Analysis of The Side Effects of Dots (*Directly Observed Treatment Shortcourse*) on The Success of Pulmonary Tuberculosis (Tuberculosis) Therapy at Raa Soewondo Pati Hospital

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Abstract

This study aims to analyze the side effects of DOTS on the success of TB therapy. The research was conducted at the RAA Soewondo Pati Hospital using a quantitative descriptive method with a cross-sectional approach. Sampling was carried out using a total sampling technique, and 117 respondents were obtained who met the inclusion and exclusion criteria. Data collection was carried out through a questionnaire of side effects and medication adherence that has been tested for validity and reliability, and supported by patient medical record data. Data analysis includes univariate analysis, and bivariate analysis with Chi-square and Odd Ratio (OR) tests. The results showed that the most common side effects experienced by patients were urine discoloration to red (100%), flu syndrome (29.9%), nausea (18.8%), and no appetite (15.4%). The severity of the majority of side effects was in the mild category (88%). The patient compliance rate was relatively high, namely 92.3% complied in undergoing therapy, and 93.2% of patients were declared successful in completing therapy. The results of bivariate analysis showed that there was a very significant relationship and influence between drug side effects and the success of pulmonary tuberculosis therapy. This is shown by the results of the chi-square test which shows a p-value of 0.000 ($p<0.05$). And the Odd Ratio (OR) which yields a value of 0.010. Interpretation of this value shows that patients who experience moderate side effects have a 100-fold higher risk of therapy failure.

Keywords: *Dots; drug side effects; medication adherence; therapy success and tuberculosis.*

I. INTRODUCTION

TBC (*Tuberculosis)* constitute *diseases caused by the bacterium Mycobacterium tuberculosis,* which mainly attacks the lungs, but can also attack other parts of the body. The disease can be transmitted when a patient with a positive Acid Resistant Bacillus (BTA) releases bacteria into the air in the form of *droplet* (splash of phlegm) when coughing or sneezing, where A single cough can produce about 3,000 sputum splashes. A person can become infected if the droplets are inhaled into the respiratory tract (Retnowati et al., 2021). TB *(Tuberculosis)* is one of the infectious diseases that is a problem in public health globally. According to data from the WHO Organization *(World Health Organization),* TB *(Tuberculosis)* spread in various parts of the world. In 2020, the highest number of new cases was recorded in Southeast Asia (43%), followed by Africa (25%) and the Western Pacific (18%). A total of 86% of new cases occurred in 30 countries with a high burden of TB, with eight countries accounting for two-thirds of the total new cases, namely India, China, Indonesia, the Philippines, Pakistan, Nigeria, Bangladesh and South Africa. Indonesia itself ranks second with an estimated 1,060,000 new cases every year and the death rate reaches 134,000 people. The number of new cases discovered in 2022 reached 724,309 cases, increasing to 792,404 cases in 2023. This figure is much higher than the pre-pandemic period, where the average number of cases found is less than 600,000 per year.

In Indonesia, Central Java is one of the provinces with the highest number of tuberculosis. Based on data from the Central Statistics Agency (BPS), in 2021 there were 73,080 cases out of a total population of 36,742,501 people, which then increased in 2023 to 117,503 out of 37,540,962 cases. Pati Regency is an area with a high incidence of tuberculosis *(Tuberculosis)* which is quite high, with reports of 1,200 cases in 2023. One of the efforts to control tuberculosis *(Tuberculosis)* in Indonesia is through DOTS *(Directly Observed Treatment Shortcourse)*, which has been recommended by the WHO since 1995. This strategy aims to break the chain of TB transmission by reducing the number of illnesses and deaths due to this disease. Treatment of

tuberculosis is generally carried out with a combination of several types of drugs in the right dosage for 6 – 8 months so that the bacteria can be effectively eradicated. However, if the type, drug, or duration of treatment is not optimal, the bacteria can become resistant to the drug. The success of a TB treatment program depends heavily on patient adherence.

