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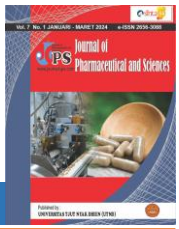

Analysis of Adherence to Tuberculosis Drug Use in Pulmonary TB Patients at UPT Pulmonary Hospital of North Sumatra in 2023

Analisis Kepatuhan Pengguanaan Obat Tuberkulosis Pada Penderita TB Paru Di UPT RS Paru Sumatera Utara Tahun 2023

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Abstract

Pulmonary tuberculosis (TB), caused by *Mycobacterium tuberculosis*, remains a pressing global health issue, with high incidence and mortality rates. Treatment adherence is a key factor in the success of TB therapy. This study analyzes the factors influencing adherence to TB medication among pulmonary TB patients at UPT Lung Hospital of North Sumatra. The study employed a cross-sectional design with an analytical survey approach. The research sample consisted of 120 pulmonary TB patients undergoing treatment. Data were collected through questionnaires, medical records, and secondary sources and analyzed using the Chi-Square test and logistic regression. The results showed that education level (p-value = 0.03), employment status (p-value = 0.03), knowledge level (p-value = 0.00), and family support (p-value = 0.05) had a significant relationship with adherence to TB medication. Meanwhile, age (p-value = 0.91) and gender (p-value = 0.59) did not show a meaningful relationship. Multivariate analysis identified knowledge and family support as the dominant factors influencing adherence. These findings suggest that education-based interventions and enhanced family support can improve TB treatment adherence. This study recommends developing public health programs to empower patients and their families in TB control efforts.

***Keywords*: Compliance, Use of Pulmonary TB Drugs, North Sumatra Community Lung Hospital**

Abstrak

Tuberkulosis (TB) paru yang disebabkan oleh *Mycobacterium tuberculosis* masih menjadi masalah kesehatan global yang mendesak, dengan angka kejadian dan kematian yang tinggi. Kepatuhan pengobatan merupakan faktor kunci dalam keberhasilan terapi TB. Penelitian ini bertujuan untuk menganalisis faktor-faktor yang memengaruhi kepatuhan penggunaan obat TB pada pasien TB paru di UPT RS Paru Sumatera Utara. Penelitian ini menggunakan desain cross-sectional dengan pendekatan survei analitik. Sampel penelitian terdiri dari 120 pasien TB paru yang sedang menjalani pengobatan. Data dikumpulkan melalui kuesioner, rekam medis, dan sumber sekunder, kemudian dianalisis menggunakan uji Chi-Square dan regresi logistik. Hasil penelitian menunjukkan bahwa tingkat pendidikan (p-value = 0,03), status pekerjaan (p-value = 0,03), tingkat pengetahuan (p-value = 0,00), dan dukungan keluarga (p-value = 0,05) memiliki hubungan signifikan dengan kepatuhan penggunaan obat TB. Sementara itu, usia (p-value = 0,91) dan jenis kelamin (p-value = 0,59) tidak menunjukkan hubungan yang signifikan. Analisis multivariat mengidentifikasi pengetahuan dan dukungan keluarga sebagai faktor dominan yang memengaruhi kepatuhan. Temuan ini mengindikasikan bahwa intervensi berbasis edukasi dan peningkatan dukungan keluarga dapat menjadi strategi efektif untuk meningkatkan kepatuhan pengobatan TB. Penelitian ini memberikan rekomendasi bagi pengembangan program kesehatan masyarakat yang lebih terfokus pada pemberdayaan pasien dan keluarga dalam upaya pengendalian TB.

***Kata Kunci*: Kepatuhan, Penggunaanan Obat TB Paru, RS Paru Masyarakat Sumatera Utara**

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Introduction

Tuberculosis or TB is a disease caused by infection of the Mycobacterium tuberculosis bacteria in the lungs. This condition is sometimes also called pulmonary TB. Tuberculosis bacteria that attack the lungs cause respiratory problems, such as chronic cough and shortness of breath [1] [2].

Mycobacterium tuberculosis is a TB germ that can cause TB disease in humans. Although it can also affect other body organs, most TB germs attack the lungs. Someone who can spread this disease is a patient whose examination results show positive acid-fast bacilli (AFB), which release germs into the air in the form of droplet nuclei [1] [3].

