermen, Selaparang, Dasan Agung, and Pajeruk) providing treatment for pulmonary TB patients, Tanjung Karang Health Center and Cakranegara Health Center did not reach the  $\geq 85\%$  target, recording success rates of 82.05% and 83.05%, respectively.

Given that pulmonary TB is an infectious disease, predisposing factors (sociodemographic characteristics, knowledge, drug side effects, and comorbidities) as well as reinforcing factors

(family support, the role of Directly Observed Treatment, Short-course [DOTS] supervisors, and the role of TB health workers at community health centers) can significantly influence treatment adherence. Since pulmonary TB is highly contagious, adherence to treatment is crucial for analysis. Moreover, there is currently no data describing the level of medication adherence among pulmonary TB patients at Ampenan Health Center. Therefore, this study was conducted to provide an overview of the treatment adherence levels among pulmonary TB patients, which may serve as input for improving the success rate of TB treatment at Ampenan Health Center.

## LITERATURE REVIEW

Tuberculosis (TB) is an infectious disease that primarily affects the pulmonary parenchyma. The term “tuberculosis” is derived from *tubercle*, referring to the small, firm nodules formed when the immune system builds a barrier around the bacteria in the lungs. Pulmonary TB is chronic in nature and is typically characterized by the formation of granulomas leading to tissue necrosis. Transmission occurs through airborne particles when an individual with active pulmonary TB coughs, sneezes, or speaks.

Tuberculosis is a directly communicable disease caused by the TB bacillus, *Mycobacterium tuberculosis*. Although the majority of TB bacteria attack the lungs, they may also infect other organs. Tuberculosis is a directly transmitted disease caused by *Mycobacterium tuberculosis* (Werdhani, 2011). *Mycobacterium tuberculosis* is highly susceptible to direct ultraviolet exposure, which can kill the bacteria within a few minutes, but it can survive in dark and humid environments. Within body tissues, the bacteria may remain dormant or inactive for several years, a condition referred to as dormancy (Ministry of Health RI, 2014).

Tuberculosis, commonly abbreviated as TB, is a chronic disease caused by infection with the *Mycobacterium tuberculosis* complex, which is transmitted through sputum droplets from TB patients to susceptible individuals (Ginanjar, 2008). The bacterium *Mycobacterium tuberculosis* is a tubercle bacillus, rod-shaped, slender, and acid-fast, often referred to as Acid-Fast Bacilli (AFB). It may appear straight or slightly curved, with a length of approximately 2–4  $\mu\text{m}$  and a width of 0.2–0.5  $\mu\text{m}$ , sometimes forming chains. The size of the bacteria depends on environmental conditions (Ginanjar, 2011).

According to the Ministry of Health (2016), the treatment of pulmonary tuberculosis involves the use of Anti-Tuberculosis Drugs (ATDs) through the Directly Observed Treatment Short-course (DOTS) strategy, which consists of:

- a) Category I (2HRZE/4H3R3) for new TB patients.
- b) Category II (2HRZES/HRZE/5H3R3E3) for retreatment patients (those whose Category I treatment failed or who relapsed).
- c) Category III for new patients with smear-negative AFB (–) but radiologically positive (Ro+).
- d) Supplementary regimen (HRZE) as an addition if, at the end of the intensive treatment phase of Category I or II, smear-positive AFB (+) is still detected.
- e) First-line Anti-Tuberculosis Drug (ATD) guidelines and their respective indications.



According to the Ministry of Health (2016), there are several categories of first-line Anti-Tuberculosis Drugs (ATDs) and their respective indications, including:

(1) Category I (2HRZE/4H3R3)

- (a) New smear-positive pulmonary TB patients.
- (b) Smear-negative pulmonary TB patients with positive chest radiographs.
- (c) Extrapulmonary TB patients.

(2) Initial Phase administered daily for two months (2HRZE):

- a) Isoniazid (H): 300 mg – 1 tablet.
- b) Rifampicin (R): 450 mg – 1 caplet.
- c) Pyrazinamide (Z): 1500 mg – 3 caplets @500 mg.
- d) Ethambutol (E): 750 mg – 3 caplets @250 mg.

These medications are taken daily in an intensive phase for a total of 56 doses. This regimen is known as KOMBIPAK II.

(3) Continuation Phase administered three times per week for four months (4H3R3):

- a) Isoniazid (H): 600 mg – 2 tablets @300 mg.
- b) Rifampicin (R): 450 mg – 1 caplet.

These medications are taken intermittently, three times per week, for a total of 48 doses. This regimen is referred to as KOMBIPAK III.

