Original Research

Effectiveness of application of daily medicine boxes to compliance with anti-tuberculosis drug consumption in Indonesian tuberculosis patients

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Article Info

Abstract

Tuberculosis (TB) is one of the infectious diseases and is a major cause of poor health, thus becoming one of the leading causes of death in the world. In 2021 the World Health Organization (WHO) said that, 9.9 million people experienced TB disease worldwide. It is also estimated that every year there are 13,110 cases of people who die from TB disease. The number of TB cases in Indonesia is estimated at 845,000 cases in 2020 with 393,323 TB cases notified. According to data from the Tasikmalaya City Health Office in 2020, there were 1.045 cases of TB sufferers in Tasikmalaya City. TB disease can be cured by taking treatment for 6 months. Adherence to treatment is one way to prevent failure in TB treatment. The daily medicine box is one solution to improve patient compliance with anti-TB treatment. This study aims to determine the effectiveness of daily medication use on adherence to anti-TB medication in TB patients at the Tamansari Public Health Center, Tasikmalaya City. This study uses a quantitative approach with the research method of Pre-Experimental Design, one group with pre-test & post-test. The sample was 16 respondents in this study, Wilcoxon Signed Rank test used in this research. Results: The results showed that the pretest-posttest had an effect of the daily medicine box on adherence to taking anti-TB drugs in TB patients with p-value 0.000 <0.05. Therefore, it can be concluded that there is a significant difference between before and after being given treatment. this study recommended that TB patients apply the daily medicine box as a tool to improve adherence to taking drugs so as to reduce failure in TB treatment.

INTRODUCTION

Tuberculosis (TB) is one of the most common infectious diseases and the leading cause of poor health and the highest cause of death in the world. In 2020 it is estimated that 9.9 million (8.9-10.9 million) people experience tuberculosis in the world, of which 5.5 million are affected by TB including men, 3.3 million women and 1.1

million children. A person who has HIV disease accounts for 8% of the total people affected by TB. The 8 countries with the highest cases are: India, China, Indonesia, the Philippines, Pakistan, Nigeria, Bangladesh and South Africa. Approximately 1.5 million people died of TB in 2020, including 214,000 people with HIV cases. Globally, the TB incidence rate fell by 11% between 2015 and 2020 (from 142 to 127 new cases per 100,000 population) including a 1.9% decrease compared to 2019.[1]

The number of TB cases in Indonesia is estimated at 845,000 cases in 2020 with 393,323 confirmed TB cases, the prevalence rate of TB cases is 7,921 confirmed RR/MDR TB cases, 4,590 RR/MDR TB enrolled cases, 33,366 cases of TB in children, then for TB cases with HIV as many as 8,003 cases, while for deaths due to TB as many as 13,110 cases, there are about 83% successful in treatment.[2] According to Basic Health Research data, the number of TB sufferers in West Java Province is (0.63%), West Java is the third largest in Indonesia after Papua and Banten. The results of the data obtained for the number of TB patients were 62,218 cases. The data identified that TB cases in West Java were still quite high.[3] Data from the Health Service of Tasikmalaya City in 2020, there were 1,141 TB patients in Tasikmalaya City, all TB cases were registered and treated in Tasikmalaya City as many as 1,045 patients, and were declared cured as many as 77.00%. The total number of complete patient treatment is 385 people.

TB is a disease caused by Amycobacterium tuberculosis, which is a type of aerobic bacteria that lives in the lungs, or in other body organs that have high oxygen pressure and are in the same temperature as themselves.[4,5] TB can be transmitted through the air such as droplets from coughs, sneezes, or sputum that is transmitted from patients to healthy people. Droplets containing TB bacilli can remain in the air for about two hours, depending on

the quality of the airways and the light in the room.[6–8] There are many factors that can influence the occurrence of TB disease, including the following factors, including individual factors, bacterial factors, and environmental factors. Individual factors are various things that can affect the patient's immune system, such as HIV/AIDS, nutritional deficiencies, Diabetes Mellitus (DM), and also the use of immunosuppressants. For this bacillus factor, the concentration of old germs meets new germs. As for environmental factors such as air ducts, the density of the occupants of the house, to the lighting in the room. As for nutritional status, it is one of the important factors in the occurrence of an infection such as TB, where the nutritional status of a person who is lacking can make it easier for someone to be infected with TB bacteria.[9] There are several efforts and prevention of risk factors for TB disease, namely by doing several ways such as cultivating good and correct cough ethics, cultivating clean and healthy living habits, being able to maintain and improve the quality of housing and the environment in accordance with healthy home standards, increase body immunity, apply prevention and control. TB infection in health service facilities, as well as outside health service facilities, as well as treatment for TB co-morbidities.[3]

To treat TB disease, several countries have strategies for TB control which are also often referred to as the Directly Observed Treatment Short (DOTS) strategy. This expansion strategy can be carried out with the principle of quality DOTS services by implementing the five components of the DOTS strategy, namely by means of: political commitment, microscopic examination, providing Anti-TB Drugs, availability of quality recording and reporting.[3] Patients who behave disobediently in taking medicine will hinder the success of therapy and even lead to failure of the therapy they get.

