Pharmacy Reports

https://doi.org/10.51511/pr.65

RESEARCH ARTICLE

Open Access

Factors influencing adherence to antituberculosis treatment: A cross-sectional study at Sendang Agung Health Center, Central Lampung

Sofia Zahra Nabila, Nurul Irna Windari*, Sarmoko

Department of Pharmacy, Department of Science, Sumatera Institute of Technology, South Lampung 35365, Indonesia

*Corresponding author: Nurul Irna Windari. Jl Terusan Ryacudu No 1, Way Hui, Jatiagung, South Lampung 35365, Indonesia. Email: nurul.windari@fa.itera.ac.id

Abstract: This study investigates factors influencing adherence to antituberculosis treatment among pulmonary tuberculosis patients at Sendang Agung Health Center. Using a cross-sectional approach and purposive sampling, data were collected from 53 patients treated between January and March 2023. The study employed validated questionnaires and statistical analyses, including Chi-Square and logistic regression tests. The results showed that 33 patients (62.3%) were compliant with using antituberculosis drugs, while 20 patients (37.7%) were not compliant. Results indicate that factors such as age, gender, education, and employment status do not significantly affect treatment adherence. However, knowledge and treatment duration were found to be significant determinants, with knowledge being the most dominant factor ($p = 0.004$, OR = 16.029). The findings suggest that enhancing patient education and support systems is crucial to improving adherence and treatment outcomes. Further efforts are needed to increase awareness and ensure effective utilization of available healthcare services.

Keywords: antituberculosis drug adherence, MARS-5, pulmonary tuberculosis

Introduction

Tuberculosis (TB) is a serious infectious disease primarily affecting the lungs and requires prolonged, intensive treatment. *Mycobacterium tuberculosis* is the main causative agent [1]. TB remains a major global health issue, with incomplete treatment leading to severe complications and death. In 2020, the World Health Organization reported 9.9 million TB cases and 1.3 million deaths worldwide [2]. Indonesia ranks third globally in TB cases, with an increase from 351,956 cases in 2020 to 397,377 in 2021 [3]. In Lampung Province, TB case detection rates fall short of the 70% target, with Central Lampung Regency having the highest detection rate at 51.4% in 2021 [4].

Non-adherence to TB treatment is a critical issue, leading to high rates of treatment failure, drug resistance, morbidity, and mortality [5]. Adherence is influenced by factors such as education level, employment status, age, gender, knowledge, and the presence of a treatment supervisor. Research indicates low adherence among patients with lower education (68.6%), unemployed status (64.7%), and those in productive age groups (81%) [6]. Additionally, poor knowledge, the absence of a drug supervisor (a person responsible for directly observing and ensuring that a TB patient takes their medication as prescribed), and long distances to health facilities contribute to non-compliance [6-8].

This study focuses on the Sendang Agung Health Center in Central Lampung, where TB cases are rising, from 154 suspected cases in 2020 to 216 in 2021. The research aims to identify factors influencing adherence to antituberculosis drug use among pulmonary TB patients at this health center.

Methods

This observational study employed a cross-sectional approach with purposive sampling. Data were primarily collected using the MARS-5 compliance questionnaire, which was validated (r table value of 0.361 (df = 28) > r count) and found reliable with a Cronbach's alpha of 0.830. Additional data were obtained from the Sendang Agung Health Center's Tuberculosis Information System (SITB) application, including a knowledge questionnaire.

The study sample comprised 53 patients who were treated between January and March 2023. Inclusion criteria were: patients aged ≥17 years, BTA-positive pulmonary tuberculosis patients, those who had

Table 1. Patient characteristics based on sociodemographic factors

Variable	Category	n = 53	Percentage
Age	- <60 years	38	71.7%
	- ≥60 years	15	28.3%
Gender	- Female	23	43.4%
	- Male	30	56.6%
Formal education level	- ≥12 years	27	50.9%
	- <12 years	26	49.1%
Employment status working	- Working	32	60.4%
	- Not working	21	39.6%
Knowledge level	- Good	40	75.5%
	- Not good	13	24.5%

Table 2. Patient characteristics based on disease factors

Variable	Category	n = 53	Percentage
Duration of treatment	- ≤6 months	34	64.2%
	- >6 months	19	35.8%
Comorbidities	- None	45	84.9%
	- Yes	8	15.1%
	- Diabetes mellitus	3	
	- Hypertension	5	

received antituberculosis drugs for at least one month, and those willing to participate. Exclusion criteria included: patients unable to read and write, patients who had completed treatment, and those who did not complete the questionnaire.