Adherence is defined as the tendency of patients to follow prescribed medical instructions (Gough, 2011). Medication adherence refers to the extent to which patients follow recommended treatment regimens in terms of timing, dosage, and frequency for the prescribed duration (Peterson, 2012). Adherence is generally lower in chronic diseases, lifestyle-related recommendations, entrenched habits, complex treatment regimens, and therapies with adverse effects. For pulmonary TB patients, adherence means completing treatment consistently and without interruption for six months (Ministry of Health RI, 2011).



Non-adherence does not only imply failure to take medications but may also include spitting out the drugs or taking them at incorrect dosages, leading to Multi-Drug Resistance (MDR). Significant distinctions between adherent and non-adherent patients are not always clearly defined; therefore, many researchers assess adherence by examining both treatment outcomes and the process of treatment itself. Factors contributing to non-adherence may be intentional or unintentional. Unintentional non-adherence occurs when patients forget or face physical challenges in accessing prescribed medications. Intentional non-adherence is often related to patients' beliefs about treatment, weighing perceived benefits against adverse effects (Chambers, 2010).

A study conducted by Lestari and Chairil (2017) found that adherence to anti-tuberculosis drug (ATD) treatment is influenced by several factors:

**Motivation to Recover** – Motivation represents a response toward a specific goal. Pulmonary TB patients aspire to recovery, which motivates them to adhere to medication and complete the treatment program.

**Family Support** – Families play a crucial role in patient recovery, providing emotional support and adequate information. A supportive family environment offers patients a sense of safety and peace for rest and recovery, while also aiding emotional regulation.

**Supervision by Treatment Supporters (PMO)** – A PMO (Pengawas Menelan Obat) is a person who voluntarily assists pulmonary TB patients during treatment. Typically someone close to the patient, preferably living in the same household, the PMO's responsibility is to supervise and ensure patients consistently take their medication until treatment completion, while also encouraging regular clinic visits. PMO supervision is an important determinant of adherence, especially since patients are often prone to forgetting doses during the initial treatment phase. With PMO support, patients are more likely to complete their treatment properly.

**Employment** – Employment status is associated with adherence, encouraging individuals to be more confident and responsible in managing health-related issues, thereby enhancing self-efficacy. Working TB patients tend to adapt their lifestyles more effectively, recognize symptoms, and allocate time to adhere to treatment schedules despite work commitments.

**Educational Level** – Education can enhance adherence, provided it involves active learning. Independent learning through books and other resources can further reinforce patients' compliance during treatment. These efforts, although modest, contribute to improved adherence and treatment success.



## METHOD

The type of research conducted was quantitative research with a design cross *This study employed a cross-sectional design, which is used to investigate an event or phenomenon at a single point in time. Data collection was carried out at Ampenan Community Health Center. Sampling was conducted using purposive sampling techniques. Research Location refers to the place where the study was conducted (Notoatmodjo, 2012). The research was conducted at Ampenan Community Health Center, Mataram City. Research Period refers to the time span during which the study was carried out (Notoatmodjo, 2012). The research was conducted from June to August 2021.*

*Population in this study refers to subjects who meet the criteria established by the researcher (Nursalam, 2017). The study population consisted of pulmonary TB patients who sought treatment at Ampenan Community Health Center between June and August 2021. Sample refers to a portion of the accessible population used as study subjects, selected through random sampling (Nursalam, 2017). The study sample consisted of all TB patients undergoing treatment at Ampenan Community Health Center during the June–August 2021 period.*

*Data Collection Technique: Data were collected using a questionnaire. A questionnaire is a well-prepared and structured list of questions that respondents answer by providing responses or making specific marks (Notoatmodjo, 2012). The type of questionnaire used was a closed-ended questionnaire, in which the researcher provided several possible answers that respondents had to choose from. The researcher first introduced themselves, explained the purpose of the study, and then asked questions to the respondents.*

*Data Analysis: The study used univariate analysis, which involves analyzing each variable individually and presenting the results in the form of tables or graphs to scientifically describe and summarize the data (Setiadi, 2007).*

*Knowledge Assessment: Knowledge was measured using a questionnaire consisting of 20 statements, with responses scored using the Guttman scale: 0 for incorrect answers and 1 for correct answers. The score of each respondent was calculated using the formula:*

$$P = \frac{n}{N} \times 100\%$$

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Where:

P = Percentage



$N$  = Total possible score

$n$  = Score obtained

The results of the 20 statements were summed and interpreted as follows:

High: > 75%

Moderate: 56–75%

Low: < 55% (Arikunto, 2009).

Medication Adherence to anti-tuberculosis treatment was assessed using the TB 01 form. Respondents were considered adherent if they had never missed or stopped taking medication at any point from the time they were diagnosed with TB until the study was conducted. Respondents were considered non-adherent if they had missed medication even once.

