Effects of Anti Tuberculosis Side Effect on the Quality of Life of Tuberculosis Patients in RSKP Respira Yogyakarta at the Period of January-June 2019

Bangunawati Rahajeng[1,*] Nabila Shafira[2,] Pinasti Utami[3]

[1,3] *Departement Pharmacology and Clinical Pharmacy. Schoolof Pharmacy, Faculty of Medicine and Health Scences, Universitas Muhammadiyah Yogyakarta*
[2] *Under Graduate Students, Schoolof Pharmacy, Faculty of Medicine and Health Scences, Universitas Muhammadiyah Yogyakarta*
Corresponding author. Email: bangunawati.r@umy.ac.id

ABSTRACT

The emergence of side effects in the use of anti-tuberculosis drugs is reported to disrupt daily activities; thus, it can affect the quality of life of TB patients. This study aims to determine the relationship between the side effects of anti-tuberculosis drugs and TB patients' quality of life. This research was conducted in April-July 2019 at Respira Hospital Yogyakarta, involving 35 tuberculosis patients who routinely underwent treatment. This study used a prospective observational study design with a case-control method with interviews and WHOQOL-BREF (WHO Quality of Life-BREF) questionnaire. A total of 35 patients (100%) experienced side effects of tuberculosis treatment. A total of 33 patients (94.3%) had a good quality of life, and two other patients (5.7%) had a poor quality of life. The relationship between side effects and quality of life was divided into two categories: the severity of side effects and interference with side effects on daily activities. A total of 23 patients (65.8%) experienced mild side effects, and 12 patients (34.2%) experienced severe side effects. A total of 16 patients (45.7%) admitted that side effects did not interfere with activity, nine patients (25.7%) claimed side effects interfered with activity, and ten patients (28.9%) claimed side effects significantly interfered with activity. The relationship between the severity of side effects with quality of life obtained a p-value > 0.05 with an Odds Ratio (OR) of 1.2 (95% Cl = 0.932-1.546). The relationship between drug side effects and quality of life obtained p-value > 0.05. Both p-values indicated no significant relationship. Thus, it can be said that the side effect of the TB-drug did not significantly affect TB patients' quality of life.

Keywords: anti-tuberculosis drug, side effects, tuberculosis, quality of life

1. INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by the Mycobacterium group of bacteria, namely the Mycobacterium tuberculosis type. These bacteria most commonly attack the lungs and small parts of other organs such as bones, lymph, and joints [1]. Indonesia occupies the position of the top 4 countries with the highest TB prevalence. A total of 420,994 new cases were reported in 2017, with the percentage of incidence in males being 1.4 times higher than in females. In 2017, it was reported that there were 992 new cases of acid-resistant bacterial TB (+) in the Special Region of Yogyakarta, with 20,260 suspected people [2].

The best TB control is to prevent transmission and infection. Preventive action can be carried out in various ways. The most important thing is to provide correct and sufficient anti-tuberculosis drugs and be consumed according to the drug's provisions. Some of the principles of TB treatment are: The first principle is to avoid the use of monotherapy, which aims to prevent the emergence of bacterial resistance to anti-TB drugs. The second principle is direct supervision (DOT = Directly Observed Treatment) and a Drug-taking Supervisor (PMO=Pengawas Minum Obat) to ensure patient compliance in taking TB drugs. The third principle is that TB treatment is carried out in two stages: the intensive and advanced stages. The treatment regimen used in TB treatment is an antibiotic based on three mechanisms: killing bacteria, sterilizing it, and preventing resistance. The drugs in the treatment of TB are Ethambutol, Rifampin, Pyrazinamide, and Streptomycin [1].

TB treatment is carried out continuously for at least 6 months with several drug combinations. The use of drugs in the long term and the combination can cause various drug side effects. The side effects caused by anti TB drugs are quite diverse, such as nausea, vomiting, tingling feet, and even reddish urine. Side effects that appear often cause patient anxiety. As much as 81.82% of tuberculosis patients admitted that treatment's side effects disrupted their daily activities [3]. It is feared that the emergence of side effects that interfere with the patient's activities can obstruct the patient's activities to meet their daily needs, both physically and mentally. If a person experiences a situation where he cannot meet his needs, it can be said that someone does not have a good quality of life. Quality of life, by WHO (2004), is defined as individual perceptions in a person's life in terms of the cultural context, behavior, and value systems in which they live and are related to the standard of living, expectations, pleasures, and individual judgments of their position in life. The study by Perwitasari et al. found that the quality of life for TB patients decreased in the first month of therapy. This study

assessed TB patients' quality of life based on physical, environmental, social, and psychological dimensions [4,5].

