



The Use of a Multi-Drug Therapy (MDT) Monitoring Calendar as a Medium to Support Medication Adherence in Leprosy Patients

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ABSTRACT

Background: Treatment of leprosy with Multi-Drug Therapy (MDT) requires a relatively long duration, depending on the type of leprosy. The extended treatment period often leads to patient fatigue, which may reduce medication adherence and increase the risk of treatment discontinuation. This situation can hinder therapeutic success and elevate the risk of disease transmission and disability. Therefore, simple and practical strategies are needed to support patients in maintaining adherence throughout the treatment period. One potential strategy is the use of an MDT monitoring calendar as a reminder and monitoring tool. This study aimed to determine the effect of the MDT monitoring calendar on medication adherence among leprosy patients in Ende Regency. Methods: This quantitative study employed a pre-experimental one-group pre-test-post-test design. Total sampling was used, involving 16 respondents. Data were analyzed using the Wilcoxon Signed-Rank Test. Results: All respondents demonstrated an increase in medication adherence after the implementation of the Multi-Drug Therapy (MDT) monitoring calendar, with no observed decrease in adherence. The Wilcoxon Signed-Rank Test indicated statistically significant results ($Z = -3.532$; $p < 0.05$), confirming the effect of the MDT monitoring calendar on medication adherence among leprosy patients in Ende Regency. Conclusion: The implementation of the Multi-Drug Therapy (MDT) monitoring calendar significantly improved medication adherence among leprosy patients. The MDT monitoring calendar can serve as an effective and easily implementable health promotion tool to support treatment success. Health service facilities are encouraged to integrate the MDT monitoring calendar into the leprosy control program in Ende Regency.

Keywords: Calendar; Leprosy; Compliance; Multi-Drug Therapy; Medication Adherence

1. INTRODUCTION

Leprosy remains an infectious disease and continues to be a public health problem both globally and in Indonesia. Its impact is multidimensional, extending beyond clinical manifestations to social, economic, and cultural dimensions. Leprosy is frequently perceived negatively and continues to generate stigma within communities, families, and even among health workers. This situation is influenced by limited knowledge, misconceptions, and inappropriate perceptions regarding leprosy and the disabilities it may cause (Kemenkes, 2018). From a socioeconomic perspective, individuals affected by leprosy generally originate from lower-income population groups. The disabilities caused by the disease further exacerbate patients' economic conditions due to reduced employment opportunities and loss of livelihood (Ahmad et al., 2023).

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Leprosy is caused by infection with the bacterium *Mycobacterium leprae*, which progresses slowly and may result in damage to the skin and peripheral nerves after a prolonged incubation period (WHO, 2025). By 2024, the World Health Organization (WHO) reported approximately 172,717 to 182,815 newly detected cases of leprosy globally across more than 180 countries and regions. This indicates that approximately 170,000–180,000 new cases continue to occur annually, confirming that leprosy remains a global public health concern (WHO, 2024).

In 2024, the prevalence rate of leprosy in Indonesia was recorded at 0.63 cases per 10,000 population, with a new case detection rate of 5.3 cases per 100,000 population. Although the trend of prevalence and new case detection has generally declined over the past decade, an increase in cases has been observed since 2022 (Isturini, 2025). In 2024, 14,698 new cases of leprosy were reported, nearly 90% of which were Multibacillary (MB) type, reflecting ongoing active transmission and delays in early detection within the community (Sahiddin, 2021).

In 2024, the prevalence of leprosy in East Nusa Tenggara Province (NTT) was recorded at 1.03 cases per 10,000 population, indicating that NTT has not yet achieved the national leprosy elimination target. The grade 2 disability rate of 1.5 per 1,000,000 population suggests delays in case detection and management. This condition confirms that transmission in NTT remains ongoing and requires strengthened early detection and primary healthcare services (Kementerian Kesehatan RI, 2024). Ende Regency reported 54 cases of leprosy over the past five years, with 11 cases classified as treatment default.

A survey conducted in 2023 found that treatment default was commonly associated with patient boredom due to the prolonged treatment duration and the perception that medication was no longer necessary once symptoms improved. A study published in *Heliyon* (2023) examining health workers' perceptions of factors influencing treatment adherence in leprosy patients identified patients' misperception of being cured as a major intrinsic barrier to adherence. Patients who perceive themselves as cured are more likely to discontinue MDT before completing the prescribed regimen. Low motivation and treatment fatigue due to the lengthy duration of therapy were also reported as contributing factors to non-adherence in MDT treatment (Pepito et al., 2023). On the other hand, most individuals possess natural immunity to leprosy, and only a small proportion are susceptible to infection. Among those infected, many recover naturally, while others progress to clinical disease (Kemenkes, 2018).