The long duration of treatment is often a challenge for patients, who sometimes stop treatment early because they feel they have recovered or because of economic factors. This can lead to treatment having to be repeated from the beginning with greater cost and longer time. Non-adherence to treatment also increases the risk of therapy failure, relapse, and the emergence of drug resistance, which ultimately worsens the spread of disease in the community. One of the factors that can affect the success of TB therapy is the side effects of anti-TB drugs (Zukhrufina Muthiah N et al., 2024).Side effects of Anti-Tuberculosis Drugs (OAT) are known to be a risk factor for non-adherence in treatment. Some of the side effects that often occur include loss of appetite, nausea, abdominal pain, joint pain, tingling, and reddish changes in the urine. Meanwhile, more serious side effects can include itching, skin rash, hearing loss, balance problems, vision disturbances, jaundice with no other cause, confusion, recurrent vomiting, and shock (Indonesian Pulmonary Doctors Association, 2021). These side effects can increase the risk of patients stopping treatment, which can ultimately lead to dual resistance to anti-TB drugs *(multidrug resistance)*. This condition can trigger TB epidemics that are more difficult to control (Aini & Astuti, 2020). Based on this background, the author is interested in conducting a research titled DOTS Side Effect Analysis *(Directly Observed Treatment Shortcourse)* On the Success of TB Therapy *(Tuberculosis)* Paru at RAA Soewondo Pati Hospital.

II. METHODS

In this study, the researcher used a descriptive method. A type of quantitative descriptive research with *a cross sectional* approach, which is research conducted by observing objects and measuring research variables at one time. The population of this study is patients diagnosed with pulmonary tuberculosis and undergoing therapy with *the Directly Observed Treatment Shortcourse* (DOTS) strategy at RAA Soewondo Pati Hospital. The sampling technique in this study is using total sampling, with a sample of 117 patients. The instruments in this study were in the form of drug side effect questionnaires, treatment compliance questionnaires, patient medical records (medical records), laboratory tests and clinical examinations. The data analysis methods in this study are univariate analysis and bivariate analysis.

III. RESULT AND DISCUSSION

Patient Characteristics

Based on data on patients, the characteristics of the sample can be determined based on age, gender, drug side effects, adherence to taking medication and the success of therapy listed in the table as follows:

Table 1. Sample Distribution by Age

	Age		
		Frequency	Percentage (%)
Valid	16-18 Years	5	4.27
	19-44 Years	40	34,19
	45-59 Years	49	41,88
	60-69 Years	17	14.53
	70-79 Years	6	5.13
	Total	117	100.0

Source : Primary data, 2025

Table 1 presents the distribution of the sample by age group. It is known that out of a total of 117 age group samples, the most are 45 - 59 years old, which is 49 patients (41.88%). Furthermore, it was followed by the age group of 19 – 44 years as many as 40 patients (34.19%), the age group of 60 – 69 years as many as 17 patients (14.53%), the age group of 70 – 79 years as many as 6 patients (5.13%). The least age group is 15 - 18 years old, which is only 5 patients (4.3%).

Table 2. Distribution of Samples by Gender

Gender		
	Frequency	Percentage (%)
Men - men	68	58.1
Women	49	41.9
Total	117	100.0

Source : Primary data, 2025

In table 2, it is known that out of a total of 117 samples, most of the pulmonary tuberculosis patients were male, namely 68 patients (58.1%) while female patients amounted to 49 patients (41.9%).

