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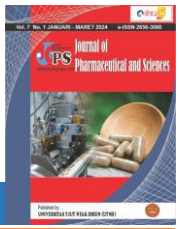

Determinants of Compliance in Taking Tuberculosis Medication at Garoga Health Center, Garoga District, North Tapanuli Regency in 2023

Determinan Kepatuhan Minum Obat Tuberkulosis Di UPT Puskesmas Garoga Kecamatan Garoga Kabupaten Tapanuli Utara Tahun 2023

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Abstract

Tuberculosis (TB) is a highly infectious disease caused by *Mycobacterium tuberculosis*, primarily affecting the lungs and transmitted through airborne droplets. As a global health concern, TB requires long-term treatment adherence to ensure successful outcomes. This study aimed to identify determinants of medication compliance among TB patients at the UPT Garoga Community Health Center, North Tapanuli Regency, in 2023. Using a cross-sectional design, data were collected from 42 patients through interviews and medical records. Variables analyzed included age, gender, education, occupation, knowledge, the role of health workers, and medication supervisors (PMO). Univariate, bivariate, and multivariate analyses were conducted to assess relationships between these factors and medication compliance. Results indicated significant associations between compliance and age (p = 0.001), gender (p = 0.006), education (p = 0.001), knowledge (p = 0.002), the role of health workers (p = 0.001), and PMO support (p = 0.002). However, no significant relationship was found between occupation and compliance (p = 0.036). These findings highlight the importance of patient education, health worker involvement, and family support in improving TB treatment adherence. The study underscores the need for targeted interventions to address these determinants and enhance treatment outcomes in TB patients.

***Keywords*: Determinants, Compliance, Taking TB Medicine, Garoga Health Center UPT**

Abstrak

Tuberkulosis (TB) adalah penyakit menular yang disebabkan oleh *Mycobacterium tuberculosis*, terutama menyerang paru-paru dan ditularkan melalui percikan udara. Sebagai masalah kesehatan global, TB membutuhkan kepatuhan pengobatan jangka panjang untuk memastikan keberhasilan pengobatan. Penelitian ini bertujuan untuk mengidentifikasi determinan kepatuhan minum obat pada pasien TB di UPT Puskesmas Garoga, Kabupaten Tapanuli Utara, pada tahun 2023. Dengan menggunakan desain cross-sectional, data dikumpulkan dari 42 pasien melalui wawancara dan rekam medis. Variabel yang dianalisis meliputi usia, jenis kelamin, pendidikan, pekerjaan, pengetahuan, peran petugas kesehatan, dan pengawas minum obat (PMO). Analisis univariat, bivariat, dan multivariat dilakukan untuk menilai hubungan antara faktor-faktor tersebut dengan kepatuhan minum obat. Hasil penelitian menunjukkan adanya hubungan signifikan antara kepatuhan dengan usia (p = 0,001), jenis kelamin (p = 0,006), pendidikan (p = 0,001), pengetahuan (p = 0,002), peran petugas kesehatan (p = 0,001), dan dukungan PMO (p = 0,002). Namun, tidak ditemukan hubungan signifikan antara pekerjaan dan kepatuhan (p = 0,036). Temuan ini menekankan pentingnya edukasi pasien, keterlibatan petugas kesehatan, dan dukungan keluarga dalam meningkatkan kepatuhan pengobatan TB. Penelitian ini menyoroti perlunya intervensi yang tepat sasaran untuk mengatasi determinan tersebut dan meningkatkan hasil pengobatan pada pasien TB.

***Kata Kunci*: Determinan, Kepatuhan, Minum Obat TB, UPT Puskesmas Garoga**

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Introduction

TB disease has been known for more than a century, namely since the discovery of the germ that causes tuberculosis by Robert Kooh in 1882. However, until now TB disease remains a health problem at the world level and in Indonesia. Tuberculosis is a disease of global concern. In accordance with the 2030 sustainable development goals, WHO targets to reduce deaths from tuberculosis by 90% and reduce the incidence of TB case detection by 80% in 2030 compared to 2014 [1].

The World Health Organization (WHO) has released a report on global tuberculosis (TB) in 2021, including a report on the state of TB in Indonesia in the Global Tuberculosis Report 2022 document. The progress that has been made in previous years has continued to slow down and even stopped since 2019. The target for achieving TB-free globally is currently completely "off track" from what has been planned [2].

TB remains one of the world's deadliest infectious diseases. Every day, more than 4,100 people lose their lives to TB and nearly 28,000 people fall ill with this preventable and curable disease. Global efforts to combat TB have saved an estimated 66 million lives since 2000. However, the COVID-19 pandemic has reversed years of progress made in the fight to end TB. For the first time in more than a decade, TB deaths increased in 2020 [2].

Indonesia is in second place with the largest number of TB sufferers in the world after India, followed by China, the Philippines, Pakistan, Nigeria, Bangladesh and the Democratic Republic of Congo in sequence. In 2020, Indonesia was in third place with the largest number of cases, so 2021 is clearly not better. TB cases in Indonesia are estimated at 969,000 TB cases (one person every 33 seconds). This figure is up 17% from 2020, which was 824,000 cases. The incidence of TB cases in Indonesia is 354 per 100,000 population, which means that for every 100,000 people in Indonesia, there are 354 people suffering from TB [2].

TB Case Findings in Indonesia Of the total 969,000 estimated TB cases in Indonesia, only 443,235 (45.7%) cases were found, while 525,765 (54.3%) other cases had not been found and reported. In 2020, the number of cases that had not been found was 430,667 cases. This means that there has been a significant increase in the number of cases that have not been found. Meanwhile, the achievement of case discovery increased from 2020 which was 393,323 cases [3].