In general, tuberculosis (TB) is a significant problem for public health. The World Health Organization declared TB a very urgent event in 1993. According to the WHO Annual Report 2022 on Global TB Control, 22 countries have a TB Burden. Also, according to the WHO report, in 2014, there were 9 million new cases of TB and 1.5 million deaths each year [4] [1].

Although there was a decrease in new TB cases in 2020, it was not fast enough to achieve the target of the END TB Strategy. There was a cumulative decrease in TB cases of only 9% in 2015-2019, followed by a reduction in new TB cases of 20% between 2015-2020 WHO Global Tuberculosis Report (Ministry of Health of the Republic of Indonesia. 2020) From the incidence of new TB cases each year, the number of TB cases in Indonesia that have been treated is 13%. Still, there may be an increase in new cases of drug-resistant TB by 2.4% each year, with an estimated total incidence of drug-resistant tuberculosis cases of 24,000 or 8.8/100 population. Around 48% of patients will start the second stage of tuberculosis treatment; it was reported that around 11,500 cases of rifampicin-resistant tuberculosis occurred in 2019 [5].

The increase in new TB cases each year may be caused by various factors, including patient non-compliance in taking medication, lack of knowledge of treatment, lack of family support, lack of drug diagnostic services, transportation, history of previous TB treatment, unavoidable side effects of drugs, high rates of therapy failure and even death [6]. In Indonesia, the dropout cases are 31% each, while the treatment success rate is less than 50%. This is due to the high mortality rate.

The estimated number of drug-resistant TB cases in Indonesia per year is 4,972 cases, as published in February 2022. This estimate comes from the number of new TB cases and RO TB each year, which always increases. The Indonesian government needs to act immediately to address this problem to prevent increased morbidity or mortality related to RO TB. Tuberculosis (TB) is common in poor countries and several developing countries. In the international agreement summarized in the Sustainable Development Goals (SDGs) in 2015, the health problem of dangerous infectious diseases such as TB is one of the main concerns of health development goals [7] [4].

According to WHO data, in 2018, there were 6.3 million new pulmonary TB cases, the same as 61% of tuberculosis cases worldwide, with a value of 10.4 million. The number of patients with TB has increased, and the number of tuberculosis cases from the previous year was 9.6 million. In addition, the number of deaths caused by tuberculosis worldwide is 40 people per 100,000 of the world's population [4].

More people in the adult age category are infected and then die due to tuberculosis infection compared to other types of bacterial infections. Based on the World Health Organization (WHO), it is estimated that

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tuberculosis infection kills two million people every year. From 2020 data, it is estimated that one billion people will be infected if not appropriately treated in patients, and this tuberculosis disease will increase by around 56 million each year if not treated immediately [8] [9].

Tuberculosis is an old disease that still occurs today. Based on data from the Central Statistics Agency of North Sumatra Province, the number of people with pulmonary TB is 17,303 people, where the highest cases are in Medan City, ranked first with 2,430 cases, followed by Deli Serdang Regency in second place with 1,698 cases and Simalungun Regency in third place with 1,298 cases and the lowest in Nias with 57 sufferers [4].

From the results of initial observations conducted by researchers at the UPT Special Lung Hospital of North Sumatra from the report of the discovery and treatment of TB patients, data was obtained that the total number of suspected TB was 1,973 people with details of 1,166 men and 807 women. From the data above, it was found that TB cases were more common in men.

The data on TB cases is still very high; this is due to the lack of knowledge, attitudes, and actions of sufferers about the spread and transmission of this disease. There is still a lack of knowledge and understanding of this disease, which is an infectious disease whose healing process will be complicated if the sufferer does not understand how the treatment process works. In addition, when this disease also occurs due to a lack of understanding of sufferers about the transmission of this disease, it is also influenced by economic factors. Hence, the healing process of this disease is complicated to eradicate. The lack of patient compliance in therapy is due to the low family support so that sufferers cannot complete the treatment program according to the set schedule.

Experimental Section

Types and Design of Research

This study used an observational (non-experimental) research design and an analytical survey. The cross-sectional study approach, namely research by conducting measurements or observations at the same time or examinations of exposure status and disease status at the same point, is used to analyze Compliance with the Use of Tuberculosis Drugs in Tuberculosis Patients Against the Success of Therapy.