Bivariate Analysis: The study employed the Chi-Square test, a statistical technique generally used to test hypotheses for nominal data (Sugiyono, 2007). The decision criteria were as follows: if the p-value was less than the error margin of 5% (0.05), the researcher's hypothesis (H1) was accepted; otherwise, it was rejected.

## RESULT AND DISCUSSION

### RESULT

**Table 1. Distribution of Respondents by Age at Ampenan Health Center**

No.	Age (years)	Frequency (F)	Percentage (%)
1	Adolescents (12–25)	1	10
2	Adults (26–45)	4	40
3	Elderly (46–65)	2	20
4	Seniors (65+)	3	30
<b>Total</b>		<b>10</b>	<b>100</b>

The table shows that out of 10 respondents, 1 person (10%) was an adolescent, 4 respondents (40%) were adults, 2 respondents (20%) were elderly, and 3 respondents (30%) were seniors.



**Table 2. Distribution of Respondents by Educational Level at Ampenan Health Center**

No.	Educational Level	Frequency (F)	Percentage (%)
1	No Formal Education	1	10
2	Elementary School	6	60
3	Junior High School	1	10
4	Senior High School	2	20
5	Higher Education	-	0
<b>Total</b>		<b>10</b>	<b>100</b>

The table indicates that among 10 respondents, 1 (10%) had no formal education, 6 (60%) completed elementary school, 1 (10%) completed junior high school, 2 (20%) completed senior high school, and none had attained higher education (0%).

**Table 3. Distribution of Respondents by Gender at Ampenan Health Center**

No.	Gender	Frequency (F)	Percentage (%)
1	Male	8	80
2	Female	2	20
<b>Total</b>		<b>10</b>	<b>100</b>

The table demonstrates that of the 10 respondents, 8 (80%) were male and 2 (20%) were female.



**Table 4. Distribution of Respondents by Occupation at Ampenan Health Center**

No.	Occupation	Frequency (F)	Percentage (%)
1	Unemployed	-	0
2	Trader	1	10
3	Private Sector	-	0
4	Laborer	2	20
5	Entrepreneur	1	10
6	Others	6	60
<b>Total</b>		<b>10</b>	<b>100</b>

The table indicates that none of the respondents were unemployed (0%), 1 respondent (10%) was a trader, none worked in the private sector (0%), 2 respondents (20%) were laborers, 1 respondent (10%) was an entrepreneur, and 6 respondents (60%) had occupations not specified in the table.

**Table 5. Distribution of Respondents by Marital Status at Ampenan Health Center**

No.	Marital Status	Frequency (F)	Percentage (%)
1	Married	8	80
2	Single	1	10
3	Widower	1	10
4	Widow	-	0
<b>Total</b>		<b>10</b>	<b>100</b>

The table shows that among 10 respondents, 8 (80%) were married, 1 (10%) was single, 1 (10%) was a widower, and none were widows (0%).

## Knowledge and Adherence

### a. Patient Knowledge



The following table presents data on the knowledge of TB patients undergoing treatment at Ampenan Health Center.

**Table 6. Knowledge of TB Patients at Ampenan Health Center**

Variable	Category	Frequency	%
Knowledge	Good	0	0
	Moderate	8	80
	Poor	2	20
<b>Total</b>		<b>10</b>	<b>100</b>

Based on the table, the majority of respondents had moderate knowledge (8 respondents; 80%). A smaller number had poor knowledge (2 respondents; 20%), and none demonstrated high knowledge (0%).

## b. Patient Adherence

The following table describes adherence to TB medication among patients at Ampenan Health Center.

**Table 7. Adherence of TB Patients at Ampenan Health Center**

Variable	Category	Frequency	%
Adherence	Adherent	4	40
	Non-adherent	6	60
<b>Total</b>		<b>10</b>	<b>100</b>

The table shows that of the 10 respondents, 4 (40%) were adherent to medication, while 6 (60%) were non-adherent.

## c. Cross-Tabulation and Chi-Square Test between Patient Knowledge and Adherence

The following table presents cross-tabulation results along with the Chi-Square test between patient knowledge and adherence.

**Table 8. Chi-Square Test Results between Patient Knowledge and Adherence**


	Patient Knowledge			P-value
	Poor	Moderate	Total	
Patient Adherence				
Non-adherent	1	5	6	0.667
Adherent	1	3	4	
<b>Total</b>	<b>2</b>	<b>8</b>	<b>10</b>	

The table shows that 1 respondent with poor knowledge was non-adherent, while another with poor knowledge was adherent. Additionally, 5 patients with moderate knowledge were non-adherent, whereas 3 patients with moderate knowledge were adherent.