Tuberculosis is a direct infectious disease caused by the Mycobacterium Tuberculosis germ, most tuberculosis germs attack the lungs, but also affect other organs [4]. Tuberculosis is a health problem with a very high incidence and is a world health problem today.

According to research Rumimpunu et al. (2018) research findings show that pulmonary tuberculosis patients who receive the majority of support from their families are compliant with treatment, as are those who receive encouragement from health workers in the good category. Meanwhile Muna et al. 2014 there are several variables of knowledge level, family support and drug supervisors that affect non-compliance with treatment in TB patients. Controlling TB is difficult due to ignorance. To overcome the problem of TB, patients must know how to treat their disease. The increase in TB cases will be affected if TB patients lack knowledge about their disease. TB cases require long-term treatment, but if ordinary TB is not treated seriously, it will cause an increase in MDR-TB cases which will indirectly impact the economy due to high costs and longer treatment times.

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The number of TB cases in Indonesia found and reported to the TB Information System (SITB) in 2022 was 717,941 cases with a TB detection coverage of 74% (target: 85%). The treatment success rate was 86%. Although still below the global target (90%) set by WHO, the TB treatment success rate in Indonesia has always increased every year. This is a hope that Indonesia will be able to end TB. This figure has increased compared to the previous year, which was 397,377 cases in 2021. "Indonesia is ranked 3rd with the highest TB sufferers in the world after India and China," according to the Ministry of Health in the 2021 Indonesian Health Profile report released in July 2022 [7] .

In 2022, the number of Tuberculosis cases found was 34,714 cases, an increase compared to the number of tuberculosis cases found in 2021, which was 19,147 cases. According to gender, the number of Tuberculosis cases in men was known to be 22,455 cases or 64.69 percent, higher than the number of Tuberculosis cases in women, which was 12,259 cases or 35.31 percent. In each Regency/City throughout North Sumatra, cases occurred more in men than women. The number of tuberculosis cases by Regency/City in 2022, where the highest cases were reported in Medan City, which was 10,050 cases, Deli Serdang Regency, which was 4,170 cases and Langkat Regency, which was 1,927 cases. The lowest cases were reported in Pakpak Bharat Regency with 117 cases, West Nias Regency with 119 cases and North Nias Regency with 163 cases [8].

From the 2022 North Sumatra Provincial Health Office Profile data, it shows that North Tapanuli Regency is ranked 16th for the number of pulmonary TB cases with 646 cases with a treatment success rate of only 52.48%, with the number of TB patient deaths during treatment as many as 22 people [8].

From the results of the initial survey conducted at the Garoga Health Center, it was shown that the number of patients with pulmonary TB was 42 people and they were routinely taking DOTs drugs, with details of 28 men and 14 women. The most pulmonary TB sufferers were found at the age of 18-52 years, as many as 34 people, over 52 years old there were 10 people, this data was obtained from medical records.

Experimental Section

Type of Research

The research design used in this study is Cross Sectional, which is a study where researchers only conduct observations and measurements of variables at a certain time. Each subject is only known once for measurement without any follow-up or repeated measurements [9].

Location and Time of Research

The research will be conducted at the Garoga Health Center UPT, Garoga District, North Tapanuli Regency in 2023. The research will be conducted from November 2023 to February 2024.

Sample

In this study, the population was 42 people, so the sample was taken from the entire population, namely 42 people, using a total sampling technique. If the respondent is not willing to participate in this study, they will be given a respondent consent sheet (informed consent) and are considered not to represent this study.

Data Collection

Data were obtained based on the results of interviews with pulmonary TB patients regarding the determinants of compliance in consuming drugs at the Garoga Health Center UPT, Garoga District, North Tapanuli Regency as primary data. While the medical record data of pulmonary TB patients is secondary data.

Validity and Reliability Test

The instrument used in this study was an instrument that had been tested by Jaya (2021), namely the Crombach's alpha value, it was known that the Cronbach's alpha value for 18 knowledge questions was obtained at 0.922 and family support with 19 questions was obtained at 0.857, which was greater than the calculated r value of 0.361 so that it was declared reliable.

Data Analysis

a. Univariate: Analysis of all variables to describe each variable studied such as: Age, education, occupation, gender, knowledge.

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b. Bivariate: Conducted to determine the influence between two variables, namely the independent variable (Age, Gender, Occupation, Knowledge, Education, Role of Health Workers and Drug Supervisors) with the dependent variable (compliance in taking TB drugs) using the Chi Square test
c. Multivariate: used to determine the independent variable that most influences the dependent variable

Results and Discussion

Overview of Research Location

The working area of Garoga Health Center includes Sibaganding Village, Padang Siandomang Village, Parinsoran Village, Aek Tangga Village, Simpang Bolon Village, Garoga Sibargot Village, Gonting Garoga Village, Parsosoran Village, Parmanuhan Village, Sibalanga Village, Gonting Salak Village, Lontung Jae I Village and Lontung Jae II Village with a population of 18,679 people (4,041 families). The working area of Garoga Health Center is 567.58 km2, consisting of highlands in the north, lowlands in the south with a composition of almost balanced land area. Land use as plantations, buildings/houses, rice fields and others. The working area of Garoga Health Center covers 13 villages in Garoga District which is also one of the districts in North Tapanuli Regency which directly borders South Tapanuli Regency, Tobasa Regency and North Labuhan Batu Regency. Garoga Health Center has 42 patients with pulmonary TB and they are routinely taking DOTs medication, with details of 28 men and 14 women. The most pulmonary TB patients found were aged 18-52 years, 34 people, and 10 people over 52 years old.