The collected data were analyzed using univariate, bivariate, and multivariate analysis with SPSS.

Results

Characteristics of pulmonary tuberculosis patients

Patient characteristics are divided based on sociodemographic factors and disease factors. The majority of patients were under 60 years old, with 38 out of 53 patients (71.7%) falling into this age group (Table 1). Most patients had been undergoing treatment for six months or less, with 34 out of 53 patients (64.2%) having a treatment duration of ≤6 months (Table 2).

The majority of patients (45 out of 53, or 84.9%) did not have any comorbidities. The most common comorbid conditions among those affected were diabetes mellitus and hypertension. However, no patients with HIV/AIDS were identified in this study. This is important, as comorbidities like HIV and diabetes can weaken the immune system, increasing susceptibility to pulmonary tuberculosis.

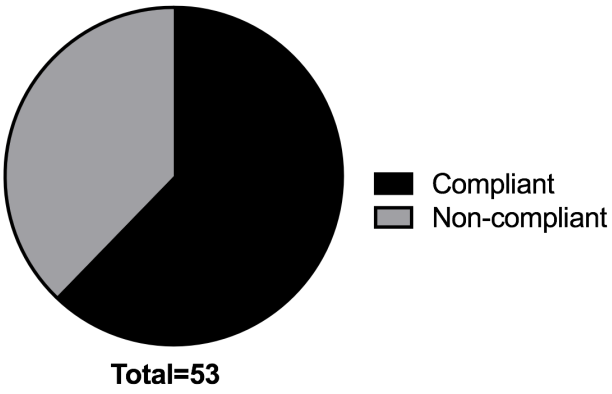

Figure 1. Frequency distribution of patients based on adherence to antituberculosis drug use

Compliance with antituberculosis drug use

Among the respondents, 33 patients (62.3%) were compliant with their antituberculosis medication regimen, while 20 patients (37.7%) were non-compliant (Figure 1). Compliance is critical for recovery, and factors such as family support, a good understanding of the disease, and a strong desire to recover play crucial roles in ensuring adherence.

Non-compliance was primarily due to patients forgetting to take their medication or temporarily stopping treatment. Additionally, long distances and poor road access to the Sendang Agung Health Center contributed to non-compliance. To address

Table 3. Chi-square test of factors on adherence to antituberculosis drug use

Variable	Compliant n (%)	Non-compliant n (%)	P value	OR (95% CI)
Age (n)				
<60 years (38)	25 (65.8%)	13 (14.3%)	0.399	1.683 (0.499-5.676)
≥60 years (15)	8 (53.3%)	7 (46.7%)		
Gender (n)				
Female (23)	12 (52.5%)	11 (47.8%)	0.185	0.468 (0.151-1.449)
Male (30)	21 (70.0%)	9 (30.0%)		
Formal education level (n)				
≥12 years (27)	20 (74.1%)	7 (25.9%)	0.071	2.857 (0.901-9.060)
<12 years (26)	13 (50.0%)	13 (50.0%)		
Employment status (n)				
Employed (32)	22 (68.8%)	10 (31.3%)	0.229	2.000 (0.642-6.233)
Not employed (21)	11 (52.4%)	10 (47.6%)		
Knowledge level (n)				
Good (40)	31 (77.5%)	9 (22.5%)	0.000*	18.944 (3.533-101.596)
Not good (13)	2 (15.4%)	11 (84.6%)		
Duration of treatment (n)				
≤ 6 months (34)	26 (76.5%)	8 (23.5%)	0.004*	5.571 (1.639-18.937)
>6 months (19)	7 (36.8%)	12 (63.2%)		
Comorbidities				
Present (8)	4 (50.0%)	4 (50%)	0.457	0.552 (0.121-2.508)
None (45)	29 (64.4%)	16 (35.6%)		

*: Statistically significant (p value <0.05); OR: odds ratio; CI: Confidence Interval

this, drug supervisors are advised to provide daily supervision during the first two months of treatment to help patients maintain adherence and avoid lapses in medication.