Leprosy control efforts in Indonesia are implemented through the National Leprosy Control Program under the Ministry of Health, which includes early detection and active case finding, provision of free Multi-Drug Therapy, disability prevention, contact tracing, and community education to reduce stigma. This program is integrated into the national strategy for the elimination of Neglected Tropical Diseases (NTDs) and aligns with the target of eliminating leprosy by 2030 (Kementerian Kesehatan RI, 2024). Leprosy treatment represents a key strategy in breaking the chain of transmission. The use of Multi-Drug Therapy aims to interrupt disease transmission, prevent drug resistance, improve medication adherence, and prevent the occurrence or worsening of disability (Kepmenkes RI, 2019). Patients who complete regular MDT treatment no longer have the potential to transmit the disease (Kemenkes, 2018).

Leprosy treatment requires a relatively long duration, approximately 6–18 months depending on the clinical type. Non-adherence to medication may result in bacterial resistance to MDT, persistent symptoms, or clinical deterioration (WHO, 2025). Medication adherence is therefore a critical determinant of therapeutic success. Continuous monitoring is necessary to prevent treatment default, and family support plays a vital role in maintaining regular medication intake (Ahmad et al., 2023).

At the Level One Health Facility (FKTP), MDT management utilizes the “Form 2 Leprosy Card” as a tool to monitor patient treatment adherence (Kemenkes, 2018). Prospective clinical research has demonstrated that the use of medication calendars significantly improves adherence among patients undergoing methotrexate therapy, with higher rates of full adherence compared to control groups at weeks 6 and 10 (Yuwindry & Ivana Kabuhung, 2021). Research published in the *Celebes Advance Health Journal* (2025) also reported that the use of pill cards as a visual medium significantly improved

medication adherence among tuberculosis patients by helping them remember treatment schedules and understand therapeutic instructions (Qhumairah et al., 2024).

The MDT monitoring calendar represents a conceptually and operationally distinct adherence support approach compared to medication cards or other passive reminder tools. The calendar is actively utilized as a daily monitoring instrument, educational medium, and structured communication tool between patients and healthcare providers to identify and address adherence barriers during follow-up visits.

Although various reminder tools have been reported in the literature, evidence regarding the implementation of an MDT monitoring calendar within routine community-level services remains limited, particularly in resource-constrained settings. This study does not aim to establish causal effectiveness but to provide a preliminary evaluation of the use of the monitoring calendar as part of MDT monitoring practices.

Researchers consider it necessary to develop a structured daily reminder system through the Multi-Drug Therapy (MDT) monitoring calendar to support medication adherence. This study aims to evaluate the use of the MDT monitoring calendar as a medium to enhance medication adherence among leprosy patients. The contribution of this study lies in evaluating the implementation of the MDT monitoring calendar as a practical support tool for medication adherence, with emphasis on its applicability, acceptability, and function as both a reminder and educational instrument within healthcare services.

2. METHODS

This study is a quantitative study with a pre-experimental design, using a one-group pre-test–post-test design to evaluate changes in the level of medication adherence of leprosy patients after the use of the MDT therapy monitoring calendar.

In this study, the instrument used was the Morisky Medication Adherence Scale (MMAS-8) Questionnaire Sheet. Main data (patient identity) with 9 questions, treatment history with 3 questions, and compliance consisting of 8 questions with "yes" and "no" answers. This questionnaire was adopted from Atika Wahyu Puspitasari in the Morisky Medication Adherence Scale (MMAS-8), which has a validity test value of more than r table of 0.306 and a reliability result of 0.776 (Puspitasari et al., 2012). However, this instrument was not revalidated locally in the leprosy population.