Location and Time of Research

This research was conducted at the UPT RS Paru Sumatera Utara Medan from September 2023 to February 2024.

Sample

The sample used in this study was 120 patients with Pulmonary Tuberculosis undergoing treatment at the UPT RS Paru Sumatera Utara Medan, who were included as inclusion criteria for the study. The inclusion criteria for the research subjects were patients with Pulmonary Tuberculosis with BTA (+) from May to October 2023 at the UPT RS Paru Sumatera Utara Medan, Tuberculosis patients over 18 years of age, and willing to volunteer to be respondents.

Data Type

Primary data was obtained directly from the study's sample population of pulmonary TB patients. The samples filled out the questionnaires that had been distributed, which became the basic material for this study. Secondary data was obtained from the research location in the form of data on pulmonary TB patients, their number, type of treatment, and duration of treatment. Tertiary data was collected from the latest sources, such as journals and government regulations governing treating and preventing pulmonary TB in Indonesia.

Validity Test and Reliability Test

The validity and reliability tests had been used previously to measure variables and their reliability, which the researcher will carry out next. Cronbach's alpha value for 18 knowledge questions was obtained at 0.922, and family support with 19 questions was obtained at 0.857, more significant than the calculated r-value of 0.361, so it is declared reliable [10].

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Data Analysis

Univariate analysis is in the form of mean, median, minimum, and maximum values distribution. The presentation of the results is textural, tabular, or graphical.

Bivariate analysis was carried out using the Chi-Square test because the scale of the independent variable data is ordinal. The degree of confidence is 95%, and decision-making is considered to have a relationship if the p-value <0.05 and Ho is rejected.

The type of multivariate analysis used is Logistic Regression because the scales of the dependent and independent variables use ordinal scales [11].

Results and Discussion

Overview of Research Location

UPTD Special Lung Hospital of North Sumatra Province Jalan Setia Budi, Pasar 2 No.84, Tanjung Sari, Tj. Sari, Kec. Medan Selayang, Medan City, North Sumatra 20132, was previously located at Jl. Asrama No.18, Helvetia, Kec. Medan Helvetia, Medan City. Since 2024, the UPT Special Lung Hospital of North Sumatra Province has been officially moved to Jalan Setia Budi Pasar 2. UPT. Special Lung Hospital for the Community has the task of assisting the Head of the Health Service in carrying out government affairs in matters of treatment services, care and recovery of community lung health according to the specified standards, fulfillment of quality standards for supporting medical and nursing facilities for hospitals and guidance, control, prevention, and promotion of community lung health at the provincial level. UPT. RSK Lung of North Sumatra Province is a government class B specialty hospital accredited at the basic level in Medan City. UPT. RSK Lung of North Sumatra Province provides lung health services to the community. UPT. The North Sumatra Provincial Lung Hospital has 203 employees, consisting of 149 civil servants, 38 honorary employees, and 16 outsourcing employees. UPT. The North Sumatra Provincial Lung Hospital is a specialist lung hospital. In addition, it has opened a Drug-Resistant TB Polyclinic, UPT. The North Sumatra Provincial Lung Hospital also has laboratory facilities equipped with a TCM (Molecular Rapid Test) machine to support the examination of sputum specimens that can identify Drug-Resistant TB patients. Special access has also been provided for drug-resistant TB patients to minimize airborne transmission. Has opened a special Drug-Resistant TB polyclinic to support Drug-Resistant TB treatment services

Univariate Analysis Results

1. Age

In this study, the age of respondents was divided into two groups, namely productive age 15-58 years and non-productive age <15 years> 58 years by the Government Regulation of the Republic of Indonesia Number 21 of 2014.

Table 1. Frequency Distribution of Respondents Based on Age at the North Sumatra Lung Hospital UPT in 2023.

Respondent Age	Amount	
	N	%
15-58 years old	75	62.50
<15 years old>58 years old	45	37.50
Total	**120**	**100**

Based on table 1 shows that of the 120 respondents, the majority of respondents were aged 15-58 years, as much as 62.5%, and those aged <15 years and >58 years were as much as 37.5%.

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2. Education

Table 2. Frequency Distribution of Respondents Based on Education Level at the UPT of North Sumatra Lung Hospital in 2023.