Table 3. Sample Distribution Based on Drug Side Effects

Side Effects		
	Frequency	Percentage
No appetite	18	15,4%
Nausea	22	18,8%
Tingling	13	11,1%
Urine turns reddish	117	100%
Flu syndrome such as fever, chills, weakness, headache, bone pain	35	29,9%
Reddish patches on the skin	10	8,5%
Hearing loss	1	0,9%
Balance disorders	15	12,8%
Confused, nauseated, vomiting	10	8,5%
Vision impairment	2	1,7%
Purpura, shock (shock), acute kidney failure	0	0%

Source : Primary data, 2025

Table 3 explains that from the distribution of samples based on drug side effects, the most common side effects were red urine, which was 117 patients (100%), followed by flu syndrome such as fever, chills, weakness, headache, bone pain as many as 35 (29.9%), nausea in 22 patients (18.8%), lack of appetite 18 (15.4%), balance disorders 15 (12.8%), tingling 13 (11.1%), confusion nausea and vomiting 10 (8.5%), reddish patches on the skin 10 (8.5%), vision impairment 2 (1.7%), hearing loss 1 (0.9%). And for the side effects of purpura, shock (shock), acute kidney failure of the 117 patients who were sampled, none of them experienced these side effects.

Table 4. Distribution of samples based on the severity of drug side effects

Severity of Side Effects		
Remarks	Frequency	Percentage
Lightweight	103	88%
Medium	14	12%
Total	117	100%

Source : Primary data, 2025

In table 4 of the distribution based on the severity of drug side effects, it is known that out of a total of 117 samples, most of them experienced side effects in the mild category, namely as many as 103 patients (88%), while in the moderate category as many as 14 patients (12%).

Table 5. Sample Distribution Based on Medication Adherence

Medication Compliance		
Remarks	Frequency	Percentage
Non-compliant	8	6,8%
Simply Obey	1	0,9%
Obedient	108	92,3%
Total	117	100%

Source : Primary data, 2025

For the level of adherence to taking medication, it is known that of the 117 pulmonary tuberculosis patients who were sampled, most of them were included in the compliance category, namely as many as 108 patients (92.3%), as many as 1 patient (0.9%) was classified as moderately compliant, while 8 patients (6.8%) were categorized as non-compliant in undergoing treatment.

Table 6. Distribution of samples based on the success of the therapy

Therapy Success		
Remarks	Frequency	Percentage
Successful	109	93,2%
Didn't work	8	6,8%
Total	117	100%

Source : Primary data, 2025

From the table above, it is known that out of a total of 117 samples of pulmonary tuberculosis patients, most of the patients were declared successful in undergoing treatment, namely 109 people (93.2%), while 8 people (6.8%) were recorded to have stopped treatment before completing therapy.

Data Analysis

This analysis is carried out to determine the appropriate statistical method to test the hypothesis.

Normality Test

Normality test is a test used to determine that the collected data has been normally distributed or taken from a normal population. In this normality test, it is used with the *Kolmogorov-Smirnov* (Sani, 2017).

Table 7. Normality Test

Statistical test	Nilai Sig. *(Asymp. Sig. 2-tailed)*	Remarks
Kolmogorov-Smirnov	.000	Abnormal

Source : Primary data, 2025

Decision-making policy :

If p > 0.05 or > 5% then the data is normal

If p < 0.05 or < 5% then the data is abnormal

Based on the results of the *Kolmogorov-Smirnov* normality test, the result was obtained with a significance value (Sig.) of 0.000. Since the value of 0.000 is less than 0.05 (p < 0.05), it can be concluded that the data is not normally distributed.

Homogeneity Test

The Homogeneity Test was performed to determine whether the variance of the variable of the adverse effect score was the same between the therapy success groups. In this homogeneity test, it is carried out with *Levene's Test* (A. Dirwan, 2020).

Table 8. Homogeneity Test

Statistical test	F	*Sig. (Significance)*
Levene's Test	0.001	0.982

Source : Primary data, 2025

Decision Making Policy :

If the value of sig. ≥ 0.05, the data variance is homogeneous

If the value of sig. < 0.05, the data variance is non-homogeneous

Based on the results *of Lavene's test, a* significance value (sig.) was obtained of 0.982. Since the value of 0.982 is greater than 0.05 (*P* ≥ 0.05), it can be concluded that the variance in the adverse effect score between the therapy success groups is homogeneous.