Univariate Analysis

1. Age

Table 1. Frequency Distribution of Respondents Based on Age at UPT Puskesmas Garoga in 2023

No	Age	f	%
1	< 15 years old	12	28.60
2	15-55 years old	20	47.60
3	>56 Years old	10	23.80
	Total	42	100

Based on table 1, it shows that of the 42 respondents, the majority of respondents were aged 15-55 years as much as 47.60% and aged >56 years as much as 23.80%.

2. Gender

Table 2. Frequency Distribution of Respondents Based on Gender at the Garoga Health Center UPT in 2023

Respondents Gender	Amount	
	N	%
Male	14	33.30
Female	28	66.70
Total	42	100

Based on table 2, it shows that the majority of respondents with pulmonary TB were women 66.70% and men 33.30%.

3. Education

Table 3. Frequency Distribution of Respondents Based on Education Level at the Garoga Health Center UPT in 2023

Respondents' Education Level	Amount	
	N	%
High (College)	14	33.30
Low (Kindergarten to High School)	28	66.73
Total	120	100

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Based on table 3, it shows that the majority of respondents' education is low education at 66.70% and higher education is 33.30%.

4. Job

Table 4. Frequency Distribution of Respondents Based on job at the Garoga Health Center UPT in 2023

Respondents' Job	Amount	
	N	%
Working	11	26.20
Not Working	31	73.80
Total	**42**	**100**

Based on table 4, it shows that the majority of respondents who are not working are 73.80% and respondents who are working are 26.20%.

5. Knowledge

Table 5. Frequency Distribution of Respondents Based on Knowledge at the Garoga Health Center UPT in 2023

Respondents Knowledge	Amount	
	N	%
Good	30	71.40
Less good	12	28.60
Total	**42**	**100**

Based on table 5, it shows that the majority of respondents with Pulmonary TB have good knowledge 71.40% and respondents are less good 28.60%.

6. Role of Health Workers

Table 6. Frequency Distribution of Respondents Based on the Role of Health Workers at the Garoga Health Center UPT in 2023

Role of Health Workers	Amount	
	N	%
Yes	29	69.00
No	13	31.00
Total	**42**	**100**

Based on table 6, it shows that the majority of respondents with Pulmonary TB have the role of health workers, 69.00% and none, 31.00%.

7. Medication Supervisor (PMO)

Based on table 7, it shows that the majority of respondents with Pulmonary TB have good support from PMO of 71.40% and respondents who do not receive support are 28.60%.

Table 7. Frequency Distribution of Respondents Based on Support from Medication Supervisors at the Garoga Health Center UPT in 2023

Medication Supervisor	Amount	
	N	%
Supports	30	71.40
Not Supports	12	28.60
Total	42	100

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8. Compliance

Table 8. Frequency Distribution of Respondents Based on Compliance at the Garoga Health Center UPT in 2023

Compliance	Amount	
	N	%
Compliant	30	71.40
Not Compliant	12	28.60
Total	42	100

Based on table 8, it shows that the majority of respondents who are compliant are 71.40% and those who are not compliant are 28.60%.

9. Therapy Success

Table 9. Frequency Distribution of Respondents Based on Therapy Success at the Garoga Health Center UPT in 2023

Therapy success	Amount	
	N	%
Recovered	30	71.40
Not Recovered	12	28.60
Total	42	100

Based on table 9, it shows that the respondents with pulmonary TB who successfully underwent treatment therapy recovered, the majority were 71.40%, while those who did not recover were 28.60%.

Bivariate Analysis

1. Relationship between Age and Compliance with Taking Pulmonary TB Medication

Table 10. Relationship between Age Distribution and Compliance with Taking Medication at the Garoga Health Center UPT in 2023

Ages	Medication Compliance				Amount		P-value
	Yes		No				
	N	%	N	%	N	%	
<15	9	21.40	3	7.10	12	28.60	0,001
15-55	13	31.00	7	16.70	20	47.60	
>56	8	19.00	2	4.80	10	23.80	

From the results of the study in table 10, the majority of respondents aged 15-55 showed compliant medication adherence of 31.00% and the majority of respondents aged <15 with non-compliant medication adherence of 21.40%. Based on the results of the analysis, the proportion coefficient (p) of 0.001 was obtained, which is smaller than the error rate used at the $\alpha = 0.05$ level, so it can be concluded that there is a relationship between age and medication adherence in pulmonary TB patients.

2. Relationship between Gender and Compliance with Taking Pulmonary TB Medication

Table 11. Relationship between Gender Distribution and Medication Adherence at the Garoga Health Center UPT in 2023

Gender	Medication Compliance				Amount		P-value
	Yes		No				
	N	%	N	%	N	%	
Male	6	14.30	8	19.00	14	33.30	0,006
Female	24	57.10	4	9.50	28	66.70	

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From the results of the study in table 11, the majority of respondents who were female showed compliance with taking medication as much as 66.70% and the majority of male respondents who were not compliant with taking medication were 19.00%. Based on the results of the analysis, the proportion coefficient (p) of 0.006 was obtained, which was smaller than the error rate used at the $\alpha = 0.05$ level, so it can be concluded that there is a relationship between gender and compliance with taking medication in pulmonary TB patients.

3. Relationship between Education and Compliance with Taking Pulmonary TB Medication

Table 12. Relationship between Education Distribution and Compliance with Taking Medication at the Garoga Health Center UPT in 2023

Education	Medication Compliance				Amount		P-value
	Yes		No				
	N	%	N	%	N	%	
High	25	59.50	3	7.10	28	66.70	0,001
Low	5	11.90	9	21.40	14	33.30	

From the results of the study in table 12, the majority of respondents who had higher education showed compliance with taking medication as much as 66.70% and the majority of respondents with low education who were not compliant with taking medication were 21.40%. Based on the results of the analysis, the proportion coefficient (p) of 0.001 was obtained, which was smaller than the error rate used at the $\alpha = 0.05$ level, so it can be concluded that there is a relationship between education and compliance with taking medication in pulmonary TB patients.