This study was conducted to determine the incidence rate of side effects of anti-tuberculosis drugs and TB patients' quality of life at Respira Hospital Yogyakarta. It also observed the relationship between the side effects of anti-tuberculosis drugs on the quality of life of TB patients at Respira Yogyakarta Hospital.

2. METHODS

2.1. Study design and Samplimg

This research is a non-experimental study with a correlative analytic method and a cross-sectional approach. Statistical analysis used bivariate analysis to identify the relationship between anti-tuberculosis drugs' side effects and the quality of life of TB patients. This study included all patients diagnosed with TB and underwent outpatient treatment at Respira Yogyakarta Hospital in January-June 2019 and obtained 53 patients' data. Respira Yogyakarta Hospital is a specialized lung hospital that is the primary reference for the Special Region of Yogyakarta, including tuberculosis cases. Respira Yogyakarta hospital's choice to be the research site was because the visit rate of TB patients at the Respira Yogyakarta hospital was higher than in the other hospitals.

The sampling technique used purposive sampling, and the Slovin formula was used to get the number of samples with a confidence level of 0.0. The samples obtained were 35 patients. The 35 patients matched the study inclusion criteria (age> 17 years and willing to be respondents).

2.2. Questionnaire

The interview form was used to determine patient characteristics and side effects of anti-TB drugs in patients. The WHOQOL-BREF (WHO Quality of Life-Bref) questionnaire consisted of 26 questions with five answer scales to determine the quality of life of TB patients. The validity test was carried out on the WHOQOL-BREF questionnaire. The r count of the 26 questions value was higher than 0.4973; thus, it could be stated that the WHOQOL-BREF questionnaire was valid for determining the quality of life of TB patients. In the reliability test, a Cronbach Alpha value was obtained of 0.938; thus, it could be said that the WHOQOL-BREF questionnaire was reliable for determining TB patients' quality of life at Respira Yogyakarta Hospital.

Hence, the authors interviewed how far the side effects interfered with daily activities and measured them on a scale. Scale 1 was for patients who experienced that side effects do not interfere with activities; that is, a condition where side effects occurred; patients could still carry out their daily activities without any disturbance. Scale 2 was for patients who experienced that side effects interfered with activities, namely a situation where with the appearance of side effects, the patient could still carry out daily activities even though

they could not be maximized, such as without drug side effects. Scale 3 was for patients who experienced that side effects were very disruptive to their activities, namely a situation where the side effects of drugs appeared, the patient could not carry out his daily activities.

2.3. Data Analysis

The quality of life was categorized into 2, namely the good and poor quality of life. According to Skevington, Lotfy, and O'Connel, the WHOQOL-BREF questionnaire's assessment can be modified by researchers. To calculating the quality of life, the statistical formula was calculated using P = range divided by many classes. P was the length of the level (the highest score minus the lowest score), the total score of 130 was divided into the excellent quality of life and poor quality of life; thus, the class length was 65. After obtaining a P of 65 and the lowest score of 0, it could be categorized as 0 -65 = poor quality of life, and 66-130 = good quality of life [6].

2.4. Ethical Clearance

This research has been approved by the research ethics committee of the Faculty of Medicine and Health Sciences Universitas Muhammadiyah Yogyakarta number 088/EP-FKIK-UMY/III/2019

3. RESULT AND DISCUSSION

3.1. Demographic Data

In this study, questionnaires were distributed to 35 tuberculosis patients who were actively undergoing outpatient treatment at Respira Yogyakarta Hospital. Of the 35 patients, it was found that the majority of patients were male, with a total of 19 patients (54.2%), while the remaining 16 were female (45.8%). Men had a higher risk of contracting TB infection than women as men of reproductive age frequently went out to work, so they were more exposed to infections. Besides, men also had a greater tendency to smoke and consume alcohol, which could lower immunity and make them more susceptible to contracting TB infection (Infodatin, 2018). In terms of the age range, the researchers divided it into two groups, 17-45 years old and > 45 years old. The age of 17 was selected because researchers found that the minimum age for a person to interpret life's quality was 17 years old. The majority was > 45 years as many as 20 patients (57.1%), while 15 patients aged between 17-45 (42.9%). The figures around the world showed that tuberculosis morbidity and mortality increased with age. Furthermore, the factor of decreasing immunity with age increased the risk of contracting various diseases, one of which was TB [7]. The researcher divided two categories of education level in this study: low education (Elementary-Junior High School) and higher education (Senior High School-College). The majority of patients had received higher education, as many as 28 patients (80%), while seven patients had low education (20%). The level of education was a confounding variable that determined the patient's attitude towards TB-drug side effects. Of the total 35 respondents involved in this study,