The Effect of Side Effects on Therapy Success

Table 9. Results of the Effect of Side Effects on Therapy Success

Side Effects	Therapy Success		Quantity
	Successful	Not Secret	
Lightweight	102	1	103 (88%)

Medium	7	7	14 (12%)
Total	109 (93,2%)	8 (6,8%)	117 (100%)

Source : Primary data, 2025

From the data above, the results were obtained that 103 patients who experienced mild side effects mostly experienced success in therapy. Meanwhile, for moderate side effects, some patients experience therapy success and some do not. This indicates a strong tendency that side effects are closely related to the success of therapy.

Uji *Chi Square*

Test *Chi Square* is a non-parametic statistical test used to see the relationship between two variables (Sani, 2017).

Table 10. Uji *Chi Square*

Test	Value	df	*p-value (Asymp. Sig.)*
Pearson chi square	46.510	1	0.000

Source : Primary data, 2025

Decision-making policy :

If the significance value obtained < 0.05 then it can be concluded that between variable 1 and variable 2 has a strong relationship and vice versa.

Table 10 shows a *p-value* of 0.000. Since the value of 0.000 is less than 0.05 ($P < 0.05$), it can be concluded that there is a statistically significant relationship between side effects and the success of pulmonary tuberculosis therapy.

***Odd Ratio* (OR)**

Odd Ratio is a statistical test used to determine how strong the influence of side effects is on the success of therapy (Sani, 2017).

Table 11. Odd *Ratio Table*

Odd Ratio (OR)	Value	95% *Confidence Interval* (CI)
OR for side effects (Light/Medium)	0.010	0.001 – 0.091

Source : Primary data, 2025

In table 11, the *Odd Ratio* (OR) value of 0.010 indicates a drastic decrease in the chances of success. Because the *Odds Ratio* (OR) is below 1 and the confidence interval limit (95% CI) does not include the number 1, it is considered significant. For the interpretation of the risk of failure, this value is reversed (1/0.010 = 100). Patients who experience moderate side effects have a chance of successful therapy only 0.010 times compared to patients with mild side effects. Or the patient's risk of therapy failure is 100 times higher if they experience moderate side effects.

Discussion

Patient Characteristics

Based on the results of the study entitled "Analysis of DOTS Side Effects on the Success of Pulmonary Tuberculosis Therapy at RAA Soewondo Pati Hospital" which was carried out from September to October 2025 at the DOTS Polytechnic of RAA Soewondo Pati Hospital, an overview of patient characteristics was obtained based on age, gender, drug side effects, medication adherence and therapy success where the sample met the inclusion and exclusion criteria. The age characteristics of patients in this study are classified according to the Ministry of Health of the Republic of Indonesia which groups age into 5 groups, namely infants and toddlers (>5 years), children (5 – 9 years), adolescents (10 – 18 years), adults (18 – 59 years), and the elderly (<60 years). In addition, the Ministry of Health of the Republic of Indonesia also divides the elderly into several stages of old age, namely pre-elderly (45-59 years), young elderly (60-69 years), middle elderly (70-79 years), and elderly (80-89 years).

Characteristics by Age

In table 1, it is explained that most of the patients are in the age group of 45 – 59 years old as many as 49 (41.88%) followed by the age group of 19 – 44 years old as many as 40 (34.19%). This shows that pulmonary tuberculosis sufferers are more common in the productive age group and pre-elderly. This age group of 19-44 years is a group with a productive age that tends to have high social activities and mobility so that it has the potential to be more exposed to bacteria that cause pulmonary tuberculosis. Meanwhile, the age group of 45 – 59 is a pre-elderly age group where this period is a transition period from adulthood to the elderly which is characterized by the onset of biological, psychological, and social changes due to the aging process. One of the internal factors a person has a significant impact on the prevalence of pulmonary tuberculosis *is* age. Pulmonary TB is more easily transmitted in an older person because in old age there is an aging cycle that causes a decrease in immunity so that they are more susceptible to exposure to bacteria that cause this disease. These results are in line with research conducted by Muhammad Farhan et al. (2024) where in old age pulmonary tuberculosis is more easily transmitted because at this age the body's immunity has decreased.