4. Relationship between Jobs and Compliance with Taking Pulmonary TB Medication

Table 13. Relationship between Jobs Distribution and Compliance with Taking Medication at the Garoga Health Center UPT in 2023

Jobs	Medication Compliance				Amount		P-value
	Yes		No				
	N	%	N	%	N	%	
Not working	25	59.50	6	14.30	31	73.80	0,036
Working	5	11.90	6	14.30	11	26.20	

From the results of the study in table 13, the majority of respondents who did not work showed a level of compliance with taking medication of 59.50% and respondents who worked and did not work who did not comply with taking medication both had a value of 14.30%. Based on the results of the analysis, the proportion coefficient (p) of 0.036 was obtained, which was greater than the error rate used at the $\alpha = 0.05$ level, so it can be concluded that there is no relationship between work and compliance with taking medication in pulmonary TB patients.

5. Relationship between Knowledge and Compliance with Taking Pulmonary TB Medication

Table 14. Relationship between Knowledge Distribution and Compliance with Taking Medication at the Garoga Health Center UPT in 2023

Knowledge	Medication Compliance				Amount		P-value
	Yes		No				
	N	%	N	%	N	%	
Good	25	59.50	5	11.90	30	71.40	0,002
Less	5	11.90	7	14.30	12	28.60	

From the results of the study in table 14, the majority of respondents who had good knowledge showed a level of compliance with taking medication of 59.50% and respondents with poor knowledge were mostly non-compliant at 14.30%. Based on the results of the analysis, the proportion coefficient (p) of 0.002 was

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obtained, which was greater than the error rate used at the $\alpha = 0.05$ level, so it can be concluded that there is a relationship between knowledge and compliance with taking medication in pulmonary TB patients.

6. Relationship between the Role of Health Workers and Compliance with Taking Pulmonary TB Medication

Table 15. Relationship between the distribution of the Role of Health Workers and Compliance with Taking Medication at the Garoga Health Center UPT in 2023

Role of Health Workers	Medication Compliance				Amount		P-value
	Yes		No				
	N	%	N	%	N	%	
Yes	24	57.10	5	11.90	29	69.00	0,001
No	6	14.30	7	16.70	13	31.00	

From the results of the study in table 15, the majority of respondents who have the role of health workers showed a level of compliance with taking medication of 57.10% and respondents who do not have the role of health workers and are not compliant were 16.70%. Based on the results of the analysis, the proportion coefficient (p) of 0.001 was obtained, which is greater than the error rate used at the $\alpha = 0.05$ level, so it can be concluded that there is a relationship between the role of health workers and compliance with taking medication in pulmonary TB patients.

7. Relationship between Medication Supervisors and Compliance with Taking Pulmonary TB Medication

Table 16. Relationship between the distribution of Medication Supervisors and Compliance with Taking Medication at the Garoga Health Center UPT in 2023

Medication Supervisors	Medication Compliance				Amount		P-value
	Yes		No				
	N	%	N	%	N	%	
Supports	25	59.50	5	11.90	30	71.40	0,002
Not Supports	5	11.90	7	16.70	12	28.60	

From the results of the study in table 16, the majority of respondents who have the role of Medication Supervisor showed a level of medication compliance of 59.50% and respondents who do not have the role of Medication Supervisor and are not compliant were 16.70%. Based on the results of the analysis, the proportion coefficient (p) of 0.002 was obtained, which is greater than the error rate used at the $\alpha = 0.05$ level, so it can be concluded that there is a relationship between Medication Supervisor and medication compliance in pulmonary TB patients.

Multivariate Analysis

In this study, multivariate analysis is an analysis to determine the relationship between independent variables, namely: Age, Gender, education, occupation, knowledge, the role of health workers and drug supervisors and to determine the most dominant independent variables. Based on the Chi-Square test, 3 (three) variables are known, namely Level of knowledge, success of therapy at the Garoga Health Center UPT in 2023. These variables can be included in the multivariate analysis because the value of the p value is <0.25. Furthermore, a multivariate analysis was carried out with a multiple logistic regression test in stages. The results of the multiple logistic regression analysis can be seen in table 17.

Table 17. Results of the Bivariate Test Included in the Multiple Logistic Regression Analysis

Variable	B	*p.value*	Exp(B)
Education	2.819	0.002	2.789
Role of Health Workers	1.233	0.000	1.000
Medication Supervisors	1.044	0.000	1.143
Constant	-7.353	.000	,000

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Based on table 17, the results of the multiple logistic regression test analysis above show that the variables of knowledge level and success of therapy are significantly related to preventing drug use compliance at the Garoga Health Center UPT in 2023.

Relationship between Age and Compliance in Taking Pulmonary TB Medication

The relationship between age and medication adherence in pulmonary tuberculosis (TB) patients is a critical factor influencing treatment outcomes. In this study, respondents aged 15-55 demonstrated a higher rate of medication adherence (31.00%), while younger patients under 15 showed lower adherence rates (21.40%). Statistical analysis revealed a significant relationship between age and adherence, with a p-value of 0.001, which is below the $\alpha = 0.05$ threshold. This finding aligns with previous research, such as Debora's 2020 study, which highlighted that the highest proportion of TB patients were in the age groups of 15-24 and 45-54 years, suggesting that productive age groups are more likely to adhere to treatment regimens.