The media used is the Multi-Drug Therapy therapy monitoring calendar. This tool is used to record, monitor, and ensure compliance with leprosy patients undergoing MDT therapy treatment within the "Multi-Drug Therapy Monitoring Calendar". There are also columns to check after the patient takes leprosy medicine, and contains information related to Epidemiology, Definition, Causes, Modes of Transmission, Signs and Symptoms, Diagnosis and Classification, Signs and Symptoms of Type PB, Signs and Symptoms of Type MB, Type PB Treatment, Type MB Treatment, Purpose of MDT treatment, and elimination of Negative Stigma. The "Multi Drug Therapy Monitoring Calendar" can be used when the patient finishes taking medication, by checking the box next to the date. The box can be checked if the patient has finished taking the medication according to the regulations, namely, once a day. The calendar cannot be checked if the patient has not or is about to take the medication. The calendar will be made in two (2) different colors, green for the Basiler Pausi (PB) type and red for the Multi Basiler (MB) type. This calendar was adopted from Atika Wahyu Puspitasari (Pratiwi et al., 2018).

2.1 Research Procedure

This study commenced with data collection at the Ende Regency Health Office, the institution responsible for supporting the leprosy control program. The researcher collaborated with leprosy program managers at all primary healthcare centers (Puskesmas) in Ende Regency that manage patients undergoing Multi-Drug Therapy. These program managers also served as members of the field research team. The researcher provided a detailed explanation to the team regarding the study objectives,

benefits, and research procedures to ensure a shared understanding and to guarantee that the study was implemented in accordance with the established protocol.

Data collection was conducted through home visits to leprosy patients. During the initial visit, the researcher explained the purpose and objectives of the study to prospective respondents and obtained their consent to participate by asking them to sign an informed consent form. Respondents were then asked to complete a pre-test questionnaire, accompanied by clear instructions on how to fill it out.

The researcher subsequently introduced the Multi-Drug Therapy Monitoring Calendar as the intervention tool and provided detailed guidance on its use as a medium for monitoring medication adherence. The calendar was distributed to respondents with instructions for daily use in accordance with the provided guidelines. During the implementation phase, an average of 5–6 respondents were reached per day, with assistance from the leprosy program managers at the respective primary healthcare centers as part of the research team.

In the fourth week, the researcher conducted follow-up home visits to evaluate the intervention and administer the post-test questionnaire. The same questionnaire used in the pre-test was administered to assess changes in medication adherence following the use of the MDT Monitoring Calendar among leprosy patients..

2.2 Data Analysis

Data analysis in this study began with descriptive analysis aimed at outlining respondent characteristics and the distribution of research variables. Descriptive analysis was conducted on demographic characteristics, including age, sex, education level, and occupation, as well as on medication adherence data among leprosy patients. Adherence was measured based on pre-intervention and post-intervention compliance scores.

Differences in medication adherence before and after the implementation of the Multi-Drug Therapy monitoring calendar were examined using inferential analysis with the Wilcoxon Signed-Rank Test. The Wilcoxon test was selected because the adherence data were measured on an ordinal scale and derived from two related observations within the same group. This non-parametric test does not require the assumption of normal data distribution. The test results were used to determine whether a statistically significant change occurred in medication adherence scores following the MDT monitoring calendar intervention.

This study was reviewed and approved by the Health Research Ethics Commission (KEPK) and received a Certificate of Ethical Feasibility with registration number [PP.06.02/F.XXIX/3800/2025](#).

3. RESULT AND DISCUSSION

As presented in [Table 1](#), the majority of respondents were aged 19–59 years (81%), with males constituting 69% of the sample. Most respondents had completed senior high school education (57%), followed by D3/Bachelor's degree holders (31%). In terms of occupation, respondents were predominantly entrepreneurs/traders and farmers/fishermen (37% each). The largest proportion of respondents had been undergoing treatment for 1–3 months (37%).

The distribution of medication adherence prior to the intervention is shown in [Table 2](#). The pre test results indicate that most leprosy patients were categorized as non compliant (87.5%), while only 12.5% were classified as compliant. Non compliance was most prevalent among respondents aged 19 to 59 years (68.7%), males (62.5%), those with senior high school education (43.7%), and those working as entrepreneurs or traders and farmers or fishermen (31.2% each). Based on treatment duration, non adherence was most frequently observed in patients undergoing treatment for 1 to 3 months (37.5%).

These findings suggest that individuals in the productive age group, particularly those with demanding work activities and irregular schedules, may experience greater difficulty maintaining consistent medication intake. The results highlight the need for practical adherence support

interventions such as the MDT monitoring calendar, particularly for groups at higher risk of non compliance.