Bivariate analysis of factors affecting medication adherence

The Chi-Square analysis revealed no significant relationship between age and adherence to antituberculosis medication among pulmonary TB patients at Sendang Agung Health Center ($p = 0.399$, $p > 0.05$). Similarly, no significant relationship was found between gender and medication adherence, with a p-value of 0.185.

Further analysis showed that the level of formal education was not significantly related to medication adherence, as indicated by a p-value of 0.071. Employment status also showed no significant association with adherence ($p = 0.229$, $p > 0.05$).

Treatment duration was significantly associated with adherence, with a Chi-Square test p-value of 0.004. Finally, the Fisher Exact Test indicated no significant relationship between comorbidities and adherence to antituberculosis medication ($p = 0.457$, $p > 0.05$).

Multivariate analysis of factors affecting medication adherence

The logistic regression analysis revealed that both the level of knowledge and the length of treatment significantly influence adherence to antituberculosis medication. Among these factors, knowledge was identified as the most dominant factor affecting compliance. This is evidenced by a p-value of 0.004 (p

Table 4. Logistic regression results based on Chi-square test

Variable	Coefisient	P value	OR	95% CI
Gender	-0.062	0.982	0.940	0.005-187.826
Employment status	1.093	0.691	2.982	0.014-648.828
Formal education level	0.459	0.533	1.582	0.373-6.702
Knowledge level	2.774	0.004*	16.029	2.442-105.233
Duration of treatment	1.722	0.036*	5.593	1.122-27.893

*: Statistically significant (p value <0.05); OR: Odds Ratio; CI: Confidence Interval

< 0.05), an odds ratio (OR) of 16.029 (greater than 1), and a 95% confidence interval (CI) of 2.442–105.233 (not crossing 1), indicating a strong and significant association (Table 4).

Discussion

Most respondents in this study were under 60 years old (71.7%), consistent with other studies showing that most pulmonary tuberculosis (TB) patients are of productive age, with 83.3% and 77.8% of patients falling under this category in previous research [8,9]. This age group is more susceptible to TB due to their higher mobility, which increases the risk of exposure to *M. tuberculosis* [10]. However, some studies indicate that TB is more prevalent among elderly patients, likely due to a weakened immune system with age [11,12].

Male patients comprised 56.6% of the respondents, which aligns with other studies showing male dominance at 59.52% and 60% [13,14]. Men may be more vulnerable to TB because of heavier workloads, insufficient rest, and habits like smoking and alcohol consumption [15]. In contrast, other research shows a higher incidence of TB in women [16], especially in low-income countries, where women are often exposed to smoke from poorly ventilated cooking spaces [17].

Regarding education, 50.9% of respondents had at least 12 years of formal education. Similar studies found that respondents with ≥12 years of education constituted 60% and 76.3% of their samples [18,19]. Higher education levels may contribute to better health awareness and treatment adherence [6]. However, some studies report higher TB incidence among those with less than 12 years of education, potentially due to a lack of understanding about healthy living environments [20,21].

Employed individuals comprised 60.4% of the respondents, which is consistent with other studies where new TB cases were more common among those employed, with figures of 83.3%, 52.2%, and 55.3% [15,22,23]. Employment status affects access to health services and information, but it can also limit the time available for treatment [24]. However, some studies found higher adherence among unemployed patients, possibly because they have more time to manage their treatment [25-27].

However, despite the availability of free tuberculosis treatment provided by the government under Minister of Health Regulation No. 67/2016 on Tuberculosis Control [28], many in the community have not utilized it effectively. This underutilization is largely due to a lack of knowledge and education about the program [29].

Most respondents (75.5%) had good knowledge of TB, similar to findings in other studies where 87.1%, 76.19%, and 84.2% of respondents had good knowledge [13,30,31]. Knowledge is critical to successful TB treatment, though some research indicates that poor knowledge increases TB exposure risk [20].

Most respondents (84.9%) did not have comorbidities, similar to findings in other studies where patients without comorbidities made up 87.5%, 73.7%, and 73.53% of the samples [11,32,33]. Other risk factors more influenced younger, productive-age patients in this study, although comorbidities such as HIV and diabetes are known to increase susceptibility to TB. Interestingly, no HIV/AIDS comorbidities were found among the patients in this study [32]. Diabetes and hypertension were the most common comorbidities observed, and managing diabetes in TB patients requires careful monitoring of blood sugar levels, which can affect treatment duration [9].