However, unproductive age groups, particularly those over 50, often face challenges in adhering to TB treatment. These challenges include comorbidities, increased side effects of medications, and a higher likelihood of drug resistance due to interrupted treatment. Age-related physiological changes, such as reduced drug absorption and slower metabolism, further complicate adherence in both the elderly and very young patients [10]. For instance, infants have underdeveloped organ systems, making them more susceptible to prolonged drug effects, while elderly patients may experience reduced physiological resilience and slower drug clearance [11–13]. These factors underscore the importance of tailoring treatment approaches to address age-specific challenges.

The productive age group (15-55 years) tends to exhibit better adherence dsue to greater awareness of the importance of treatment, access to information, and active engagement in their healthcare. This group is more likely to understand the necessity of completing the full course of TB medication, which typically lasts 6-9 months, to avoid relapse or drug resistance [14]. Additionally, younger patients in this age range are often more receptive to educational interventions and technological tools, such as mobile health applications, which can enhance adherence through reminders and monitoring features [15,16].

Educational interventions and community support play a vital role in improving adherence across all age groups. Studies have shown that patients with a clear understanding of TB and its treatment are more likely to adhere to their medication regimens [17]. Furthermore, family and community support can significantly influence adherence, particularly for elderly and pediatric patients who may rely on caregivers for medication management [18].

Age is a significant determinant of medication adherence in TB patients, with productive age groups showing higher compliance rates compared to younger or elderly patients. To improve treatment outcomes, it is essential to address age-specific barriers, such as physiological changes, comorbidities, and access to information. Future interventions should prioritize tailored educational programs, community support, and the utilization of technology to enhance adherence across all age groups.

Relationship between Gender and Compliance in Taking Pulmonary TB Medication

From the results of the study in table 11, the majority of respondents who were female showed compliance in taking medication as much as 66.70% and the majority of male respondents who were not compliant in taking medication were 19.00%. Based on the results of the analysis, the proportion coefficient (p) of 0.006 was obtained, which was smaller than the error rate used at the $\alpha = 0.05$ level, so it can be concluded that there is a relationship between gender and compliance in taking medication in pulmonary TB patients.

Gender is a term that refers to a person's biological status. Consists of physical appearance that distinguishes between women and men [19]. According to Siahaan et al. (2019) said that exposure to TB infection in a person is influenced by several factors, including: social status, economy, nutritional status, age, gender, and other social factors. The gender of pulmonary TB patients tends to be higher in men than women [21].

According to the researcher's assumption that men have a higher percentage of failure in treatment compared to women, this is because men smoke more than women, this is supported by the statement of Okanurak et al. who said that this may be because women pay more attention to health than men. The difference in the frequency of pulmonary TB disease between men and women is the difference in lifestyle habits. The possible differences in lifestyle habits are smoking and drinking alcohol. Where men smoke and

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drink more alcohol than women, because the habit of smoking and drinking alcohol can reduce the body's immunity so that it is more susceptible to pulmonary TB disease.

Relationship between Education and Compliance in Taking Pulmonary TB Medication

From the results of the study in table 12, the majority of respondents who had higher education showed compliance in taking medication as much as 66.70% and the majority of respondents with low education who were not compliant in taking medication were 21.40%. Based on the results of the analysis, the proportion coefficient (p) of 0.001 was obtained, which was smaller than the error rate used at the $\alpha = 0.05$ level, so it can be concluded that there is a relationship between education and compliance in taking medication in pulmonary TB patients. Education is a factor that makes it easy for someone to receive knowledge and change their mindset, but not everyone who is highly educated understands knowledge from various fields, so education is not someone who does good behavior or actions if it is not based on knowledge [22].

According to the researcher's assumption, the majority of respondents consider that pulmonary TB is a dangerous and frightening disease, so that both respondents who go to school up to elementary school and those who are educated up to high school or college, they feel encouraged to check themselves at a health service facility and undergo treatment for 6-8 months. Therefore, basically a person's level of education does not directly affect the success of pulmonary TB treatment. This shows that there is no relationship between the level of education and compliance in taking medication in pulmonary tuberculosis patients. This condition can occur because the tuberculosis treatment pattern does have its own rules about the type of drug that is more than one and the duration of treatment is at least 6 months. This rule makes patients feel bored or burdened and in the middle of treatment they feel cured so they stop taking medication in the middle of time (drop out). This condition is very worrying because it can trigger the emergence of resistant germs that threaten global health

Relationship between Work and Compliance in Taking Pulmonary TB Medication

From the results of the study in table 13, the majority of respondents who did not work showed a level of compliance with taking medication of 59.50% and respondents who worked and did not work who did not comply with taking medication both had a value of 14.30%. Based on the results of the analysis, the proportion coefficient (p) of 0.036 was obtained, which was greater than the error rate used at the $\alpha = 0.05$ level, so it can be concluded that there is no relationship between work and compliance with taking medication in pulmonary TB patients. This study is supported by Deddy's research in 2022 entitled The Relationship between Work and the Role of Drug Supervisors in Swallowing Medicines on the Success of Tuberculosis Treatment in Kupang City. The results of the Chi Square test obtained a p value: 0.000 ($p \leq 0.05$). The conclusion of this study is that there is a relationship between work and the role of PMO on the success of treatment of pulmonary TB patients in Kupang City [23].

In relation to the success of TB treatment, there are several factors that can affect the success of TB treatment such as workers, economic status, role of PMO, level of knowledge, presence of multidrug resistance (MDR TB), treatment compliance, role of cadres, role of health facilities, distance and family support. In this study, researchers obtained data that work affects the success of TB treatment in patients. This is because patients who work sometimes forget about the drugs they take, so this is the trigger for patients not to recover and further treatment is carried out for sufferers [11].