Respondents' Education Level	Amount	
	N	%
High (College)	30	25.00
Middle (SMP, SMA)	50	41.66
Low (TK,SD)	40	33.33
Total	120	100

Table 2 shows that 41.66% of respondents have secondary education, and 33.3% have low education.

3. Employment

Table 3. Frequency Distribution of Respondents Based on Employment in North Sumatra Lung Hospital UPT in 2023.

Employment of Respondent	Amount	
	N	%
Working	52	43.30
Not working	68	56.70
Total	80	100

Table 3 shows that 56.70% of respondents do not work, and 43.30% work.

4. Gender

Table 4. Frequency Distribution of Respondents Based on Gender of UPT North Sumatra Lung Hospital in 2023.

Respondent Gender	Amount	
	N	%
Male	51	42.50
Female	69	57.50
Total	120	100

Table 4 shows that most respondents with Pulmonary TB were female, 57.50% and 42.50%.

5. Knowledge

Table 5. Frequency Distribution of Respondents Based on Knowledge at the North Sumatra Lung Hospital UPT in 2023

Knowledge Respondents	Amount	
	N	%
Good	48	40.00
Enough	37	30.80
Less	35	29.20
Total	120	100

Table 5 shows that most respondents with Pulmonary TB have good knowledge. Of 40.00%, 30.80% have sufficient knowledge, and 29.20% have less knowledge.

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6. Family Support

Table 6. Frequency Distribution of Respondents Based on Family Support at the North Sumatra Lung Hospital UPT in 2023

Family Support	Amount	
	N	%
Good	70	58.30
Less	50	41.70
Total	120	100

Table 6 shows that of respondents with Pulmonary TB who have received support from their families, the majority are 58.30%, and the fewest are 41.70%.

7. Compliance

Table 7. Frequency Distribution of Respondents Based on Compliance at the UPT of the North Sumatra Lung Hospital in 2023

Table 7 shows that the majority of respondents are compliant. Namely, 76.70%, and those who are not compliant are 23.30%.

8. Therapy Success

Table 8. Frequency Distribution of Respondents Based on Therapy Success at the North Sumatra Lung Hospital UPT in 2023

Therapy success	Amount	
	N	%
Healed	79	65.80
Not Healed	41	34.20
Total	120	100

Table 8 shows that 65.80% of respondents with Pulmonary TB who were successfully treated with therapy recovered, while 34.20% did not.

Bivariate Analysis

1. Relationship Between Age and Compliance with Medication Use in Pulmonary TB Patients

Table 9. Relationship between Age Distribution and Compliance with Medication Use at the North Sumatra Lung Hospital UPT in 2023

Age	Medication Compliance				Amount		P-value
	Yes		No				
	N	%	N	%	N	%	
15-58	61	50.8	14	11.7	75	62,5	0,091
<15>58	31	25.8	14	11.7	45	37.5	

Table 9 shows that 50.8% of respondents aged 15-58 demonstrated good medication adherence, while 25.8% of respondents aged <15 or >58 had poor adherence. The p-value of 0.091 ($p > 0.05$) indicates no significant relationship between age and medication adherence. This suggests that age does not determine adherence among pulmonary TB patients.

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2. Relationship between Education and Compliance with Drug Use in Pulmonary TB Patients

Table 10. Relationship between Education and Compliance with Drug Use at the UPT Pulmonary Hospital of North Sumatra in 2023

Education	Medication Compliance				Amount		P-value
	Yes		No				
	N	%	N	%	N	%	
High	68	56.7	12	10.0	80	66.7	0,003
Low	24	20.0	16	13.3	40	33.3	

Table 10 reveals that 56.7% of respondents with higher education showed good adherence, compared to 13.3% of those with lower education who were non-compliant. The p-value of 0.003 ($p < 0.05$) indicates a significant relationship between education level and adherence. Higher education likely enhances patients' understanding of the importance of medication compliance.

3. Relationship between Work and Compliance with Use of Pulmonary Tuberculosis Drugs

Table 11. Relationship between Work and Compliance with Use of Drugs at the UPT of the North Sumatra Lung Hospital in 2023

Employment	Medication Compliance				Amount		P-value
	Yes		No				
	N	%	N	%	N	%	
Not Working	59	49.2	9	2.5	68	56.7	0.003
Working	33	27.5	19	51.3	52	43.3	

Table 11 demonstrates that 49.2% of unemployed respondents were compliant, compared to 27.5% of employed respondents. The p-value of 0.003 ($p < 0.05$) suggests a significant relationship between employment status and adherence. Unemployed individuals may have more time to focus on their treatment, while employed individuals might face challenges balancing work and medication schedules.