Regarding treatment adherence, 62.3% of respondents were compliant with their antituberculosis medication, consistent with other studies reporting compliance rates of 85.71%, 86.8%, and 55% [30,13,5]. Compliance

is crucial for recovery and is influenced by factors such as family support, understanding of TB, and the desire to recover. Non-compliance was often due to patients forgetting to take their medication, which aligns with other study [25]. The distance to the health center and poor road access also contributed to non-compliance [35]. To address this, intense daily supervision by drug supervisors during the first two months of treatment is recommended to improve adherence [36].

The Chi-Square analysis found no significant relationship between age and medication adherence ($p = 0.399$), consistent with other studies showing similar non-significant results [27,21]. While aging can exacerbate drug side effects, leading to the need for more assistance, other studies indicate that productive-age individuals are more likely to drop out of treatment due to busy lifestyles and lack of supervision [36-38].

Similarly, there was no significant relationship between gender and adherence ($p = 0.185$), echoing findings from other research [15,39,40]. Men's non-compliance is often due to forgetting to take medication, whereas women may delay treatment due to fear of stigma [27]. However, male patients may adhere better because they desire to recover and support their families [24].

No significant relationship was found between formal education and adherence ($p = 0.071$), consistent with some studies but differing from others that found a significant relationship, where higher education levels facilitated better treatment compliance [39-42]. However, low education does not necessarily guarantee non-compliance, as knowledge about TB can be acquired through various means [12].

Employment status also showed no significant relationship with adherence ($p = 0.229$), in line with findings from several other studies [21,27,43]. Employment can affect income and access to health services [44], but non-working individuals may have more time to adhere to treatment schedules [45].

A significant relationship was found between TB knowledge and medication adherence ($p = 0.000$), consistent with other studies showing similar results [8,13,46]. Better knowledge generally leads to better adherence, although some studies suggest that personal motivation and self-awareness play key roles, regardless of knowledge level [31].

Finally, the length of treatment was significantly related to adherence ($p = 0.004$), with longer treatment durations often leading to non-compliance due to the financial, physical, and psychological burden [35,43,36]. However, other studies have found no significant relationship between treatment length and adherence, likely due to strong family support during extended treatment periods [35].

The multivariate logistic regression analysis identified knowledge and treatment length as significant factors influencing TB medication adherence, with knowledge being the most dominant factor ($p = 0.004$, OR = 16.029, 95% CI = 2.442–105.233). This is consistent with other studies that highlight the importance of knowledge in patient compliance [6,27]. Knowledge impacts adherence through proactive information-seeking, the role of health workers, and the effectiveness of the drug supervisor involvement [5]. Conversely, non-compliance among those with less knowledge may result from a lack of understanding about treatment duration and the risks of antibiotic resistance [27].

Conclusion

In conclusion, the study highlights that while factors such as age, gender, education, and employment status do not significantly influence adherence to antituberculosis treatment, knowledge and treatment duration are critical determinants of compliance among pulmonary tuberculosis patients. Knowledge, in particular, plays a dominant role in ensuring adherence, underscoring the importance of education and awareness programs.

Acknowledgment

None.

Declaration of interest

The authors declare no conflict of interest.

Author contributions

NIW conceptualized the study design, SZN investigated the data, SZN, S wrote original draft, SZN, NIW, S reviewed and edited final version, NIW and S supervised all experiments. All authors have read the final manuscript.

Received: April 4, 2024
Revised: August 28, 2024
Accepted: August 29, 2024
Published online: August 30, 2024