According to the researcher's assumption that work is a factor that affects the success of patients in TB therapy, this is because if patients work outside the home, they will be busy so that sometimes they forget to take medicine or come for check-ups at health services so that busy activities outside the home make patients fail in TB therapy.

Relationship of Knowledge with Compliance in Taking Pulmonary TB Medication

Berdasarkan hasil penelitian yang disajikan pada Tabel 14, terlihat bahwa sebagian besar responden dengan tingkat pengetahuan yang baik menunjukkan tingkat kepatuhan dalam mengonsumsi obat sebesar 59,50%. Sebaliknya, responden dengan tingkat pengetahuan yang kurang cenderung tidak patuh, dengan persentase sebesar 14,30%. Hasil analisis statistik menunjukkan koefisien proporsi (p) sebesar 0,002, yang lebih kecil dari tingkat kesalahan (α) yang ditetapkan sebesar 0,05, mengindikasikan adanya hubungan yang signifikan antara tingkat pengetahuan dengan kepatuhan dalam mengonsumsi obat pada pasien tuberkulosis paru (TBC). Menurut Dwiningrum et al. (2021), pengetahuan merupakan faktor kunci yang memengaruhi

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seseorang dalam mengambil tindakan, termasuk dalam hal kesehatan [24]. Pengetahuan yang baik tentang suatu penyakit mendorong individu untuk memahami pentingnya menjaga kesehatan dan menerapkan tindakan yang diperlukan, seperti kepatuhan dalam pengobatan [25].

Temuan ini sejalan dengan penelitian Syafakamila & Purbowati (2022), yang menyatakan bahwa pasien dengan pengetahuan yang baik cenderung lebih patuh dalam menjalani pengobatan TBC paru dibandingkan dengan pasien yang memiliki pengetahuan kurang [26].

Peneliti berasumsi bahwa pasien dengan pengetahuan yang baik lebih memahami bahwa TBC paru dapat disembuhkan melalui pengobatan yang teratur dan disiplin, meskipun membutuhkan waktu yang lama. Mereka juga menyadari risiko yang mungkin timbul jika tidak patuh, seperti berkembangnya resistensi kuman terhadap obat, yang dapat mengakibatkan pengobatan harus diulang dari awal dan memakan waktu lebih lama. Dengan demikian, pengetahuan yang tinggi mendorong kepatuhan yang baik dalam pengobatan. Di sisi lain, pasien dengan pengetahuan yang kurang cenderung menganggap TBC paru sebagai penyakit yang dapat sembuh meskipun mereka tidak disiplin dalam mengonsumsi obat. Misalnya, mereka mungkin mengabaikan dosis obat hanya karena lupa, tanpa menyadari dampak serius yang dapat ditimbulkan. Hal ini menunjukkan bahwa kurangnya pengetahuan dapat menjadi penghambat dalam mencapai kepatuhan pengobatan yang optimal.

Temuan ini menggarisbawahi pentingnya peran pihak terkait, seperti tenaga kesehatan dan pemerintah, dalam memberikan penyuluhan kepada masyarakat tentang bahaya TBC paru dan pentingnya kepatuhan dalam pengobatan. Penyuluhan yang efektif harus menggunakan media, metode, dan sasaran yang tepat agar dapat meningkatkan pengetahuan pasien secara signifikan. Dengan meningkatnya pengetahuan, diharapkan tingkat kepatuhan dalam pengobatan juga akan meningkat. Selain itu, dukungan dari keluarga dan lingkungan sosial juga memegang peranan penting. Keluarga dapat memberikan dukungan emosional dan informasi yang diperlukan untuk memotivasi pasien dalam menjalani pengobatan. Penelitian oleh Diesty et al. (2020) menunjukkan bahwa dukungan sosial, termasuk dari keluarga dan kelompok sebaya, dapat memperkuat komitmen pasien terhadap pengobatan TBC [27].

Berdasarkan hasil penelitian, dapat disimpulkan bahwa terdapat hubungan yang signifikan antara pengetahuan dan tingkat kepatuhan dalam pengobatan TBC paru. Pasien dengan pengetahuan yang baik cenderung lebih patuh dalam mengonsumsi obat, sementara pasien dengan pengetahuan yang kurang memiliki risiko lebih tinggi untuk tidak patuh. Oleh karena itu, upaya peningkatan pengetahuan melalui edukasi dan penyuluhan, serta dukungan dari keluarga dan lingkungan, merupakan langkah penting dalam meningkatkan kepatuhan pengobatan TBC paru. Pendekatan yang holistik dan inklusif diperlukan untuk memastikan keberhasilan terapi dan mencegah resistensi obat.

Relationship between the Role of Health Workers and Compliance in Taking Pulmonary TB Medication

From the results of the study in table 15, the majority of respondents who have the role of health workers showed a level of compliance in taking medication of 57.10% and respondents who do not have the role of health workers and are not compliant were 16.70%. Based on the results of the analysis, the proportion coefficient (p) of 0.001 was obtained, which is greater than the error rate used at the $\alpha = 0.05$ level, so it can be concluded that there is a relationship between the role of health workers and compliance in taking medication in pulmonary TB patients. According to research conducted by Rismayanti et al. (2021), it shows that there is a relationship between family support and patient success in treating pulmonary TB. Family support greatly supports the success of treatment for pulmonary TB patients by always reminding sufferers to take their medication, having a deep understanding of sufferers who are sick and encouraging them to continue taking their medication diligently.