most of the patients worked as many as 24 patients (68.6%), while 11 patients did not work (31.4%). People who worked had a TB prevalence of 1.5 times greater than people who did not work. A person who actively worked for income had a risk of suffering from tuberculosis compared to people who did not work [5]. Data on patient characteristics distribution is presented in Table 1.

Table 1. Patients Characteristics

No	Patients Characteristics		n	%
1	**Gender**	Male	19	54,2
		Female	16	45,8
2	**Age**	17-45	15	42,9
		>45	20	57,1
3	**Level of Education**	Elementary– Junior High School	7	20
		High School-University	28	80
4	**Job**	Employed	24	68,6
		Unemployed	11	31,4
	TOTAL		35	100

3.2. Side Effects of Anti Tuberculosis

The majority of patients who underwent treatment for 3-6 months were 14 (40%), followed by 13 (37.1%) who underwent treatment for 1-3 months, and eight patients (22.9%) underwent treatment> 6 months.

Tuberculosis outpatients at Respira Yogyakarta Hospital took 1-5 types of medicine per day. The majority of patients consumed three types of drugs, namely 13 people (37.1%) and 9 people (25.8%) who consumed two types of drugs per day, six people (17.1%) consumed five types of drugs per day, five people (14, 3%) consumed 1 type of medicine per day and two people (5.7%) consumed four types of medicine per day. At the interview stage, the researcher ensured that the respondent was not undergoing treatment other than TB-drugs so that the side effects that occurred to the respondents were side effects caused by TB- drugs.

Of the 35 TB patients, it was indicated that the majority of patients, which were 27 people (77.1%), experienced 1-5 incidents of side effects, and eight people (22.9%) experienced > 5 side effects. To classify the extent to which the incidence of side effects disturbed the patient's daily activities, the authors divided it into three scales: a scale of 1 for information of not disturbing, scale 2 for information of disturbing, and scale 3 for information of very disturbing. The results showed that most patients (16 patients 45,7%) felt that their daily activities were not disturbed by TB-drugs' side effects. Ten people (28.6%) admitted that the side effects were alarming, while the remaining nine people (25, 7%) stated that TB-drug's side effects interfered with daily

activities. Of the 35 patients, 18 (51.4%) reported side effects to the Respira Yogyakarta Hospital, while the other 17 (48.6%) did not report any side effects. The response from Respira Yogyakarta Hospital in responding to the 18 reports of side effects was divided into three actions, namely ten reports of drug administration (55.5%), medical treatment for four reports (22.25%), and administration of drugs and medical treatment for four reports (22.25%). After getting further action from the Respira Yogyakarta hospital, 16 people (88.9%) stated that the side effect complaints decreased. In contrast, the other 2 (11.1%) stated that the side effect complaints did not decrease. Details can be seen in table 2

Table 2. Anti-Tuberculosis Drug Use Description

No	Description	n	%
The duration of therapy			
1	1-2 months	13	37,1
2	3-6 months	14	40
3	>6 months	8	22,9
The item of medication			
1	1 item	5	14,3
2	2 items	9	25,8
3	3 items	13	37,1
4	4 items	2	5,7
5	5 items	6	17,1
The incidence of side effects			
1	1-5 incidences	27	77,1
2	>5 incidences	8	22,9
Reports on Side Effects to the Hospital			
1	Reported	18	51,4
2	Not Reported	17	48,6
Hospital Actions			
1	Drug Administration	10	55,5
2	Medical Treatment	4	22,25
3	Drug Administration & Medical Treatment	4	22,25
The result of the action			
1	Less complaints	16	88,9
2	Complaints have not been reduced	2	11,1

The incidence of TB-drug's side effects in the Respira Yogyakarta Hospital outpatient installation was recorded

using the interview method and filling in the checklist in the TB-drug's side effects form. Details can be seen in table 3

Tabel 3. Types of Side Effects Of Anti Tuberculosis

No	Side Effects	n	%
1	Red urine	34	97,14
2	Nausea	18	51.4
3	Lack of appetite	18	51,4
4	Joint pain	17	48,6
5	Tingling	14	40
6	Itchy	12	34,3
7	Fever	9	25,7
8	Stomach ache	8	22,9
9	Feet burns	4	11,4
10	Headache	4	11,4
11	Reddish skin	2	5,7
12	Increased uric acid	1	2,9
13	Liver disorders	1	2,9
14	Cold Feet	1	2,9
15	Shaky	1	2,9
16	Out of breath	1	2,9

For severity, the authors referred to WHO (2019), which divided anti-tuberculosis drug's side effects into mild and severe side effects [8]], in full in Table 4.