References

1. Gebreweld FH, Kifle MM, Gebremicheal FE, Simel LL, Gezae MM, Ghebreyesus SS, et al. Factors influencing adherence to tuberculosis treatment in Asmara, Eritrea: A qualitative study. J Heal Popul Nutr. 2018;37(1):1-8. https://doi.org/10.1186/s41043-017-0132-y
2. WHO GT. Global Tuberculosis 2021. USA: Gevena: World Health Organization; 2021.
3. Kemenkes RI. Profil Kesehatan Indonesia 2021. Jakarta: Kementerian Ksehatan Republik Indonesia; 2022.
4. Lampung D. Profil Kesehatan Provinsi Lampung 2019. Lampung; 2019.
5. Radiah N, Diansa TF, Nufus LS. Hubungan Tingkat Pengetahuan PasienTuberculosis (TB) Dengan Kepatuhan Minum Obat di Puskesmas Gunung Sari. J Ilmu Kesehat dan Farm. 2021;9(2):41-42. https://doi.org/10.51673/jikf.v9i2.879
6. Fitri LD. Kepatuhan Minum Obat pada Pasien Tuberkulosis Paru. J Ilmu Kesehat Masy. 2018;7(01):33-42. https://doi.org/10.33221/jikm.v7i01.50
7. Azalla CR, Ismail N. Analisis Kualitas Hidup Penderita Tuberkulosis Paru terhadap Kepatuhan Pengobatan Tuberkulosis di Wilayah Kabupaten Pidie Jaya Tahun. J Aceh Med. 2020;4(2):122-36.
8. Ulfah U, Windiyaningsih C, Abidin Z, Murtiani F. Faktor-Faktor yang Berhubungan dengan Kepatuhan Berobat Pada Penderita Tuberkulosis Paru. Indones J Infect Dis. 2018;4(1). https://doi.org/10.32667/ijid.v4i1.44
9. Oleh D, Panjaitan F. Karakteristik Penderita Tuberkulosis Paru Dewasa Rawat Inap di Rumah Sakit Umum Dr. Soedarso Pontianak Periode September - November 2010. J Mhs Fak Kedokt Untan. 2012;1(1):12-21.
10. Maelani T, Cahyati WH. Karakteristik Penderita, Efek Samping Obat dan Putus Berobat Tuberkulosis Paru. HIGEIA (Journal Public Heal Res Dev. 2019;3(4):625-34.
11. Asmawanti I, Mardiyaningsih, Trilestari. Tingkat Kepatuhan Penggunaan Obat Antituberkulosis pada Pasien Poli Paru di RSU Muhammadiyah Ponorogo. J Ilmu Kesehat Bhakti Setya Med [Internet]. 2022;7(2):38-46. https://doi.org/10.56727/bsm.v7i2.99
12. Muflihatin SK, Milkhatun, Hardianti. Hubungan Kepatuhan Minum Obat dengan Kualitas Hidup Pasien Tuberkulosis di Wilayah Kerja PUSKESMAS Segiri Samarinda. J Ilmu Kesehat. 2018;6(2):141-51.
13. Oktavienty O, Hafiz I, Khairani TN. Hubungan Tingkat Pengetahuan Terhadap Kepatuhan Minum Obat Pada Pasien Tuberkulosis Paru (TB) di UPT Peskesmas Simalingkar Kota Medan. J Dunia Farm. 2019;3(3):123-130. https://doi.org/10.33085/jdf.v3i3.4483
14. Fitria CN, Mutia A. Hubungan Tingkat Pengetahuan Tentang Tuberkulosis Dengan Kepatuhan Minum Obat di Puskesmas. J Ilmu Keperawatan dan Kebidanan. 2016;7(1):41-5.
15. Novalisa S, R., Nurmainah. Analisis Faktor-faktor yang Mempengaruhi Kepatuhan Penggunaan Obat Tuberkulosis pada Pasien di Puskesmas. J Syifa Sci Clin Res. 2022;4(2):342-53. https://doi.org/10.37311/jsscr.v4i2.14195