Family support is needed to encourage pulmonary TB patients by showing concern and sympathy, and caring for patients. Family support that involves emotional concern, assistance and affirmation will make patients feel comfortable. Family support can empower TB patients during treatment by providing continuous support, such as reminding patients to take their medication and being sensitive if they experience side effects from the medication. According to Dhewi et al. (2018), family support is related to the success of TB patient treatment. PMO should be a family member, namely a child or partner, for reasons of being more trustworthy. In addition, the closeness of emotional relationships greatly influences PMO in addition to being a supervisor of taking medication. The success of patients in TB treatment can be measured from a complete treatment history and being declared cured. Complete treatment is a TB patient who completes their treatment

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completely, but does not meet the requirements for recovery or failure. Meanwhile, recovery is a TB patient who completes their treatment completely with a sputum re-examination at the end of treatment and a previous sputum re-examination that is negative. Therefore, if the patient is declared cured and complete, the patient is included in the Treatment Success Rate (TSR) recording [28].

According to the researcher's assumption that family support is support for patients so that patients who experience health problems, especially during the treatment stage, will be supported by their families so that the support provided will make family members more enthusiastic. In addition, with family support, there will be someone to remind them of the schedule for taking medication and the schedule for visits so that this affects the success of TB patient treatment therapy.

Relationship between Medication Supervisor and Compliance in Taking Pulmonary TB Medication

From the results of the study in table 16, the majority of respondents who have the role of Medication Supervisor showed a level of medication compliance of 59.50% and respondents who do not have the role of Medication Supervisor and are not compliant were 16.70%. Based on the results of the analysis, the proportion coefficient (p) of 0.002 was obtained, which is greater than the error rate used at the $\alpha = 0.05$ level, so it can be concluded that there is a relationship between Medication Supervisor and medication compliance in pulmonary TB patients.

In relation to the success of TB treatment, there are several factors that can affect the success of TB treatment such as workers, economic status, role of PMO, level of knowledge, presence of multidrug resistance (MDR TB), medication compliance, role of cadres, role of health facilities, distance and family support. In this study, researchers obtained data that work affects the success of TB treatment. This is because patients who work sometimes forget about the drugs they take, so this is the trigger for patients not to recover and further treatment is carried out for sufferers[11].

According to the researcher's assumption, the role of the medication supervisor is a factor that influences the success of patients in TB therapy. This is because if the patient is always monitored by the PMO, the success rate of pulmonary TB treatment will be achieved.

Conclusions

Based on the research conducted at Garoga Health Center, Garoga District, North Tapanuli Regency in 2023, several determinants related to tuberculosis patients' compliance in taking medication were identified. The study found a significant relationship between age and medication adherence, with a P-value of 0.001. In addition, gender was also found to be related to compliance, with a P-value of 0.006. Education emerged as an important factor influencing patient compliance, with a P-value of 0.001, indicating a strong relationship. However, employment did not show a significant relationship with patient compliance, with a P-value of 0.036, which is higher than the significance level used ($\alpha = 0.05$). Patients' knowledge about the disease and its treatment was also associated with their level of compliance, with a P-value of 0.002. Furthermore, the role of health workers and support from the Medication Supervisor (PMO) were found to have a positive impact on patient compliance, with P-values of 0.001 and 0.002, respectively. Overall, the findings of this study provide valuable insights for efforts to improve tuberculosis medication adherence in the Garoga Health Center area, taking into account the factors that influence compliance.

Conflict of Interest

The author affirms the research was conducted independently, free from external influence or conflicts of interest, ensuring integrity, objectivity, and credibility. This commitment to transparency upholds academic rigor and reinforces the reliability of the findings.