Table 4. Classifications of side effects

Mild Side Effects		n	%
Types	**Etiology**		
No appetite, nausea, stomach ache	Rifampicin	23	65,8
Joint pain, tingling sensation, and burning in the legs	Pyrazinamide Isoniazid		
Reddish color in urine	Rifampicin		
Severe Side Effects		12	34,2
Itching and redness	All types of anti-tuberculosis drugs		
Deaf	Streptomycin		
Balance disorders	Streptomycin		
Jaundice without other causes	Almost all anti-tuberculosis drugs		
Confusion and vomiting (starting medication)	Almost all anti-tuberculosis drugs		
Vision Impairment	Ethambutol		
Purpura and shock	Rifampicin		

A total of 12 (34.2%) patients experienced severe side effects in the form of itching and 2 of these 12 patients experienced redness, which was a severe side effect. In comparison, 23 patients (65.8%) experienced side effects such as nausea, lack of appetite, eating, stomach pain, tingling sensation, and red urine, which were minor. The occurrence of these side effects allowed for limitations in activities. A complete description can be seen in Table 5

Table 5. Interference with Side Effects on Life

No	Disturbance Scale	n	%
1	1 (do not disturb)	16	45,7
2	2 (annoying)	9	25,7
3	3 (very annoying)	10	28,6

3.3. Quality of Live of Tuberculosis Patients

Based on the WHOQOL-BREF questionnaire distribution to 35 tuberculosis patients who experienced side effects at the outpatient installation of Respira Yogyakarta Hospital, the results showed that 34 (97.1%) people had a good quality of life. In contrast, others (2.9%) had a poor quality of life. The total score of the WHOQOL-BREF questionnaire was 130, divided into the excellent quality of life and poor quality of life so that the class length was 65. After getting a P of 65 and the lowest score of 0, it could be categorized as 0 -65 = poor quality of life, and 66-130 = good quality of life[6].

Patient health assessment is very dependent on the doctor's assessment, where the doctor will assess the patient's health based on clinical, laboratory, and radiological data represented by physical functions. Physical function can be affected by age and employment status, both of which also affect an individual's quality of life. Rochmayanti (2011) stated that one that affects the quality of life was age. Kristofferzon (2005) stated that increasing age would decrease physiological function, which could inhibit individual activities in improving the quality of life and lifestyle; thus, it reduced life quality [9]. Physical function is also influenced by work status; job status can affect patients' quality of life. Work is related to self-actualization and increases the ability of individuals to be more responsible in completing tasks. On the other hand, individuals who work may have more dense activities and the possibility of more significant stress [10]. Meanwhile, in terms of the results obtained for questions on physical dimension points, 94.3% of patients had a score of more than 17.5 from a total score of 35, which indicated that the physical function of tuberculosis patients functioned correctly.

Social support is an item that expresses an individual's feeling of responsibility, support, and the availability of help from friends and family. Social support can be assessed by how satisfied individuals are with family and friends' support. In this case, it is the support received by patients during difficult times. In this study, in terms of the assessment of questions that compiled social relationships' dimensions, 100% of patients obtained a score above 7.5 from a maximum

rating of 15, which indicated that patients had high satisfaction with support from friends or family [11]. According to Ventegodt, one of the many aspects that affected the quality of life was wellbeing, satisfaction with life & happiness. Wellbeing is defined as a prosperous life, both superficially, fulfillment of needs, and self-realization.

Meanwhile, satisfaction with life & happiness is defined as a feeling when hopes, needs, and desires are fulfilled, causing a feeling of satisfaction. Self-satisfaction can be interpreted as a mental feeling, which means happiness, something that is contained in a person that involves a unique balance in him [12]. This theory is supported by an assessment of the psychological dimensions of tuberculosis patients. In terms of questions from the psychological dimensions, 94.3% of patients had a score of more than 15 from a maximum value of 30, indicating that the patient had satisfaction with his life.

