



## IMPROVING MEDICATION ADHERENCE AS INDICATED BY BTA TEST IN TUBERCULOSIS PATIENTS USE MOTIVATIONAL INTERVIEWING

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## **ABSTRACT**

*Low adherence to TB medication can lead to drug resistance, making treatment more challenging. There is a need for a specific approach to TB patients to enhance motivation in OAT treatment, including the innovation of providing MI. This study aims to determine the impact of MI on the treatment adherence of tuberculosis patients as indicated by the BTA test. The research used a quasi-experimental design with a control group. The population consisted of 60 respondents using consecutive sampling techniques. Descriptive analysis was used to depict the deviation in the percentage of gender, age, and education, while the difference test employed the Wilcoxon. The results indicated that both the experimental and control groups consisted mostly of males, with 16 (53.3%) and 17 (56.7%), respectively, and individuals over 41 years of age, with 23 (76.7%) and 21 (70%), respectively. Meanwhile, the difference test showed that the treatment group had a p-value of 0.000, indicating a significant difference in treatment adherence before and after the intervention. MI can increase clients' motivation to engage in positive behavior's, such as adhering to treatment, which can lead to negative BTA test results. This intervention can be recommended as an additional approach to improving treatment adherence in tuberculosis patients.*

*Keyword: adherence, BTA test, medication, motivational interviewing, tuberculosis*

## **ABSTRAK**

*Rendahnya kepatuhan minum obat TB dapat menyebabkan resistensi obat, sehingga pengobatan semakin sulit. Perlunya pendekatan khusus terhadap pasien TBC untuk meningkatkan motivasi dalam pengobatan OAT, salahsatunya inovasi pemberian motivational interviewing. Penelitian ini bertujuan untuk mengetahui pengaruh MI terhadap kepatuhan berobat pasien tuberculosis yang ditunjukkan oleh tes BTA. Penelitian menggunakan quasi-eksperimen dengan control group. Populasi 60 responden menggunakan tehnik sampling consecutive, terbagi menjadi 30 kelompok eksperimen dan 30 kelompok control. Analisis deskriptif untuk menggambarkan deviasi prosentase jenis kelamin, usia, dan pendidikan, sedangkan uji perbedaan menggunakan Wilcoxon Signed Ranks Test. Hasil yang didapatkan kedua kelompok eksperimen dan control paling banyak berjenis kelamin laki-laki 16 (53,3% ) dan 17 (56,7%), usia > 41 tahun 23 (76,7%) dan 21 (70%). Sedangkan hasil uji beda menunjukkan kelompok perlakuan  $p=0,000$  yang artinya terdapat perbedaan signifikan terhadap kepatuhan pengobatan sebelum dan sesudah intervensi. komunikasi MI dapat meningkatkan motivasi klien untuk berperilaku positif seperti patuh terhadap pengobatan hingga berdampak pada hasil BTA test negatif. Intervensi tersebut dapat direkomendasikan sebagai intervensi tambahan dalam meningkatkan kepatuhan berobat pada pasien tuberculosis.*

*Kata kunci: BTA, kepatuhan berobat, motivational interviewing, pengobatan, TBC*

## **INTRODUCTION**

Tuberculosis (TB) is a bacterial infectious disease transmitted through the air and is considered one of the deadliest infectious diseases worldwide (Ali et al., 2019). Adherence to TB medication is crucial to prevent the spread of the disease and achieve patient recovery. However, the primary issue frequently encountered in TB treatment is the low level of patient adherence to medication schedules prescribed by healthcare professionals (Khamis et al., 2022). This low adherence often has implications for Bacillus Calmette-Guérin (BTA) test results, which are used to monitor the progression of TB (Rojali & Noviatuzzahrah, 2018). In addition, inadequate adherence to TB medication can lead to the development of drug resistance, making the treatment even more challenging (Walker et al., 2018).