Table 1. Characteristics of Respondents Based on Age, Gender, Education, Occupation, and Length of Treatment

Respondent Characteristics	f	(%)
Age		
10-18 Years	2	13
19-59 Years	13	81
≥ 60 Years	1	6
Total	16	100
Gender		
Male	11	69
Women	5	31
Total	16	100
Education		
Elementary School	1	6
Junior High School	1	6
Senior High School	9	57
D3/Bachelor	5	31
Total	16	100
Jobs		
PNS	2	13
Entrepreneur/Trader	6	37
Farmer/Fisherman	6	37
Others (students)	2	13
Total	16	100
Duration of Treatment		
≤ 1 month	3	19
1-3 months	6	37
4-6 months	3	19
7-9 months	4	25
Total	16	100

The high level of non adherence observed in the pre test is consistent with [Sahiddin \(2021\)](#), who reported that family support, including emotional, informational, and instrumental support, was significantly associated with medication adherence among leprosy patients ([Sahiddin, 2021](#)). Other studies have confirmed that social support from family significantly influences patient compliance behavior, indicating that non adherence should be understood not only in terms of individual characteristics but also within the broader social context ([Wahyudi Agusstyawan et al., 2020](#)). These findings reinforce the view that adherence to leprosy treatment is shaped by complex interactions between individual, familial, and healthcare system factors.

As shown in [Table 3](#), post test results demonstrated a marked increase in medication adherence, with 87.5% of respondents classified as compliant and only 12.5% as non compliant. The highest level of compliance was observed among respondents aged 19 to 59 years (81.2%). All female respondents were compliant, while compliance among male respondents reached 56.3%.

Based on education level, the highest compliance rates were found among respondents with senior high school education (50%) and D3 or Bachelor's degrees (31.2%). In terms of occupation, farmers or

fishermen (37.5%) and entrepreneurs or traders (31.2%) demonstrated the highest adherence levels. Regarding treatment duration, respondents undergoing therapy for 1 to 3 months showed the highest compliance (31.2%).

Table 2. Distribution of Medication Compliance of Leprosy Patients Based on Respondent Characteristics Before Intervention

Respondent Characteristics	Pre-test compliance			
	Non-compliant		Obedient	
	n	%	n	%
Age				
10-18 Years	2	12,5	0	0
19-59 Years	11	68.7	2	12.5
≥ 60 Years	1	6.3	0	0
Total	14	87.5	2	12.5
Gender				
Male	10	62.5	1	6.3
Female	4	25	1	6,3
Total	14	87.5	2	12.5
Education				
Elementary School	1	6,3	0	0
Junior High School	1	6,3	0	0
Senior High School	7	43.7	2	12.5
D3/Bachelor	5	31,2	0	0
Total	14	87.5	2	12.5
Jobs				
Civil servants	2	12.5	0	0
Entrepreneur/Trader	5	31.2	1	6.3
Farmer/Fisherman	5	31.2	1	6.3
Others (students)	2	12.5	0	0
Total	14	87.5	2	12.5
Duration of Treatment				
≤ 1 month	1	63	2	12.5
1-3 months	6	37.5	0	0
4-6 months	3	18.7	0	0
7-9 months	4	25	0	0
Total	14	87.5	2	12.5

These post intervention findings indicate a positive behavioral change in medication adherence following the implementation of the MDT monitoring calendar. The improvement reflects not only the function of the calendar as a visual reminder but also its potential role in strengthening patient awareness, motivation, and engagement in the treatment process.

The results of the Wilcoxon Signed Rank Test are presented in Table 4. All respondents (n = 16) were classified as positive ranks, indicating that post test adherence scores were higher than pre test scores. No negative ranks or ties were identified, meaning that no respondent experienced a decrease or unchanged adherence score.

The statistical analysis yielded a Z value of negative 3.532 with a p value of 0.000 (p < 0.05), indicating a statistically significant difference between pre test and post test adherence levels. These

findings confirm that the MDT monitoring calendar intervention was associated with a significant improvement in medication adherence among leprosy patients..