Kara and Alberto (2007) suggested that patients were direct agents who would shape and respond to environmental conditions. Thus, patients could play a role in self-development, adaptation, and self-renewal [13]. The environmental dimension was influenced by environmental conditions, participation in recreation, and satisfaction with health services. The environmental dimension consisted of several questions with a maximum value of 40; 100% of tuberculosis patients obtained a score of more than 20, which indicated that the patient had a proper assessment of the environmental conditions around him, and could adapt to the environment and the ability to access the right information.

3.4. Relationship of TB-Drug's Side Effects and Quality of Life of TB Patients

To identify the relationship between TB-drugs' side effects and the quality of life of TB patients, the researchers divided it into two categories: the severity of the incidence of side effects experienced by the patient and the side effect disturbed in the patient's daily activities. The chi-square test results for the severity of the incidence of side effects obtained p = 0.11. The p-value was obtained from Fisher's extract test as the data analyzed was 2x2, but there was a value of <5 in the cell. As the p value> 0.05 indicated that Ho was accepted, there was no significant relationship between the severity of the incidence of TB-drug's side effects on the quality of life of tuberculosis patients. The Odds Ratio (OR) value was 1.2 (95% Cl = 0.932-1.546), which indicated that patients with severe side effects were 1.2 times more likely to have a poor quality of life. Meanwhile, the 95% Confidence Interval value indicated that in a broader scope, in this case, the province of Yogyakarta, someone who experienced severe category side effects in tuberculosis treatment, had a higher probability of 0.932-1.546 having a poor quality of life. Based on the bivariate analysis, out of a total of 35 respondents, patients with mild side effects had a good quality of life of 65.71%, and patients with mild side effects who had poor quality of life were 0%. Meanwhile, patients with severe side effects and had a good quality of life were 28.6%, and patients with severe side effects and had a poor quality of life were 5.7%. Furthermore, it can be seen in table 6.

Table 6. The Correlation of Severity of Anti-Tuberculosis Side Effects with Quality of Life of TB Patients

No	Side Effect Severity	Quality of Life		p	OR	95%CI
		Good	Poor			
1	Mild	23 (65,71%)	0 (0%)	0,111	1,200	0,932-1,546
2	Severe	10(28,6%)	2 (5,7%)			
Total		33 (94,3%)	2 (5,7%)			

Meanwhile, in terms of the category of association with side effects of anti-tuberculosis in daily activities with the patient's quality of life, a Chi-square result of 0.407 (p> 0.05) showed no significant relationship between side effects in daily activities and the patient's quality of life. Chi-square value was obtained from the Pearson Chi-Square analysis as the data analyzed was 3x2. Based on the multivariate analysis, the explanation can be seen in table 7

Table 7. Relationship between Anti-Tuberculosis Side Effects and Quality of Life of TB Patients

No	Side Effects on daily activities	Quality of Life		p
		Good	Poor	
1	Does not disturb	16 (45,7%)	0 (0%)	0,407
2	Disturb	8 (22,8%)	1(2,9%)	
3	Very annoying	9 (25,7%)	1(2,9%)	
	Total	33 (94,2%)	2(5,8%)	

Someone who supports a higher level of education will increase self-confidence in behaviour [14]. The results showed that 80% of patients had a high level of education, namely high school and university education, so it was easier for them to digest the counseling of side effects of TB-drug given by the Respira Yogyakarta hospital before starting the treatment. The patient also reported the incidence of side effects in the Yogyakarta Respira hospital. The patient did not feel anxious as these effects did not last long and could be overcome by administering drugs or medical treatment.

The support of all family members is essential in the patient's healing and recovery process in providing support to one of the family members suffering from a disease. Family support is vital in treating tuberculosis patients. The family's role in treating tuberculosis, among others, is to motivate the patient so that the patient does not feel alone in undergoing treatment [15]. Besides, the family is expected to foster the spirit of life for tuberculosis patients to generate enthusiasm for their recovery. This theory is supported by acquiring the highest score from the four dimensions that made up the WHOQOL-BREF instrument, which was the dimension of

social relations, where 88.6% of patients received excellent support from family or friends during the treatment period. This condition allowed the patient to tell the side effects he experienced to his closest relatives. Family or friends encouraged the patient to report the side effects they experienced to the Yogyakarta Respira hospital. The emergence of anti-tuberculosis side effects did not harm the quality of life of tuberculosis patients who experienced the effects.