According to the World Health Organization (WHO), TB continues to pose a significant threat to global public health (Santoso et al., 2023; Wawo Bulu et al., 2023). In 2019, the WHO recorded approximately 10 million new TB cases worldwide (Santoso & Sasmito, 2020). India, Indonesia, China, the Philippines, and Pakistan contributed 56 percent of the total. Deaths due to pulmonary TB

in 2016 reached approximately 1.3 million worldwide. In Indonesia, there were 298 thousand cases of pulmonary TB with 156 thousand positive test results, based on the pulmonary TB case report (Dumiri Manurung, 2023). In 2017, the number of pulmonary TB cases in Indonesia reached 10 million, with a rate of 133 per 100,000 population. Data from the 2019 Health Research revealed that the adherence rate to TB medication in certain regions remained remarkably low, with approximately 15-20% of patients not following their treatment as recommended (Riskesmas, 2019). These statistics reflect a serious challenge in the efforts to control TB.

Not adhering to the treatment in tuberculosis patients can lead to a low recovery rate, increase bacterial resistance to Anti-Tuberculosis Drugs (ATDs) or even resistance to combination drugs (MDR), raise the risk of relapse, and result in a high mortality rate (Dumiri Manurung, 2023). The main reasons for the low adherence to taking medication among TB patients are diverse, including social, economic, and psychological factors. Patients may experience unpleasant medication side effects or face barriers to accessing medical care (Sholichah et al., 2020). Motivation also plays a crucial role (Happi et al., 2021). This is where motivational interviewing (MI) can have a positive impact. MI is a communication approach aimed at enhancing individuals' motivation to change their behavior (Randall & McNeil, 2017). By exploring the patients' internal reasons and incentives to adhere to treatment, MI can be an effective tool in improving medication adherence in TB patients.

Several studies have been conducted to determine the effect of Motivational Interviewing on medication adherence and Bacillus Calmette-Guérin (BTA) test results in TB patients. For instance, research by (Parwati et al., 2021) demonstrated that MI interventions increased medication adherence in TB patients and significantly improved TB treatment success (Kurnia et al., 2021). A study conducted by (Zuliani, 2019) indicates that MI can enhance motivation, thus improving medication adherence. These findings highlight the potential of motivational interviewing as an intervention to enhance the effectiveness of TB treatment (Mohd et al., 2023) and reduce the global impact of this disease (Tolchin et al., 2020). This study aims to investigate the influence of implementing motivational interviewing in improving medication adherence as indicated by the BTA test in tuberculosis patients.

## **METHOD**

This study employed a quasi-experimental pretest-posttest control group design (Sugiyono & Puspanthani, 2020). The research received ethical approval from STIKes Bahrul Ulum Jombang under number 137/EC/KEPK-BU/I/2023. The recruitment process was conducted from December 2022 to April 2023, involving 60 selected clients from three high tuberculosis prevalence community health centers (Puskesmas) in West Sumba Region: Puuweri Puskesmas, Weekaro Puskesmas, and Tanarara Puskesmas. The sample selection method used convenience sampling with inclusion criteria: (1) aged between 21-60 years, (2) tuberculosis clients with a positive BTA test undergoing treatment for 1-2 months at most, (3) clients without comorbid diseases, (4) clients capable of hearing and understanding instructions. Exclusion criteria included: (1) clients classified as MDR TB patients, (2) clients experiencing complications. The selected clients were divided into two groups: an experimental group of 30 clients and a control group of 30 clients.

The first step in the research was the pre-test, involving the observation of BTA test results and a review of the treatment history. The implementation of motivational interviewing (MI) commenced on February 1, 2023, with two sessions per week conducted over a period of four weeks, each lasting 45 minutes. During each MI session, the researcher began with progressive muscle relaxation for 15 minutes. Subsequently, for 30 minutes, the researcher inquired about the problems patients faced when taking anti-tuberculosis medication, together with the patients identifying priority issues. Following this, motivation and education on tuberculosis were provided, covering its causes, signs,

and symptoms, the consequences of treatment discontinuation, proper treatment methods, and prevention measures as well as healthy lifestyle behaviors.

No specific interventions were applied to the control group, but they continued to receive standard care from the community health centers. After a period of 24 weeks (6 months) counted from the initiation of the patient's treatment, both groups underwent a post-test. The researcher assessed medication adherence in TB patients by observing BTA test results and reviewing their treatment history over the course of six months. The post-test concluded on August 20, 2023.