The Chi-Square test between patient knowledge and adherence to TB medication yielded a  $p$ -value of 0.667. Since this value exceeds the 0.05 error threshold determined in the study, it indicates that there is no statistically significant association between patients' knowledge of TB and their adherence to treatment.

## DISCUSSION

Based on the study results, it was found that the majority of pulmonary TB patients at Ampenan Health Center were within the age group of 25–45 years, with 4 patients (40%). This finding is consistent with the study by Dian WL et al., which reported that the highest proportion of patients fell into the 26–45-year category, accounting for 78 patients (37.2%). Similarly, research conducted by Suliyati EY in Padang indicated that more than half of TB cases occurred in the productive age group. According to Gendhis ID et al., this occurs because individuals in the productive age group have higher mobility, thereby increasing the likelihood of exposure to *Mycobacterium tuberculosis*. In addition, endogenous reactivation (the reactivation of latent infection within the body) tends to occur more frequently during these years of productivity. In terms of gender distribution, the majority of patients were male, with 8 cases (80%). This aligns with the findings of Dian WL et al. (2015), who reported that the male population constituted the largest proportion of cases, amounting to 108 patients (55.1%). Gendhis ID et al. also suggested that men tend to have higher mobility compared to women, which increases their risk of exposure to *Mycobacterium tuberculosis*. Furthermore, lifestyle factors such as smoking, alcohol consumption, and frequent night activities are more prevalent among men and contribute to weakened immune systems, further heightening the risk of TB infection.



Regarding medication adherence, the study showed that the majority of patients, 6 individuals (60%), were non-adherent to TB treatment. This result highlights that non-adherence may be attributed to insufficient knowledge. According to research conducted by Lestari and Chairil (2017), adherence to anti-tuberculosis drug (OAT) regimens is influenced by several factors, including the motivation to recover, family support, supervision by treatment supporters (PMO), occupation, and educational background.

The level of patient knowledge was supported by educational background (Fitria & Mutia, 2016). In this study, most respondents had completed elementary school as their highest level of education. Consequently, the majority of respondents demonstrated moderate knowledge, which is supported by Notoatmodjo (2014), who posited that an individual's knowledge is influenced by educational attainment. Generally, the higher a person's level of education, the easier it is for them to absorb and understand information. This is corroborated by Himawan et al. (2015), who found that prolonged exposure to education enhances one's knowledge acquisition. In addition to education, health promotion activities conducted at Ampenan Health Center also influenced adherence. Respondents with relatively higher educational backgrounds were more receptive to the health information provided by healthcare workers, thereby supporting better adherence to TB treatment.

Nursalam (2013) further asserted that education is necessary for obtaining information relevant to health, which can improve quality of life. Education significantly shapes behavior and attitudes. However, this is contradicted by Aditama and Aris (2013), who found that educational attainment did not significantly influence knowledge of TB. Instead, they emphasized the crucial role of patients' personal experiences. Additionally, information gained through health education sessions provided by healthcare professionals also played an important role. These findings complement the current study, as the patients' educational background combined with structured health counseling—such as regular educational sessions and home visits—further supported adherence to TB treatment.

The present study also revealed that respondents with moderate knowledge generally demonstrated good adherence to TB treatment and daily medication intake. Theoretical perspectives suggest that the higher one's knowledge, the more likely they are to comply with treatment regimens. However, some discrepancies were observed. For instance, respondent number 09, despite having moderate knowledge, was non-adherent. Interviews revealed that this individual missed a dose of medication due to urgent activities and forgetting to bring the medication.

Interestingly, the study also demonstrated that not all patients with poor knowledge were non-adherent. While limited knowledge generally increases the risk of non-adherence, respondent number 02 exhibited poor knowledge yet remained adherent to treatment. This occurred because the patient received consistent reminders to take their medication. This emphasizes the critical role of the Treatment Supporter (PMO) in ensuring timely medication adherence among TB patients.



The results of the Chi-square test revealed no significant association between patients' knowledge of TB and their adherence to medication regimens. This may be explained by the fact that adherence is primarily influenced by the patients' intrinsic motivation to recover. This finding is consistent with the study conducted by Anugerah (2007), which similarly found no significant relationship between patient knowledge and adherence to TB treatment.

## CONCLUSION

Based on the study conducted at Ampenan Health Center regarding the relationship between knowledge and adherence to anti-tuberculosis (OAT) medication, it can be concluded that the majority of respondents demonstrated a moderate level of knowledge about tuberculosis, with 8 respondents in this category, while 2 respondents had a low level of knowledge, and none exhibited a high level of knowledge.

The Chi-square test analysis revealed a p-value of 0.667, which is greater than the error threshold of 0.05. This indicates that there is no significant association between patients' knowledge of tuberculosis and their adherence to anti-tuberculosis medication.

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