Characteristics by Gender

In terms of gender, male patients are more than women, namely 68 (58.1%) male patients and 49 (41.9%) female patients, which can be seen in table 2. These results show that men are more at risk of suffering from pulmonary tuberculosis, this is due to high mobility, heavier work, and smoking habits. These results are in line with the research conducted by Endang Martini et al. (2024) with 97 (64.7%) male and 53 female (35.7%) results from a sample of 150 patients (Martini et al., 2024). In line with the research of Besse Putri Andira et al. (2024) which shows that from 49 samples consisting of 30 respondents (61.2%) and 19 female respondents (38.8%) who suffer from tuberculosis *(Tuberculosis)* mud (Andira et al., 2024).

Characteristics Based on Drug Side Effects

Related to the severity of drug side effects are classified based on standard criteria that refer to clinical literature sources or treatment guidelines which can be seen in table 5. In this study, the determination of severity (mild, moderate, severe) was assessed not only through the symptoms reported, but also based on the duration of time and length of time the patient felt side effects through a questionnaire distributed to respondents. This study showed that most of the side effects occurred in the intensive phase, namely in the first 1 to 2 months of treatment. The intensive phase is a vulnerable stage because the patient consumes the most abundant and potent combination of OAT, so unwanted drug reactions often appear significantly. However, after going through the intensive phase, it is reported that most of the side effects are no longer felt and gradually improve. Patients generally report feeling more comfortable undergoing therapy in the advanced phase. In this study, the severity of mild side effects was 103 (88%) and moderate 14 (12%). The most commonly reported side effects complaints included red urine 117 (100%), no appetite 18 (15.4%), nausea 22 (18.8%), and flu-syndromes such as fever, chills, weakness, headache, and bone pain experienced by 35 (29.9%).

In flu-syndrome symptoms, most patients complain of aches and pains, this explanation can be seen in table 4.1.3. These findings suggest that the use of anti-tuberculosis drugs (OATs) is generally still well tolerated by patients. In this study, the most common side effect was the change in urine color to red, which was experienced by all respondents (100%). In line with research previously conducted by Andira et al (2024) at the Jogaya Makasaar Health Center, it showed that out of 49 samples of pulmonary tuberculosis patients (100%) experienced the side effect of urine turning red (Andira et al., 2024). In line with the research of Nur Rasdianah et al. (2022) at MM Dunda Limboto Hospital which reported that the most frequent complaint in TB patients is reddish urine due to the influence of drug metabolism. This change in urine color is not dangerous because it is the result of the normal metabolic process of the drug and not a sign of organ damage (Numbers et al., 2022). Based on the results of observations at the Poli DOTS RAA Soewondo Pati Hospital, health workers routinely provide education to patients that these side effects are temporary and do not need to be worried. Treatment of side effects is carried out through periodic

monitoring by pulmonologists and healthcare workers during routine controls, so that patients can continue treatment safely and effectively.

Characteristics Based on Medication Adherence

From the compliance aspect listed in table 5, it is known that 92.3% of patients are classified as compliant in taking medication while only 6.8% are non-compliant. This high level of compliance demonstrates the effectiveness of implementing the DOTS strategy that ensures patients take medication regularly under the supervision of health workers. In line with this, the results of the study also showed that 93.2% of patients successfully completed therapy with treatment results that were declared successful, while the other 6.8% were recorded as discontinuation of treatment. These findings indicate that medication adherence is an important factor that is closely related to the success of therapy in pulmonary tuberculosis patients. Medication compliance can be found from the questionnaire distributed to respondents, in addition to that it can be known from taking medication according to the specified time and shown by the yellow TBC 01 form card carried by each control.