4. Relationship between Gender and Compliance with Drug Use in Pulmonary TB Patients

Table 12. Relationship between Gender and Compliance with Drug Use at the UPT Pulmonary Hospital of North Sumatra in 2023.

Gender	Medication Compliance				Amount		P-value
	Yes		No				
	N	%	N	%	N	%	
Female	57	47.5	12	10.0	69	57.5	0,059
Male	35	29.2	16	13.3	51	42.5	

Table 12 shows that 47.5% of female respondents were compliant, compared to 29.2% of male respondents. The p-value of 0.059 ($p > 0.05$) indicates no significant relationship between gender and adherence. This finding suggests that gender is not essential in determining medication compliance.

5. Relationship between knowledge and drug use compliance in patients with pulmonary TB

Table 13 indicates that 36.7% of respondents with good knowledge were compliant, while 16.7% of those with poor knowledge were non-compliant. The p-value of 0.000 ($p < 0.05$) confirms a significant relationship between knowledge and adherence. Better knowledge about TB and its treatment likely motivates patients to adhere to their medication regimen.

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Table 13. Relationship between knowledge and drug use compliance at the UPT RS Paru Sumatera Utara in 2023.

Knowledge	Medication Compliance				Amount		P-value
	Yes		No				
	N	%	N	%	N	%	
Good	44	36.7	4	3.3	48	40.0	0.000
Enough	33	27.5	4	3.3	37	30.8	
Less	15	12.5	20	16.7	35	29.2	

6. Relationship between Family Support and Drug Compliance in Pulmonary TB

Table 14. Relationship between Family Support and Drug Compliance in Pulmonary Tuberculosis at UPT RS Paru Sumatera Utara in 2023.

Family Support	Medication Compliance				Amount		P-value
	Yes		No				
	N	%	N	%	N	%	
Good	60	50.0	10	8.3	70	58.3	0,005
Less	32	26.7	18	15.0	50	41.7	

Table 14 shows that 50.0% of respondents with strong family support were compliant, compared to 15.0% of those with weak support. The p-value of 0.005 ($p < 0.05$) indicates a significant relationship between family support and adherence. Family support is crucial in encouraging patients to follow their treatment plans.

7. Relationship between Therapy Success and Compliance with Pulmonary Tuberculosis Drug Use

Table 15. Relationship between Therapy Success and Compliance with Pulmonary Tuberculosis Drug Use at the UPT RS Paru Sumatera Utara in 2023.

Therapy Success	Medication Compliance				Amount		P-value
	Yes		No				
	N	%	N	%	n	%	
Healed	71	59.2	8	6.7	79	65.8	0,000
Not Healed	21	17.2	20	17.7	41	34.2	

Able 15 reveals that 59.2% of respondents who achieved therapy success were compliant, while 17.7% of those who did not achieve success were non-compliant. The p-value of 0.000 ($p < 0.05$) confirms a significant relationship between therapy success and adherence. This highlights the importance of adherence in achieving positive treatment outcomes.

Multivariate Analysis

The logistic regression analysis identified knowledge (Exp(B) = 2.374, p = 0.000) and family support (Exp(B) = 1.048, p = 0.000) as the most significant factors influencing medication adherence. These results indicate that patients with higher levels of knowledge about TB and more substantial family support are significantly more likely to adhere to their medication regimen. Specifically, the Exp(B) values suggest that for every unit increase in knowledge, the odds of adherence increase by 2.374 times, while for every unit increase in family support, the odds of adherence increase by 1.048 times.

This study conducted multivariate analysis to examine the relationships between independent variables such as knowledge level, compliance, age, gender, occupation, family support, and education and to identify the most dominant factors influencing medication adherence. Based on the Chi-Square test, three variables (knowledge level, therapy success, and family support) were included in the multivariate analysis, as their p-values were <0.25. The results of the multiple logistic regression analysis are presented in Table 16.