In improving the patient's behavior to comply with taking OAT, several strategies can be used, one of which is by providing assistive devices such as daily medication boxes. The medicine box given to the patient contains several medications and can be closed with a border and a label showing the day and time of the week. A TB patient only needs to carry a box of medicine every day, but the medicines can be stored for 7 days. In addition, the daily medicine box also helps remind patients to take their medicine on.[10,11]

A previous study conducted on the effectiveness of daily administration of medication for hypertension in patients with hypertension and found the following results: 16 respondents (80.0%) became compliant, and 4 respondents (20.0%) did not comply after being given a medication box. Statistical test results p-value = 0.000, it can be concluded that there is an effect of giving daily medicine boxes on adherence to taking hypertension medicine in hypertensive patients.[10]

The research regarding the effectiveness of giving posters and medicine boxes to improve drug adherence in patients with diabetes mellitus obtained the following results "The majority of respondents had a low level of drug adherence as many as 29 respondents (88%), after the Wilcoxon test, p = 0.000 < = 0.05. It was concluded that there was an effect of poster media and drug installation boxes in increasing medication adherence for diabetes mellitus patients".[12]

Judging from previous research and also preliminary studies that have been carried out regarding the administration of medicine boxes in patients with hypertension and diabetes mellitus patients, the results are effective, while for TB disease, research has not been carried out. Therefore, this study was conducted to find out whether there is an effect of the application of the daily medicine box on the adherence of TB patients to taking Anti-TB drugs, if the patient is given a tool in the form of a daily medicine box.

METHOD

The type of research used is quantitative with a pre-experimental design type of research. The approach in this research uses the One Group Pretest Posttest Design. The place where this research was conducted is at the Tamansari Health Center and conducted in June 2022. The population in this study were TB patients seeking treatment at the Tamansari Health Center. The sample in this study used non-probability sampling with a total sampling of 16 populations in total. The instrument in this study used the Indonesian version of the Morisky Medication Adherence Scale-8 (MMSA-8) Questionnaire which had been validated. The MMSA-8 questionnaire was created in early 1986 by Donald E. Morsky of the University of California and is a questionnaire to measure patient medication adherence. This MMAS-8 instrument has been developed in several languages, such as French, Thai, Malaysian and Korean versions, and Indonesian versions which have been tested for validity and reliability. To measure patient compliance in taking Anti-TB drug in Asia, the MMSA-8 questionnaire is the most frequently used method in assessing adherence to tuberculosis patients and the reseacher has got permission to use this questionnaire.

MMAS-8 is a questionnaire with 8 questions related to medication adherence. For questions 1-7 if the patient answers "Yes" will be given a score 0 but if the patient answers "No" then he is given a score 1, for question no 5 if he answers "yes" he is given a score 1. As for the 8th question using a 5-point Likert scale (0-1), then the results are added with a score 1-7 questions. The 5-point Likert scale consists of 5 respondents' answers, where if the respondent answers never then a score 1 is given, once is given a value of 0.75, those who answer sometimes are given a score 0.50, the answer is usually

given a score 0.25 and for those who answer is usually given a score 0.25. answer is always given a score 0 The number of values with a level of compliance, namely high compliance has a score 8, moderate compliance has a score 6-<8, and low compliance has a score 0-<6 (Amalia, 2020).

The researcher asked for approval from TB patients at the Tamansari Public Health Center to volunteer to be respondents in this study, then an informed consent carried out and provide an explanation of the process, as well as the objectives of the study. The data analysis method in this study used univariate and bivariate analysis with the statistical test used, namely the Wilcoxon Signed Rank Test.

RESULTS

Level of compliance before and after being given a daily medicine box.

Table 1
Frequency distribution of adherence levels before and after being given a daily medicine box

Indicators	f	%
Before		
High compliance	0	0
Medium compliance	11	68,8
Low compliance	5	31,3
After		
High compliance	14	87,5
Medium compliance	2	12,5
Low compliance	0	0

Based on table 1, the results of the frequency distribution test of the level of adherence to medication were obtained, namely for respondents in the moderate compliance category, 11 people with a percentage of 68.8%. And for respondents with low compliance category as many as 5 people with a percentage of 31.3%.