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Supplementary Materials

References

[1] Ri K. Data Dan Informasi Profil Kesehatan Indonesia 2017. KemenKes RI 2018; 2018.
[2] WHO. Global Tuberculosis Report 2022. Https://WwwWhoInt/Teams/Global-Tuberculosis-Programme/Tb-Reports/Global-Tuberculosis-Report-2022 2022.
[3] Kemenkes RI. Tuberculosis Control In Indonesia 2022. Jakarta: 2022.
[4] Kemenkes RI. Kemenkes Ri. Profil Kesehatan Indonesia 2017.
[5] Rumimpunu R, Maramis FRR, Kolibu FK. Hubungan antara dukungan keluarga dan dorongan petugas kesehatan dengan kepatuhan berobat penderita tuberkulosis paru di Puskesmas Likupang Kabupaten Minahasa Utara. KESMAS: Jurnal Kesehatan Masyarakat Universitas Sam Ratulangi 2018;7.
[6] Muna L, Soleha U. Motivasi Dan Dukungan Sosial Keluarga Mempengaruhi Kepatuhan Berobat Pada Pasien TB Paru Di Poli Paru Bp4 Pamekasan. Journal of Health Sciences 2014;7.
[7] Kemenkes RI. Sistem Informasi Tuberkulosis. Https://SitbKemkesGoId/ 2022.
[8] BPS. Jumlah Kasus Penyakit Menurut Kabupaten/Kota dan Jenis Penyakit di Provinsi Sumatera Utara, 2022. Https://SumutBpsGoId/Id/Statistics-Table/1/MzA2NCMx/Jumlah-Kasus-Penyakit-Menurut-Kabupaten-Kota-Dan-Jenis-Penyakit-Di-Provinsi-Sumatera-Utara-2022 2023.
[9] Noor J. Metodelogi penelitian. Jakarta: Kencana Prenada Media Group 2011.
[10] Pamungkas SB, Kurniawati T. Gambaran Pengetahuan Dan Sikap Keluarga Mengenai Pencegahan Penularan Penyakit Tb Paru: Literature Review. Prosiding Seminar Nasional Kesehatan, vol. 1, 2021, p. 421–9.
[11] Wahyuni S, Cahyati P, Limakrisna N. The influence of self efficacy on cognitive load in online learning in the pandemic Covid-19 on nursing students. European Journal of Molecular & Clinical Medicine 2020;7:2562–75.
[12] Chen X, Du L, Wu R, Xu J, Ji H, Zhang Y, et al. The Effects of Family, Society and National Policy Support on Treatment Adherence Among Newly Diagnosed Tuberculosis Patients: A Cross-Sectional Study. BMC Infect Dis 2020;20. https://doi.org/10.1186/s12879-020-05354-3.
[13] Musiimenta A, Tumuhimbise W, Mugaba A, Muzoora C, Armstrong-Hough M, Bangsberg DR, et al. Digital Monitoring Technologies Could Enhance Tuberculosis Medication Adherence in Uganda: Mixed Methods Study. J Clin Tuberc Other Mycobact Dis 2019;17:100119. https://doi.org/10.1016/j.jctube.2019.100119.
[14] Parwati NM, Bakta IM, Januraga PP, Wirawan IMA. A Health Belief Model-Based Motivational Interviewing for Medication Adherence and Treatment Success in Pulmonary Tuberculosis Patients. Int J Environ Res Public Health 2021;18:13238. https://doi.org/10.3390/ijerph182413238.
[15] Fuadiati LL, Sukartini T, Makhfudli M, Dewi YS, Rosyid AN, Qona'ah A. Development of an EKA Application to Help Tuberculosis Patients Improve Medication Adherence and Self Efficacy. International Journal of Public Health Science (Ijphs) 2024;13:76. https://doi.org/10.11591/ijphs.v13i1.23309.
[16] Nagaraja SB, Kotur NS, Murthy N, Kunjathur SM, Sappandi NB, Murthy D, et al. "Kill-Tb" Drug Reminder Mobile Application for Tuberculosis Patients at Bengaluru, India: Effectiveness and Challenges. J Tuberc Res 2020;08:1–10. https://doi.org/10.4236/jtr.2020.81001.
[17] Fang X-H, Shen H, Hu W-Q, Xu Q, Jun L, Zhang Z, et al. Prevalence of and Factors Influencing Anti-Tuberculosis Treatment Non-Adherence Among Patients With Pulmonary Tuberculosis: A Cross-Sectional Study in Anhui Province, Eastern China. Medical Science Monitor 2019;25:1928–35. https://doi.org/10.12659/msm.913510.

Electronic ISSN : 2656-3088
Homepage: https://www.journal-jps.com

[18] Nyamagoud SB, Swamy AH V, Chathamvelli A, Patil K, Pai Anirudh, Baadkar A. Assessment of Knowledge, Attitude, Practice and Medication Adherence Among Tuberculosis Patients in Tertiary Care Hospital. Int J Pharm Investig 2023;14:135–40. https://doi.org/10.5530/ijpi.14.1.17.
[19] Henderson AD, Miller D, Hambrick DC. How quickly do CEOs become obsolete? Industry dynamism, CEO tenure, and company performance. Strategic Management Journal 2006;27:447–60.
[20] Siahaan PBC, Lubis R, Hiswani H. Faktor-faktor yang mempengaruhi terjadinya TB paru pada pasien HIV/AIDS. Jurnal Kesmas Prima Indonesia 2019;3:17–23.
[21] Siahaan PBC, Lubis R, Hiswani H. Faktor-faktor yang mempengaruhi terjadinya TB paru pada pasien HIV/AIDS. Jurnal Kesmas Prima Indonesia 2019;3:17–23.
[22] Rizqiya RN. Hubungan Stigma Masyarakat Dengan Kepatuhan Minum Obat Pasien Tb Paru Di Puskesmas Puhjarak Kecamatan Plemahan Kabupaten Kediri. Jurnal Ilmiah Kesehatan Keperawatan 2021;17:66–76.
[23] Dedy MAE, Sagita S, Artawan IM. Hubungan Pekerjaan Dan Peran Pengawas Menelan Obat Terhadap Keberhasilan Pengobatan Tuberkulosis Di Kota Kupang. Cerdika: Jurnal Ilmiah Indonesia 2022;2:600–6.
[24] Dwiningrum R, Wulandari RY, Yunitasari E. Hubungan Pengetahuan dan Lama Pengobatan TB Paru dengan Kepatuhan Minum Obat pada Pasien TB Paru Di Klinik Harum Melati. Jurnal Aisyah: Jurnal Ilmu Kesehatan 2021;6:209–14.
[25] Dwiningrum R, Wulandari RY, Yunitasari E. Hubungan Pengetahuan dan Lama Pengobatan TB Paru dengan Kepatuhan Minum Obat pada Pasien TB Paru Di Klinik Harum Melati. Jurnal Aisyah: Jurnal Ilmu Kesehatan 2021;6:209–14.
[26] Syafakamila M, Purbowati R. Relationship between medication adherence level and recovery of pulmonary tuberculosis patients at gapura public health center Sumenep. Jurnal Ilmiah Kedokteran Wijaya Kusuma 2022;11:131–7.
[27] Diesty UAF, Tjekyan RMS, Zulkarnain MZ. Medical compliance determinants for tuberculosis patients in Palembang. Jurnal Ilmu Kesehatan Masyarakat 2020;11:272–84.
[28] Rismayanti IDA, Sundayana IM, Ariana PA, Heri M. Edukasi diabetes terhadap penurunan glukosa darah pada penderita diabetes mellitus tipe 2. Journal of Telenursing (JOTING) 2021;3:110–6.

Electronic ISSN : 2656-3088
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