The medication adherence scores are categorized into two groups: adherent and non-adherent. Adherence is determined as "adherent" if the BTA test results are negative and the patient consistently completes a 6-month treatment course, as observed from their treatment history records. Conversely, "non-adherent" is determined if the BTA test results are positive and the patient does not complete the treatment as prescribed.

Descriptive analysis was used to examine the means, standard deviations, and relative frequencies within each group. Statistical tests were employed to assess data or variable normality using the Shapiro-Wilk test (for samples <100) and Levene's test to assess equality with a significance level of  $p > 0.05$ .

Statistical tests to compare medication adherence values between the experimental and control groups were analyzed using the Wilcoxon Signed Ranks Test. It was used to analyze differences in adherence variables before (pre) and after (post) the intervention, with a significance level of  $\alpha=0.05$ . If  $p \geq 0.05$ , then the research hypothesis (H1) is accepted.

## RESULTS AND DISCUSSION

Table 1 Demographic Characteristic Data of Respondents

Characteristic		Treatment Group		Control Group		Total		p-value
		n	%	n	%	n	%	
Gender	Men	16	53,3	17	56,7	33	55,0	0,629
	Female	14	46,7	13	43,3	27	45,0	
Age	<40 years	7	23,3	9	30,0	16	26,7	0,254
	>41 years	23	76,7	21	70,0	44	73,3	

Table 1 indicates that the equivalence test between the experimental and control groups shows  $p > 0.05$ , which means there is no difference or homogeneity in the characteristics of gender ( $p=0.629$ ), age ( $p=0.254$ ). The majority of the respondents were male, with 16 (53.3%) in the experimental group and 17 (56.7%) in the control group. In line with the World Health Organization (WHO), men accounted for 56% of all TB cases in 2020, compared to 33% in adult women, with the remaining cases involving children (WHO, 2022).

Men tend to have a broader social network and often participate in behaviors that elevate the likelihood of acquiring TB, including activities like traveling, smoking, alcohol consumption, staying in settings favorable for transmission, and pursuing careers with higher risk factors (Echazarreta et al., 2018). Additionally, men may be less inclined to seek medical care or undergo regular health check-ups, which can lead to delays in the diagnosis and treatment of TB (Mason et al., 2017).

Evidence suggests that male sex hormones, such as testosterone, have the potential to suppress the immune response to infections, thus increasing the risk of susceptibility to TB. Research conducted in both human and animal studies has indicated that the immune defense against *M. tuberculosis* relies significantly on CD4+ Th1 cells, which release IFN- $\gamma$ , a response modulated by IL-12. In comparison to intact male mice, female mice, and castrated male mice exhibit heightened levels of TNF- $\alpha$ , IFN-

$\gamma$ , and IL-12, and when subjected to testosterone treatment, their vulnerability to infections caused by *Mycobacterium intracellulare* and *Mycobacterium marinum* increases. (Dias et al., 2022).

The majority of respondents over the age of 41 years amounted to 23 respondents (76.7%) in the experimental group and 21 respondents (70%) in the control group. At this age, individuals tend to be more productive, and people in the productive age group typically have high mobility, which could expose them to a higher risk of TB bacteria (Setyaningrum, 2018).

Being over 41 years of age is associated with aging processes that significantly affect the immune system, rendering older people more vulnerable to various diseases, including tuberculosis (TB). The decline in the immune system in old age is known as "immunosenescence" and can be caused by several factors. In old age, more specific immune responses like T-cell and B-cell responses tend to decrease. T cells, which play a crucial role in recognizing and combating TB infections, experience a decline in their effector function, which can hinder the body's ability to control TB infections (Fulop et al., 2018). Additionally, there are physical changes in the body that can affect the respiratory system, such as a decrease in lung volume and lung elasticity. This can worsen TB symptoms and make individuals more susceptible to infections (Wachinou et al., 2018).