Based on table 1, the results of the frequency distribution test of the level of adherence to medication are obtained, namely for respondents in the high compliance category, 14 people with a percentage of p87.5%. And for respondents

with moderate compliance category there are 2 people with a percentage of p12.5%.

The analysis of respondents based on the level of compliance before and after being given a daily medicine box is as follows:

Table 2
Analysis of respondents based on the level of compliance before and after being given a daily medicine box

Characteristic	Mean	p
Pre-test	2,31 (±0.479)	0,0001*
Post-test	1,13 (±0.342)	

* Wilcoxon

Based on table 2, the results of the descriptive statistical test data score scores for adherence to taking medication before being given a daily medicine box, a mean 2.31, median 2.00, standard deviation 0.479, minimum value 2 and maximum value 3. Statistical test data scores for adherence to taking medication after being given a daily medicine box, a mean of 1.13, a median of 1.00, a standard deviation of 0.342, a minimum value 1 and a maximum value 2. Based on table 2 it can be seen that the value of Sig. on the data before (pre-test) of p0.029 <0.05 and the value of Sig. the data after (post-test) of p0.000 <0.05 So it can be concluded that the two data are not normally distributed. The mean value of the patient's level of compliance in taking OAT before the intervention is 2.31 with a standard deviation of 0.479. While the mean after the intervention is 1.13 with a standard deviation of 0.342.

Based on table 6 above, it is explained that in the data from the Wilcoxon signed ranks test there is a change in the p value before and after the intervention is given. Positive Ranks with an N = 16 means that the entire sample experienced an increase in the score from pretest to posttest. The mean pRanksp or the average increase is 8.50 and the Sum of Ranksp or the number of positive rankings is 136.00 and the Ties value is 0 meaning that there is no similarity in the values between the pretest and posttest.

Based on table 2, it is known that the value of Asymp. Sig (2-tailed) is p0.000 <0.05. Therefore, it can be concluded that Ha is accepted, Ho is rejected, which means that there is a significant difference in the results of filling out the questionnaire before (pre-test) and after (post-test).

DISCUSSION

The results of this study showed that most of the respondents before being given a daily medicine box were in the moderate category. And after being given a daily medicine box for 21 days, most of them were in the high compliance category.

In line with the study of Papeo et al., (2021) showed the level of adherence based on the MMAS-8 questionnaire filled out by 75 patients, with 69% of TB patients having high adherence, 15% indicating moderate adherence and 16% indicating adherence. Low adherence to the use of Anti-TB Drug. The researchers found that, of the six characteristic factors investigated (age, gender, occupation, income, education, and duration of treatment), the factors that had a significant impact on Anti-TB Drug adherence were gender (p=0.01) and occupation (p=0.03). The study program taken and having heard of TB disease is a factor related to TB knowledge.[14] Another study revealed that knowledge had a positive effect on medication adherence at the level of tofu with a p value 0.041. Because knowledge is considered very important for the success of TB treatment because patients will get information about the mode of transmission, stages of treatment, treatment goals, side effects of drugs, and complications of the disease. The knowledge that a person has will affect how he should behave, plan and also in making decisions.[15]

Compliance in treatment reflects the patient's behavior in obeying all advice and instructions given by medical personnel such as doctors, nurses and pharmacists regarding everything that must be done to achieve optimal treatment, one of which is adherence to taking Anti-TB Drug. this is a condition for achieving the success of the treatment carried out.[12]

The research results obtained from the Wilcoxon Signed Rank test results in an Asymp.Sig (2-tailed) value 0.000 <0.05. So it can be concluded that there is a significant difference in the results of filling out the questionnaire between before and after being given a daily medication box, which means that there is an effect of the daily medication box on adherence to taking Anti-TB Drug.

The results of this study were strengthened by research conducted by Puspita et al., (2020) explaining that from the results of the study, 20 respondents (100.0%) did not comply with taking hypertension drugs. A total of 16 respondents (80.0%) after being given a daily medicine box became compliant and 4 respondents (20.0%) did not comply after being given a daily medicine box. The results of the statistical test with a value of p = 0.000, it can be concluded that there is an effect of giving daily medicine boxes on adherence to taking hypertension drugs in hypertensive patients.