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Table 16. Results of Bivariate Tests Included in Multiple Logistic Regression Analysis

Variables	B	*p.value*	Exp(B)
Knowledge	1.698	0.000	2.374
Therapy Success	1.170	0.041	3.205
Family Support	2.348	0.000	1.048
Constant	-10.096	.000	,000

Table 16 shows the results of the multiple logistic regression test analysis above. It shows that knowledge level and therapy success are significantly related to preventing drug use compliance at the UPT Community Lung Hospital of North Sumatra Province.

1. Relationship of Age Based on Compliance with Use of Pulmonary TB Drugs

Active Pulmonary TB infection increases significantly according to age; the highest incidence of Pulmonary TB usually affects young adults. In Indonesia, it is estimated that 75% of Pulmonary TB sufferers are in the productive age group, namely 15-50 years [12].

The study found that out of 75 respondents, those aged 15-58 years showed good compliance with pulmonary tuberculosis drugs, as much as 50.8%. The majority of respondents aged <15> 58 years showed several compliant uses of Pulmonary TB drugs, as much as 28.5%. Based on the results of the analysis, the proportion coefficient (p) of 0.091 was obtained, which was greater than the error rate used at the α = 0.05 level, so it can be concluded that there is a relationship between age and compliance with the use of drugs in Pulmonary TB does not show a significant relationship.

This can happen because age is a predisposing factor for behavioral changes that are associated with the physical and psychological maturity of Pulmonary TB sufferers. Meanwhile, based on age, it appears that they are moving towards a non-productive age due to resignation to the disease they are suffering from [13].

2. Relationship between Education and Compliance in the Use of Pulmonary Tuberculosis Drugs

The study's results show that a person's level of knowledge will affect their Compliance with the Use of Pulmonary Tuberculosis Drugs. The higher the respondent's education can show this, the more compliant they will be in taking medication. They will better understand the importance of maintaining health and complying with all rules when taking their medication.

A person's level of education will affect their knowledge, including the possible effects that will occur if they are not compliant in taking Pulmonary Tuberculosis drugs and other possibilities that will be fatal. In addition, a person's level of education will affect the type of work. A better level of formal education in the community will indirectly reduce the number of illnesses and deaths because they can absorb information and increase public awareness to live healthier and actively participate in maintaining their health [14].

From the results of the study, it is known that from 120 respondents, it was found that the majority of respondents who had higher education showed that they were compliant in consuming pulmonary TB drugs as much as 56.7,% and the majority of respondents who had low education with those who were not compliant in consuming drugs as much as 13.3%. Based on the analysis results, the proportion coefficient (p) of 0.003 was obtained, which was smaller than the error rate used at the α = 0.05 level, so it can be concluded that there is a relationship between education and drug compliance.

Based on the multiple logistic regression statistical test, education is significantly related to Compliance with pulmonary TB drugs. This can be explained even though education describes behavior to comply, not being a dominant factor in a person's behavior. The lower the education level, the less knowledge there is in the health field. It can directly and indirectly affect the physical, biological, and social environment and harm health [15].

3. Relationship between Work and Compliance with the Use of Pulmonary Tuberculosis Drugs

The type of work determines the risk factors that each individual must face. Suppose workers work in a dusty environment. Exposure to dust particles will affect the occurrence of disorders in the respiratory tract. Chronic exposure to polluted air can increase morbidity, especially the occurrence of respiratory diseases, such as pulmonary TB.

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From the results of the study, it was found that out of 120 respondents it was found that the majority of respondents who did not work showed compliance in consuming Pulmonary TB drugs, 49.2%, and the majority of respondents who worked who did not comply with consuming Pulmonary TB drugs were 15.8%. Based on the results of the analysis, the proportion coefficient (p) was obtained as much as 0.003, 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 work and Compliance with the Use of Pulmonary Tuberculosis drugs.

Research presented by Oktavia et al. (2016) states that respondents who comply with the use of pulmonary TB drugs are mostly respondents who do not have jobs compared to those who are employed. Research conducted by Dedy et al. (2022) states that work will affect the use of health services, and a person's job will reflect the amount of information received, including information about health services [16] [7].

4. Relationship between Gender and Compliance with Pulmonary Tuberculosis Drug Use

Gender refers to a person's biological status. It consists of physical appearance that distinguishes between women and men [17]. Kartasasmita (2016) said that several factors, including social status, economy, nutritional status, age, gender, and other social factors, influence a person's exposure to TB infection. The gender of pulmonary TB patients tends to be higher in men than women [18].