Characteristics Based on Therapy Success

In table 6, it is explained that out of a total sample of 117 patients, as many as 109 patients (93.2%) successfully completed pulmonary tuberculosis therapy completely, while 8 patients (6.8%) were recorded as unsuccessful. The unsuccessful in this therapy is due to the fact that the patient does not complete the treatment until it is finished. Follow-up efforts have been made by health workers by contacting patients through the registered phone number, but have not received any further response. Patients who have successfully undergone therapy are those who have completed the entire course of treatment and show significant improvement in clinical conditions. This is characterized by weight gain that is monitored every month, reduced complaints such as cough and shortness of breath, and clinical examination results that show improvement in the patient's general condition. Medical records also show that the patient obtained negative BTA laboratory results. This is in line with research conducted by Adelia Ratna Sari et al. (2022) which states that the DOTS strategy is categorized as successful if the patient experiences clinical improvement, such as increased appetite followed by weight gain. This happens because OAT (Anti-Tuberculosis Drug) treatment is able to suppress most of the population of germs that cause tuberculosis, especially in the first few days of therapy, so that the body's immune system has a chance to recover and increase the patient's immunity (Sari et al., 2022).

Normality Test

The Kolmogorov-Smirnov normality test conducted on the research data showed a significance niali *(Asymp.Sig. 2-tailed)* of 0.000. Based on statistical criteria, the p< value of 0.05 indicates that the data is not normally distributed. These results determine the next analysis to be carried out. Because the basic assumption of normality is not met, the use of parametric statistical methods *such as Independent Samples T – Test* or linear regression cannot be done because it can produce biased and inaccurate conclusions. Therefore, this study used *non-parametric statistical analysis*, namely *chi-square* and *Odd Ratio* (OR), to test the relationship and effect of side effects on the success of pulmonary tuberculosis therapy.

Homogeneity Test

In the homogeneity test*, the Levene's Test* was carried out to find out whether the variance in the side effect score was the same between the therapy success groups. Based on the results of the tests that have been carried out, a significance value (Sig.) of 0.982 was obtained. Since the p> value was 0.05 (0.982 > 0.05), it can be concluded that the variance in the adverse effect score between the therapy success groups was homogeneous. Although this homogeneity is assumed to be met, this does not affect the results of the normality test that has been performed. Therefore, in this study, non-parametric statistical analysis was still used, namely *chi-square* and *Odd Ratio* (OR) to test the relationship and influence of side effects and therapy success.

The Effect of Side Effects on the Success of Pulmonary Tuberculosis Therapy

Based on the results of statistical analysis that has been carried out through *Chi-square* and *Odd Ratio* (OR) tests, it is known that drug side effect variables have a very strong influence on the success of therapy of pulmonary tuberculosis patients at RAA Soewondo Pati Hospital. The results of *the chi-square* test showed a *P-value* of 0.000 (<0.05), indicating that there was a significant relationship between drug side effects and therapy success. And the *Odd Ratio* (OR) shows a value of 0.010 with a 95% confidence interval between 0.001 to 0.091. This OR value is well below 1 and the limit of the confidence interval does not include the number 1. This suggests that moderate side effects are a risk factor that significantly decreases the success of therapy. Specifically, the risk of patients to fail therapy is 100 times higher if the patient experiences moderate side effects compared to patients who experience mild side effects. The patient's chance of success in therapy is only 0.010 times if they experience moderate side effects. This finding can be explained through the theory *Health Belief Model* (HBM). In HBM, side effects are considered to be "*perceived barrier*" or the obstacles felt by the patient in carrying out therapy. When patients experience uncomfortable symptoms such as nausea, joint pain, hives, or liver disorders due to anti-tuberculosis drugs (OAT), the perception of resistance to treatment increases, thus decreasing motivation to continue therapy regularly.