Another study showed that the compliance rate of patients who used daily medicine boxes was 81% and those who used conventional pill bottles were 86%, but more patients were satisfied with daily medicine boxes, which was 61% compared to conventional pill bottles, which was 11% and thought that daily medicine boxes were more helpful in increasing adherence to taking medicines by as much as 50%. in using conventional pill bottles as much as 11%.[12]

One of the solutions to improve patient compliance in taking medication is by providing a tool in the form of a daily medicine box that can be stored in a place that is easily visible to the patient so as to make the patient remember to take the

medicine more. By providing a tool in the form of a daily medicine box, it will help patients to be more obedient in taking drugs. This is in line with other research explaining that a tool has been created to overcome adherence to routine drug consumption, medicine boxes are considered to be able to help the elderly who have complaints of hypertension, diabetes, tuberculosis or diseases that require the consumption of drugs.[10] every day for a long time. This is reinforced by the results of interviews that the researchers conducted with several respondents who had a high level of adherence after being given a daily box of drugs. Respondents said that the daily medicine box given can reduce forgetfulness and that the daily medicine box is also easy to carry everywhere when the respondent travels. By providing a tool in the form of a daily medicine box, it will help patients remember so that they can improve adherence in taking Anti-TB Drug.

In addition to medicine boxes, knowledge, family support, the role of health workers is proven to have a significant influence on medication adherence [16]. Research by [17] said that patients who received good family support could improve pulmonary tuberculosis treatment adherence so as to increase the success rate of pulmonary tuberculosis treatment. Another study found that family values who always interacted directly with patients could act as a medication companion to fully support the treatment program that the patient is currently undergoing.[18] Families who understand emotional support will meet the patient's needs, so that there is potential for successful treatment and healing of TB clients.

Another study found that the support provided by caregivers can help empower TB patients during the treatment period by providing continuous encouragement and as a supervisor for taking medication. Caregiver support is also an important factor in showing sympathy, helping patients to be more confident and willing to accept their situation. Therefore, the patient's healing process will take place optimally,[19] Furthermore,[20] argue that with complete information about pulmonary TB treatment, families can carry out the function of health services for pulmonary TB clients who are undergoing treatment. Pulmonary TB clients need medical therapy and positive attention and feedback from the family.[21] Family support and motivation greatly affect the success of TB treatment. The family always reminds the patient to take my medicine regularly and generally take care of him. The need for support is given to patients when they comply with treatment and have confidence in their recovery.[22] This study is in line with research conducted by Hannan & Hidayat, (2013) which states that a good family can lead in the success of treatment and have a high awareness of TB client care.

The role of the environment and good health services are expected to be able to support the provision of information to patients related to information, disease science, and correct treatment which will be able to reduce the risk of the spread of pulmonary TB disease and the healing rate continues to grow. This fact shows that families who have good knowledge and understanding of the importance of their role and function in caring for pulmonary TB patients so that they can provide good support.[24] Furthermore, social support is also important for people with chronic diseases such as tuberculosis because social support can affect individual behavior, such as decreasing anxiety, helplessness, and hopelessness, which in turn can improve health status. Increased health status means that it will improve the quality of life of patients.

CONCLUSION

Based on the results of the pretest-posttest, it can be concluded that there is a significant effect between before and after being given treatment from the daily medicine box on adherence to taking OAT in TB patients at

Tamansari Health Center. Therefire, the researchers hope that TB patients can apply this daily medicine box to increase adherence to taking drugs.

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CONFLICTS OF INTEREST

The author does not have a conflict of interest that could bias the results in the research that has been done.

REFERENCES

1. WHO. World Health day 2021. Geneva; 2021.

2. Kemenkes RI. Profil Kesehatan Indo-nesia. Pusdatin.Kemenkes.Go.Id. 2021. Kementrian Kesehatan Republik Indonesia.

3. Kemenkes RI. Tuberkulosis (TB). Tuberkulosis. 2018;1(april):2018.

4. CDC. Trends in Tuberculosis — United States. USA; 2011.

5. Selasa Pius; israfil. ; Teli Margaretha. Self-Management For patients in the Treatment Program of Pulmonary Tuberculosis in Kupang City, East Nusa Tenggara Province Indonesia. European Journal of Molecular & Clinical Medicine. 2020;7(10):2882–9.

6. Lestari Muslimah DD. Physical Environmental Factors and Its Association with the Existence of Mycobacterium Tuberculosis: A Study in The Working Region of Perak Timur Public Health Center. Jurnal Kesehatan Lingkungan. 2019;11(1):26.

7. Kemenkes RI. Pedoman Nasional Pengendalian Tuberkulosis-Keputusan Menteri Kesehatan Republik Indonesia Nomor 364. Kementerian Kesehatan Republik Indonesia. 2011;(Pengendalian Tuberkulosis):110.