Table 3. Distribution of Medication Compliance of Leprosy Patients Based on Respondent Characteristics After Intervention

Variabel Features	Post-test compliance			
	Non-compliant		Obedient	
	f	%	f	%
Age				
10-18 Years	1	6.3	1	6.3
19-59 Years	0	0	13	81.2
≥ 60 Years	1	6.3	0	0
Total	2	12.5	14	87.5
Gender				
Male	2	12.5	9	56.3
Women	0	0	5	31.2
Total	2	12.5	14	87.5
Education				
Elementary School	1	6,3	0	0
Junior High School	0	0	1	6,3
Senior High School	1	6.3	8	50
D3/Bachelor	0	0	5	31.2
Total	2	12.5	14	87.5
Jobs				
Civil servants	0	0	2	12.5
Entrepreneur/Trader	1	6.3	5	31.2
Farmer/Fisherman	0	0	6	37,5
Others (students)	1	6.3	1	6.3
Total	2	12.5	14	87.5
Duration of Treatment				
≤ 1 month	0	0	3	18.7
1-3 months	1	6.3	5	31.2
4-6 months	0	0	3	18.7
7-9 months	1	6,3	3	18.7
Total	2	12.5	14	87.5

Table 4. Wilcoxon Signed Test Results Rank Test Compliance Pre-test and Post-test

Statistic	N	Mean Rank	Z	p-value	
Pre-test and Post-test compliance	Negative Ranks	0	0,00	-3.53	0.00
	Positive Ranks	16	8.50		
	Ties	0			
	Total	16			

The findings are consistent with evidence indicating that structured educational and follow up interventions significantly improve adherence in chronic disease management (Tolley et al., 2023). Adherence behavior has been conceptualized as being influenced by three key components, namely

capacity such as knowledge and cognitive ability, opportunity such as access to information and social support, and motivation such as self efficacy and belief in therapy (Zhang et al., 2025).

In the context of leprosy, research has shown that intrinsic motivation, adequate disease knowledge, and consistent counseling and follow up from healthcare providers play critical roles in sustaining long term treatment adherence (Pepito et al., 2021).

Technology based reminder interventions, including text messaging and mobile health applications, have also demonstrated effectiveness in improving adherence to long term therapy (Arshed et al., 2023). The MDT monitoring calendar operates on a similar principle by providing a structured visual reminder that reinforces daily medication routines. Studies in other chronic conditions have shown that medication calendars significantly increase the proportion of patients adhering to prescribed schedules (Yuan et al., 2025).

Additional pre experimental studies reported significant improvements in adherence scores following the use of calendar based reminder tools (Duwi Saputra and Dhiah Anggraeni, 2025; Yuwindry and Ivana Kabuhung, 2021).

The increase in post test adherence observed in this study may therefore be attributed to the calendar's function as a simple, practical, and structured self monitoring tool. Although the research design does not allow for strong causal inference, the findings provide empirical support for the potential role of the MDT monitoring calendar as an applicable adherence support strategy in primary healthcare settings.

This study has limitations in the form of a short follow-up duration (four weeks), the use of self-report-based instruments, and the absence of a comparison group, so that the findings have the potential to be influenced by social desirability bias and do not reflect long-term adherence during MDT therapy. Further research is suggested using a design with a control group, extending the follow-up period, and combining subjective and objective compliance measurements to strengthen the inference of results.

CONCLUSION

This study found that medication adherence among leprosy patients was low prior to the intervention but increased significantly after the implementation of the Multi Drug Therapy monitoring calendar. The improvement observed between the pre test and post test results indicates that structured and simple reminder tools can positively influence patient adherence behavior.

The MDT monitoring calendar functions not only as a visual reminder but also as a self monitoring instrument that encourages consistency in daily medication intake. It supports the development of regular treatment habits and strengthens patient awareness of medication schedules. Consistent adherence is essential in leprosy management because incomplete treatment may lead to complications, prolonged transmission, and an increased risk of disability.

The results of this study highlight the importance of integrating practical and low cost adherence support tools into routine leprosy services. The MDT monitoring calendar represents a feasible strategy for improving compliance in primary healthcare settings, particularly in resource limited areas. Further research involving larger sample sizes and more rigorous research designs is needed to confirm these results and to examine the long term impact of this intervention on treatment outcomes.

ADVISE

Leprosy patients are advised to use the MDT therapy monitoring calendar consistently as a reminder and control tool for medication adherence. Researchers are then expected to develop research with a wider range of respondents and a longer duration of observation to assess the sustainability of therapy success. Health care institutions are advised to integrate MDT monitoring calendars as part of health promotion activities to improve leprosy treatment adherence. Families and the community are expected

to play an active role in assisting patients and utilizing the MDT monitoring calendar as a means of controlling medication adherence.

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