Severe side effects often cause patients to stop or delay taking medication without consulting a health professional, ultimately leading to therapy failure. This strengthens the results of the analysis that side effects have a strong relationship with *Outcome* therapy, because side effects can decrease adherence, motivation, and sustainability of therapy in pulmonary tuberculosis patients undergoing DOTS treatment (Asclepius, 2024).The results of this study are in line with the findings of several previous studies, both at the national and international levels. Research conducted by Setiawan and Ascobat (2019) in Jakarta shows that adverse drug reactions (*Adverse Drug Reactions* or ADR) against first-line OAT was significantly associated with therapy failure, with the *Odds Ratio* by 10.91 ($p < 0.001$). This means that patients who experience ADR have almost 11 times greater risk of therapy failure than patients without side effects (Setiawan & Ascobat, 2019). In line with the research of Rosamarlina et al. (2017) at RSPI, Prof. Dr. Sulianti Saroso showed that the side effects of OAT are a serious problem that can affect the success of treatment of TB patients.

Of the 53 patients observed, 50.9% experienced mild to moderate side effects and the researchers concluded that side effects that were not properly managed could reduce the success of therapy (Lisdawati et al., 2017). Research by Seniantara et al. (2018) at the Pekauman Health Center in Banjarmasin also found that there was a significant relationship between OAT side effects and medication adherence, where the more severe the side effects experienced by the patient, the lower the level of adherence to therapy (Seniantara et al., 2018). It is also in line with the research conducted by Eko Retnowati et al. (2021) at the outpatient installation of the Jiken health center in Blora district, based on the results of a bivariate analysis test using a statistical test *Chi Square* obtained (p) p value = $0.000 \leq 0.05$ which states that there is a relationship between side effects of anti-tuberculosis drugs combination of package 4 on the level of compliance of tuberculosis patients (Retnowati et al., 2021). Thus, the results of the study at RAA Soewondo Pati Hospital reinforce the finding that the side effects of OAT are an important factor that affects the success of pulmonary tuberculosis therapy, either directly through physiological disorders and indirectly through decreased patient adherence to DOTS treatment.

IV. CONCLUSION

In general, the implementation of DOTS therapy at RAA Soewondo Pati Hospital showed good results. Most patients successfully complete therapy with a high success rate, despite experiencing various side effects of the drug. The side effects that arise are generally mild to moderate and can be controlled through monitoring and education from health workers. The most common types of side effects experienced by pulmonary tuberculosis patients during DOTS therapy include urine discoloration to red 117 (100%), nausea 22 (18.8%), flu syndrome with the most complaints of joint pain 35 (29.9%), itching to redness spots

on the skin 11 (9.4%) and lack of appetite 19 (16.2%). Severe side effects such as hearing loss or vision impairment are experienced by only a small percentage of patients.

Patient characteristics showed that the majority of pre-elderly 45-59 years old as many as 49 patients (41.88%) and adults aged 19-44 years as many as 40 patients (34.19%) and 68 male patients (58.1%) more compared to female patients 49 (41.9%). The severity of side effects was dominated by the mild category as much as 97 (82.9%), followed by moderate as much as 12 (10.3%), and a small part severe as many as 8 (6.8%). Mild side effects do not cause significant disruption to the continuation of therapy, but severe side effects may affect the patient's motivation and adherence to taking OAT regularly. There is a very significant relationship and influence between drug side effects and the success of pulmonary tuberculosis therapy. This is shown by the results of the chi-square test which shows a p-value of 0.000 ($p<0.05$). And the Odd Ratio (OR) which yields a value of 0.010. Interpretation of this value shows that patients who experience moderate side effects have a 100-fold higher risk of therapy failure.

Thank You

The researcher would like to thank the supervisor who has guided the researcher in compiling this research.

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