From the results of the study, it was found that out of 120 respondents, it was found that the majority of female respondents showed compliant compliance with the use of Pulmonary TB drugs, as much as 45.5%, and the majority of male respondents with compliant compliance with the use of Pulmonary Tuberculosis drugs as much as 13.3%. This can happen because men have higher mobility than women, so the possibility of exposure is more significant. Based on the results of the analysis, the proportion coefficient (p) was obtained as 0.059, which is greater than the error rate used at the $\alpha = 0.05$ level, so it can be concluded that there is no relationship between gender and compliance with the use of pulmonary tuberculosis drugs.

5. Relationship between Knowledge and Compliance in the Use of Pulmonary Tuberculosis Drugs

Knowledge is an essential capital for someone to behave. People who have a good understanding of TB disease will be a reference for them to try to prevent the disease because they already understand the dangers and transmission of Pulmonary TB disease.

From the results of the study, it is known that out of 120 respondents, it was found that the majority of respondents who had good knowledge showed Compliance in the use of Pulmonary Tuberculosis drugs were compliant as much as 36.7,% and the majority of respondents who had sufficient expertise with Compliance in the use of Pulmonary Tuberculosis drugs who were not compliant as much as 3.3% and knowledge that was lacking showed non-compliance as much as 16.7%. Based on the results of the analysis, the proportion coefficient (p) of 0.000 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 knowledge and Compliance in the use of Pulmonary Tuberculosis drugs.

This is because knowledge is the essential capital for someone to behave. People who have a good understanding of TB disease will be a reference for them to try to comply in consuming the TB medicine. Because they already understand the dangers. From the study results in Table 4.9, the majority of respondents with good knowledge show compliance in consuming TB medicine, as much as 36.7%, and the majority of respondents with sufficient knowledge show compliance in using medicine, as much as 27.5%. Based on the analysis results, the proportion coefficient (p) of 0.000 is obtained, which is smaller than the error rate used at the $\alpha = 0.05$ level; it can be concluded that there is a relationship between knowledge and Compliance in using Pulmonary Tuberculosis medicine.

6. Relationship of Family Support with Compliance in Use of Pulmonary Tuberculosis Drugs

After conducting the chi-square test, it was found that respondents who received good family support in compliance with the use of drugs were compliant in consuming them; this is evident from the test results showing a value of 50.0%; this is different from respondents who received less attention from their families in Compliance with the use of Pulmonary Tuberculosis drugs who were not compliant showing a figure of 15.0%. Based on the results of the analysis, the proportion coefficient (p) of 0.005 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 family support and Compliance with the use of Pulmonary Tuberculosis drugs.

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Family support is where the family can be a very influential factor in determining individuals' beliefs and health values and the treatment program they can receive. In this case, the family plays a vital role in influencing the respondent's mindset to take the path of treatment. Families who cannot convince their family members who suffer from Pulmonary TB will cause Pulmonary TB sufferers not to want to take treatment; if that happens, it is possible that sufferers do not do it routinely because there is no support in this case in the form of supervision of the sufferer [5]. Family support is one of the factors that influences compliance with TB treatment, where the family functions as a support system for their sick family members.11 The family is always ready to help and assist if needed[19].

Conclusions

This study examined factors influencing medication adherence among pulmonary tuberculosis (TB) patients at the UPT North Sumatra Lung Hospital. The findings revealed that age (p-value = 0.91) and gender (p-value = 0.59) did not significantly affect medication adherence. However, education level (p-value = 0.03), employment status (p-value = 0.03), knowledge about TB (p-value = 0.00), and family support (p-value = 0.05) were significantly associated with adherence. Specifically, higher education levels, better knowledge about TB, and strong family support were positively correlated with improved adherence. These results highlight the importance of educational interventions and family involvement in enhancing treatment compliance among TB patients. To improve medication adherence at the individual and community levels, policymakers and healthcare providers should prioritize patient education programs to improve understanding of TB and its treatment. Additionally, initiatives to strengthen family support systems, such as counseling and community-based support groups, should be implemented. Integrating adherence monitoring tools and providing incentives for consistent medication use at the institutional level could improve outcomes.

Conflict of Interest

The author confirms that this research was conducted independently, free from any external interference or conflicts of interest that could potentially affect the impartiality and credibility of the results.

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Supplementary Materials

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