3.4. Limitation

The weakness of this research is the questionnaire used to measure the quality of life. WHOQOL-BREF is a general quality of life questionnaire which is not specific to the respiratory system. Consideration for using a general quality of life questionnaire is that TB can occur not only in the lungs.

4. CONCLUSION

A study of 35 tuberculosis patients with side effects showed that 94.3% of respondents had a good quality of life, with 34.3% of patients experiencing significant TB-drug's side effects and 65.7% of patients experiencing minor side effects.

The severity of the incidence of anti-tuberculosis side effects and the side effects disorders had no significant relationship with the patient's quality of life.

ACKNOWLEDGMENTS

REFERENCES

[1]. Kementrian Kesehatan RI. Stranas_tb-2010-2014.pdf [Internet]. 2011 [cited 2020 Aug 22]. Available from: http://origin.searo.who.int/indonesia/topics/tb/stranas_tb-2010-2014.pdf

[2]. Departemen Kesehatan RI. Infodatin Tuberkulosis. 2018.

[3]. Farhanisa, Untari EK, Nansy E. Kejadian Efek Samping Obat Anti Tuberkulosis (OAT) Kategori 1 Pada Pasien TB Paru Di Unit Pengobatan Penyakit Paru-Paru (UP4) Provinsi Kalimantan Barat. 2017.

[4]. WHO. WHO | Anti-tuberculosis medication side-effects constitute major factor for poor adherence to tuberculosis treatment. Bulletin Of the WHO. 2008 Mar;86(3):161–240.

[5]. Perwitasari DA, Mulyani UA, Thobari JA. Pengukuran Kualitas Hidup Pasien Tuberkulosis Menggunakan Instrumen St George Respiratory Questionnaire (SGRQ) Di Yogyakarta. Prosiding Seminar Nasional Peluang Herbal Sebagai Alternatif Medicine. 2015;7.

[6]. Skevington SM, Lotfy M, O'Connell KA. The World Health Organization's WHOQOL-BREF quality of life assessment: Psychometric properties and results of the international field trial. A Report from the WHOQOL Group. Quality of Life Research. 2004 Mar;13(2):299–310.

[7]. Resende LSO, Santos-Neto ET dos. Risk factors associated with adverse reactions to antituberculosis drugs. Jornal Brasileiro de Pneumologia. 2015 Feb;41(1):77–89.

[8]. WHO | Global tuberculosis report 2019 [Internet]. WHO. World Health Organization; [cited 2020 Aug 25]. Available from: http://www.who.int/tb/publications/global_report/en/

[9]. Rochmayanti R. Analisis Faktor-Faktor Yang Mempengaruhi Kualitas Hidup Pasien Penyakit Jantung Koroner di Rumah Sakit PELNI Jakarta. Universitas Indonesia; 2011.

[10]. Chinomona R, Dhurup R, Chinomona E. The influence of Quality of Work Life on Employee Job Satisfaction, Job Commitment and Tenure Intention in the Small and Medium Enterprise Sector. South African Journal of Economic and Management Sciences. 2013 Dec;16(4):31.

[11]. Potter P, Perry A. Fundamental Keperawatan (3-Vol Set) - 7th Edition. In: 7th ed. Elsevier; 2010 [cited 2020 Aug 25]. Available from: https://www.elsevier.com/books/fundamental-keperawatan-3-vol-set/potter/978-981-272-534-9

[12]. Ventegodt S, Merrick J, Andersen NJ. Quality of Life Theory I. The IQOL Theory: An Integrative Theory of the Global Quality of Life Concept. The Scientific World JOURNAL. 2003;3:1030–40.

[13]. Kara Kaşıkçı M, Alberto J. Family support, perceived self-efficacy and self-care behaviour of Turkish patients with chronic obstructive pulmonary disease. Journal of Clinical Nursing. 2007 Aug;16(8):1468–78.

[14]. Waisbord S. Beyond the medical-informational model: Recasting the role of communication in tuberculosis control. Social Science & Medicine. 2007 Nov;65(10):2130–4.

[15]. Suriya M. Faktor-Faktor Yang Berhubungan Dengan Kualitas Hidup Pasien TB Paru Di Rumah Sakit Khusus Paru Lubuk Alung Sumatera Barat. Jurnal Keperawatan Abdurrab. 2018 Jul 2;2(1):29–38.