16. Nailius IS, Anshari D. Hubungan Karakteristik Sosial Demografi dan Literasi Kesehatan Dengan Kepatuhan Minum Obat Pada Penderita Tuberkulosis di Kota Kupang. Perilaku dan Promosi Kesehat Indones J Heal Promot Behav. 2022;4(2):43. https://doi.org/10.47034/ppk.v4i2.6332
17. Gupta A, Nayak U, Ram M, Bhosale R, Patil S, Basavraj A, et al. Postpartum Tuberculosis Incidence and Mortality among HIV-Infected Women and Their Infants in Pune. Clin Infect Dis. 2007;45(2):241-249. https://doi.org/10.1086/518974
18. Purbantari AD, Roesdiyanto R, Ulfah NH. Hubungan Pendidikan, Akses Pelayanan Kesehatan Dan Dukungan Keluarga Dengan Pemanfaatan Pelayanan Kesehatan Penderita Tb Paru Bta+ Di Puskesmas Janti Kota Malang. Prev Indones J Public Heal. 2019;4(1):1. https://doi.org/10.17977/um044v4i1p1-14
19. Chusna NN, Fauzi L. Faktor-Faktor yang Berhubungan dengan Kesembuhan Tuberkulosis pada Penderita Tuberkulosis di Kota Semarang. Indones J Heal Community. 2021;2(1):8. https://doi.org/10.31331/ijheco.v2i1.1625
20. Kondoy PPH, Rombot D V, Palandeng HMF, Pakasi TA. Faktor-Faktor Yang Berhubungan Dengan Kepatuhan Tuberkulosis Paru di Lima Puskesmas di Kota Manado. J Kedokt Komunitas dan Trop. 2014;2(1):1-8.
21. Zelfino. Analsis Faktor-Faktor Yang Berhubungan Dengan Perilaku Menelan Obat Penderita TB Paru Program DOTS Di Puskesmas Kecamatan Ciracas Jakarta Timur. Indones Heal Inf Manag J. 2014;2(1):1-10.
22. Nurkumalasari N, N., Wahyuni D. Hubungan Karakteristik Penderita Tuberkulosis Paru Dengan Hasil Pemeriksaan Dahak Di Kabupaten Ogan Ilir. J Keperawatan Sriwijaya,. 2016;3(2):51-8.
23. Ruditya DN. Hubungan Antara Karakteristik Penderita Tb Dengan Kepatuhan Memeriksakan Dahak Selama Pengobatan. J Berk Epidemologi. 2015;3(2):122-133. https://doi.org/10.20473/jbe.V3I22015.122-133
24. Rokhmah D. Gender dan Penyakit Tuberkulosis: Implikasinya Terhadap Akses Layanan Kesehatan Masyarakat Miskin yang Rendah. Kesmas Natl Public Heal J. 2013;7(10):447. https://doi.org/10.21109/kesmas.v7i10.3
25. Afwansyah M, Dania H. Tingkat Kepatuhan Penggunaan Obat Anti Tuberkulosis Paru di Rumah Sakit PKU Muhammadiyah Bantul Menggunakan Metode Pill-Count dan MARS. Farmasains J Ilm Ilmu Kefarmasian. 2022;9(1):9-17. https://doi.org/10.22236/farmasains.v9i1.6175
26. Salsabila LZ, Susanti R, Bhakti WK. Analisis Faktor Tingkat Kepatuhan Minum Obat Anti Tuberkulosis Pada Pasien Tb Paru Rawat Jalan Di Puskesmas Perumnas 1 Kota Pontianak Tahun 2021. J Mhs Farm Fak Kedokt UNTAN. 2022;6(1):1-8.
27. Ariani NW, Rattu AJM, Ratag B. Faktor-Faktor Yang Berhubungan Dengan Keteraturan Minum Obat Penderita