8. Chen X, Du L, Wu R, Xu J, Ji H, Zhang Y, et al. The effects of family, society and national policy support on treatment adherence among newly diagnosed tuberculosis patients: A cross-sectional study. BMC Infect Dis. 2020;20(1):1–11.

9. Marlinae et al. Desain kemandirian pola perilaku kepatuhan minum obat pada penderita TB anak berbasis android. 1st ed. Theana S, Lutfiani A, Marisa, editors. Yogyakarta: CV Mine; 2019. 1–99 p.

10. Puspita RR, Pratiwi RD, , Fenita Purnama Sari Indah DE, Sandria Tambunan VAY. Pemberian kotak obat harian terhadap kepatuhan mengkonsumsi obat hipertensi pada pasien hipertensi. Edu Dharma Journal. 2020;4(1):31–5.

11. Pradipta IS, Houtsma D, van Boven JFM, Alffenaar JWC, Hak E. Interventions to improve medication adherence in tuberculosis patients: a systematic review of randomized controlled studies. NPJ Prim Care Respir Med. 2020;30(1).

12. Sentana AD, Pratama K. Efektivitas Poster dan Kotak Obat dalam Meningkatkan Kepatuhan Minum Obat Pasien Diabetes Melitus. Bima Nursing Journal. 2021;2(2):104.

13. 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. Indonesian Journal of Pharmaceutical Education. 2021;1(2):86–97.

14. Falah M, Tai CY, Lu YY, Liu CY, Lismayanti L. Tuberculosis Knowledge among University Students in Indonesia. South East Asia Nursing Research. 2019;1(2):95.

15. Mientarini EI, Sudarmanto Y, Hasan M. Hubungan Pengetahuan Dan Sikap Terhadap Kepatuhan Minum Obat Pasien Tuberkulosis Paru Fase Lanjutan Di Kecamatan Umbulsari Jember. Ikesma. 2018;14(1):11.

16. Nopiayanti G, Falah M, Lismayanti L. Faktor-Faktor Yang Berhubungan Dengan Tingkat Kepatuhan Minum Obat Pada Penderita Tb Di Kota Tasikmalaya. Healthcare Nursing Journal. 2022;4(1):243–7.

17. Suarnianti, Selan CH, Sumi SS. Evaluasi Peer Group Support dan Family Support Terhadap Kepatuhan Pengobatan Pada Pasien Tuberkulosis Paru: Literature Review. 2021;11(1):51–8.

18. Reza TF, Nalugwa T, Nantale M, Adams K, Fielding K, Nakaweesa A, et al. Design and execution of a public randomization ceremony to enhance stakeholder engagement within a cluster randomized trial to improve tuberculosis diagnosis in Uganda. Contemp Clin Trials Commun. 2021;22:100707.

19. Irnawati MN, T Siagian IE, Ottay RI. Pengaruh dukungan keluarga terhadap kepatuhan minum obat pada penderita tuberkulosis di puskesmas Motoboi Kecil Kota Kotamobagu. Jurnal Kedokteran Komunitas dan Tropik. 2016;4(2):59–64.

20. Hayati D, Musa E. Hubungan Kinerja Pengawas Menelan Obat Dengan Kesembuhan Tuberkulosis Di Upt Puskesmas Arcamanik

Kota Bandung. Jurnal Keperawatan. 2016;4(1):10–8.

21. Sukumani JT, Lebese RT, Khoza LB, Risenga PR. Experiences of family members caring for tuberculosis patients at home at Vhembe district of the Limpopo Province. Curationis. 2012;35(1):54.

22. Kartikasari D, Rejeki S, Wuryanto E. Hubungan peran keluarga sebagai pengawas minum obat (PMO) dengan kepatuhan minum obat pada penderita tuberkulosis paru di Puskesmas Kedungwuni II kabupaten Pekalongan. Jurnal Ilmu Keperawatan. 2012;5(1):71–9.

23. Hannan M, Hidayat S. Peran keluarga dalam perawatan penderita tuberkulosis paru di Kecamatan Gapura Kabupaten Sumenep. Jurnal Kesehatan "Wiraraja Medika." 2013;17–0.

24. Nastiti AD, Kurniawan C. Hubungan Dukungan Keluarga Dengan Kepatuhan Kontrol Pasien TB Paru STIKES Dian Husada Corresponding author : ayudewi.akper@unej.ac.id di Wilayah Puskesmas Kedundung Kecamatan Magersari Kota Mojokerto Pendahuluan TB paru atau tuberkulosis adalah penyakit m. 2020;15(1):78–89.