Table 2 Results of Wilcoxon Signed Ranks Test for Medication Adherence Values

Variable	Results	Treatment Group				Control Group			
		Pre test		Post test		Pre test		Post test	
		f	%	f	%	f	%	f	%
Adherence	Non-compliant	30	100	2	6,7	30	100	13	43,3
	Compliant	0	0	28	93,3	0	0	17	56,7
<b>Total</b>		<b>30</b>	<b>100</b>	<b>30</b>	<b>100</b>	<b>30</b>	<b>100</b>	<b>30</b>	<b>100</b>
p-value <i>wilcoxon</i>		0,000				0,000			

Based on the data in Table 2, there are Wilcoxon test results indicating a significant difference in adherence levels before and after the intervention in the experimental group ( $p=0.000$ ). Similar results are also observed in the control group ( $p=0.000$ ), demonstrating a significant difference in adherence levels before and after the intervention.

Table 3 Results of Wilcoxon Signed Ranks Test for BTA Test Values

Variable	Results	Treatment Group				Control Group			
		Pre test		Post test		Pre test		Post test	
		f	%	f	%	f	%	f	%
BTA test	Positif	30	100	2	6,7	30	100	13	43,3
	Negatif	0	0	28	93,3	0	0	17	56,7
<b>Total</b>		<b>30</b>	<b>100</b>	<b>30</b>	<b>100</b>	<b>30</b>	<b>100</b>	<b>30</b>	<b>100</b>
p-value <i>wilcoxon</i>		0,000				0,000			

Table 3 shows that the Wilcoxon test results indicate a significant difference in BTA test values before and after the intervention in the experimental group ( $p=0.000$ ). Similar results are observed in the control group ( $p=0.000$ ), indicating a significant difference in BTA test values before and after the intervention. However, when considering the number of respondents who achieved negative results, the treatment group has a larger number compared to the control group.

From the results of this study, it can be concluded that the MI communication model intervention has a positive impact on medication adherence levels and the treatment success of pulmonary tuberculosis, as indicated by the BTA test. MI is a therapeutic approach focused on motivating individuals to change their behavior (Herdiman et al., 2022). In the context of tuberculosis (TB) treatment, the use of MI with clients has several aspects that can enhance treatment adherence (Louwagie et al., 2014), ultimately leading to negative BTA test results.

The use of motivational interviews as an intervention with clients has yielded positive results in terms of medication adherence, self-care, and treatment success (Moriarty et al., 2019), especially when there is a decrease in adherence in each stage of behavior change (Parwati et al., 2021). MI is a counseling for the intrinsic motivation needed for behavioral change. Motivational Interviewing (MI) as a patient-centered intervention is a behavioral change strategy that enhances the patient's perception of the importance of behavioral change (Mohd et al., 2023). This motivational communication model embodies an effective patient-centered approach founded on theory and presents an inventive tactic for individuals with tuberculosis who are enduring intricate, long-term treatment challenges (R.F. Loa, 2016). The aim is to cultivate enduring self-confidence and surmount hurdles to medication adherence, thereby bolstering the achievement of successful treatment (Tolchin et al., 2020).

In MI, counselors work collaboratively with clients to enhance individual motivation for positive behavioral changes and resolve conflicts between clients' immediate and long-term priorities (Herdiman et al., 2022). MI can help TB patients develop self-confidence in facing their treatment. With increased self-confidence, patients are more likely to persist in their treatment and avoid treatment discontinuation.

## **CONCLUSIONS AND SUGGESTIONS**

Based on the Wilcoxon test results in the experimental and control groups, there is a significant difference in BTA test values before and after the intervention ( $p=0.000$ ). However, the treatment group showed a greater number of respondents with negative results compared to that in the control group. The conclusion of this study indicates that the intervention of the Motivational Interviewing (MI) communication model has a positive impact on the medication adherence level and the treatment success of pulmonary tuberculosis patients, as indicated by negative results in the BTA test. MI, as a therapeutic approach focused on motivating individuals to change behavior, has proven effective in improving treatment adherence in the context of tuberculosis treatment. This behavioral change strategy, through motivational interviews, helps patients build confidence and overcome obstacles in medication adherence, making it an efficient and innovative client-centered approach to support the success of TB patient treatment. Healthcare professionals can apply MI to build a positive and empathetic relationship with patients, providing motivation, especially for treatment adherence, and emphasizing the positive impact of treatment adherence, such as improved health, better quality of life, and increased immune resilience.

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