Tuberkulosis Paru Di Wilayah Kerja Puskesmas Modayag, Kabupaten Bolaang Mongondow Timur. J Ilmu Kesehat Masy Unsrat. 2015;5(2):157-68.

28. Kemenkes R. PMK No. 67 tentang Penanggulangan Tuberkolosis. Jakarta: Kementerian Kesehatan Republik Indonesia; 2017.
29. Sianturi R. Analisis Faktor Yang Berhubungan Dengan Kekambuhan Tb Paru (Studi Kasus di BKPM Semarang Tahun 2013. Unnes J Public Heal. 2014;3(1):1-10.
30. Amran R, Abdulkadir W, Madania M. Tingkat Kepatuhan Penggunaan Obat Anti Tuberkulosis Pada Pasien Di Puskesmas Tombulilato Kabupaten Bone Bolango. Indones J Pharm Educ. 2021;1(1):57-66. https://doi.org/10.37311/ijpe.v1i1.10123
31. Hendesa A, Tjekyan RMS. Hubungan Pengetahuan, Sikap, Dan Dukungan Keluarga Dengan Kepatuhan Berobat Pada Pasien Tuberkulosis Paru Di Rs Paru Kota Palembang Tahun 2017. J Kedokt Sriwij. 2018;50(4):1-8.
32. Bakhtiar MI, Wiedyaningsih C, Yasin NM, Kristina SA. Hubungan Karakteristik, Kepatuhan, dan Outcome Klinis Pasien Tuberkulosis Paru Di Puskesmas Kabupaten Bantul. Maj Farm. 2021;17(2). https://doi.org/10.22146/farmaseutik.v17i2.60681
33. Depo M, Pademme D. Faktor yang berhubungan dengan kepatuhan berobat penderita tuberkulosis paru di kota Sorong. J Teknosains. 2022;11(2):174-85. https://doi.org/10.22146/teknosains.61225
34. Marizan M, Mahendradhata Y, Wibowo TA. Faktor Yang Berhubungan Dengan Non-Konversi BTA Positif Pada Pengobatan Tuberkulosis Paru Di Kota Semarang. Ber Kedokt Masy BKM J Community Med Public Heal. 2016;32(3):77-82. https://doi.org/10.22146/bkm.7674
35. Erawatyningsih E, Subekti H. Faktor-Faktor Yang Mempengaruhi Ketidakpatuhan Berobat Pada Penderita Tuberkulosis Paru. Ber Kedokt Masy. 2009;25(3):117-24.
36. As'hab PP, Keliat BA. Faktor Yang Mempengaruhi Kepatuhan Klien Terhadap Pengobatan Tuberkulosis Resistan Obat. J Ilmu Keperawatan Jiwa. 2020;3(2):149-60.
37. Anisah A, Sumekar DW, Budiarti E. Hubungan Demografi dan Komorbid dengan Kejadian Tuberkulosis Resisten Obat (TB RO. J Ilm Kesehat Sandi Husada. 2021;10(2):568-574. https://doi.org/10.35816/jiskh.v10i2.655
38. Waithaka S, Kei R, Mbugua G. Factors that Influence the Interruption of Tuberculosis Treatment in Imenti South Sub-County. Int J Prof Pract. 2015;7(2):15-25.
39. Susilo R, Maftuhah A, Hidayati NR. Kepatuhan Pasien Tb Paru Terhadap Penggunaan Obat Tb Paru Di Rsud Gunung Jati Kota Cirebon Tahun 2017. Med Sains J Ilm Kefarmasian [Internet]. 2018;2(2):83-88. https://doi.org/10.37874/ms.v2i2.46
40. Wulandari DH. Analisis Faktor-Faktor yang Berhubungan dengan Kepatuhan Pasien Tuberkulosis Paru Tahap Lanjutan Untuk Minum Obat di RS Rumah Sehat Terpadu Tahun 2015. J Adm Rumah Sakit Indones. 2015;2(1):25-34. https://doi.org/10.7454/arsi.v2i1.2186
41. Papeo DRP, Immaculata M, Rukmawati I. Hubungan Antara Kepatuhan Minum Obat (MMAS-8) Dan Kualitas Hidup (WHOQOL-BREF) Penderita Tuberkulosis Di Puskesmas Di Kota Bandung. Indones J Pharm Educ. 2021;1(2):86-97. https://doi.org/10.37311/ijpe.v1i2.11143
42. Notoatmodjo. Promosi Kesehatan Dan Ilmu Perilaku. Jakarta: PT. Rineka Cipta; 2012.
43. Pitorukmi AW, Intiyani R, Miyarso C. Evaluation of Compliance with Use of Anti-Tuberculosis Medicine in Outpatient Adult Patients. Pros Univ Res Colloq [Internet]. 2021;14:1021-1030. https://repository.urecol.org/index.php/proceeding/article/view/1666
44. Pakpahan M, Siregar D, Susilawaty A. Promosi Kesehatan dan Perilaku Kesehatan. Jakarta: EGC; 2021.
45. Rahmah A, Panghiyangani R, Muhyi R. Meta-Analysis: The Effect of Anemia, Pre-Eclampsia and Parity on the Prevalence of Low-Birth-Weight Infants in Indonesia. Int J Sci Healthc Res. 2021;6(4):142-158. https://doi.org/10.52403/ijshr.20211021
46. Dwiningrum R, Wulandari RY, Yunitasari E. Hubungan Pengetahuan dan Lama Pengobatan TB Paru dengan Kepatuhan Minum Obat pada Pasien TB Paru Di Klinik Harum Melati. J Aisyah J Ilmu Kesehat. 2021;6:1-12. https://doi.org/10.30604/jika.v6iS1.788