Improvement of Patients' Knowledge, Attitude, and Practice on Tuberculosis Treatment Using Video and Leaflet

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ABSTRACT

Background: *The effectiveness of Tuberculosis (TB) treatment outcomes for patients is currently suboptimal, posing a significant challenge to comprehensive efforts aimed at eradicating the disease. To address this problem, several studies have proposed that the implementation of health education initiatives have the potential to enhance treatment adherence and behavior of patients. Therefore, this study aims to assess the efficacy of health education programs using video and leaflet modalities.*

Method: *This was a quasi-experimental study with a non-randomized pretest-posttest control group design. The sample population consisted of 85 TB patients at the Kenanga Health Center, Tegal Sari Mandala II, Medan Denai District, Medan City in 2022. Furthermore, the samples size was obtained using a purposive sampling method, involving 64 patients, which were evenly divided into two groups, namely intervention and control. The controls and intervention groups were educated using leaflet and video media, respectively. Pre-test and post-test were given to all the participants using the same instrument. A post-test was administered on the twenty-fifth day, where the materials were the same as those used at the pre-test stage. The data collected in this study were analyzed using the Wilcoxon, Mann-Whitney, and N-Gain tests.*

Results: *There were significant differences between knowledges, attitudes, and practices of the participants before and after being given the interventions. Furthermore, knowledges, attitudes, and practices scores increased after the interventions were administered. Based on the results, health education using video (N-Gain score of 76.82) improved behavior of TB patients compared to the use of leaflet (N-Gain score of 49.74). After being educated, people with TB were expected to exhibit higher treatment adherence and adoption of healthy lifestyles.*

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INTRODUCTION

Tuberculosis (TB) poses a significant public concern due to its potential to cause massive economic losses and increase healthcare expenses across nations.[1,2] Furthermore, it is a respiratory and infectious disease caused by Mycobacterium TB, which spread through the transmission of sputum droplets when others sneeze and cough.[3] According to a global study conducted by World Health Organization (WHO), TB is responsible for up to 1.7 million fatalities worldwide.[4] The Southeast Asian region bears the highest burden of TB cases (44%), and Indonesia stands among the eight countries with the highest prevalence of the disease worldwide at 8.5%.[5] Based on the 2018 Basic Health Research Report, the prevalence of TB in Indonesia is estimated to be 0.42%, affecting a total of 1,017,290 people.[6] However, the establishment of an early diagnosis and provision of prompt treatment can significantly reduce the number of TB-related deaths, as all patients have the potential to be cured.[7]

Ensuring favorable outcomes for patients is crucial in the global efforts to control TB and mitigate the emergence of drug resistance due to treatment failure.[8,9] Drug resistance has been reported to pose a significant barrier to effective TB therapy and prevention. Multidrug-resistant TB (MDR-TB) arises from factors, such as incorrect treatment, inadequate medication supply and quality control, and airborne transmission of the bacterium in public settings.[10,11] Resistance of Mycobacterium TB bacteria to anti-TB drugs (ATD) refers to a condition, where these microbes can no longer be effectively eliminated by first-line ATD, particularly isoniazid and rifampicin.[12] To combat TB epidemic, WHO has set a target of 95% eradication by 2035

through its End TB program.[13] Furthermore, one well-known approach for enhancing the success of therapy is the implementation of the Directly Observed Therapy Short Course (DOTS).[14] This strategy has demonstrated considerable success in increasing the cure rate for TB patients despite encountering obstacles, such as long distances to healthcare facilities, lack of health insurance, challenges in medication adherence, and loss of income due to access to DOTS.[15,16]

Previous studies have highlighted the significance of addressing the lack of knowledges, attitudes, and practices among TB patients as a barrier to successful treatment and a contributing factor to the low cure rate. Du *et al.*[17] stated that insufficient understanding of TB care among individuals could create fear and uncertainty regarding examination, treatment, fees, and selection of treatment centers. Meanwhile, the possession of a positive attitudes can reduce the likelihood of neglecting healthcare-seeking behavior, thereby limiting the transmission of the disease. Another study revealed that more than half of the participants were unaware of the availability of free treatment, leading them to opt out of utilizing health facilities.[18] TB patients often tend to isolate themselves from others due to the fear of stigmatization. This indicates that the formation of a positive attitudes must be promoted to instill confidence in patients, enabling them to recover and complete their treatment.[19] A study in Ethiopia reported that sufferers who exhibited good and positive actions were more likely to have an early awareness of the need to visit health facilities.[20] A study in Gambia also revealed that the stigma surrounding TB led to the social ostracization of patients.[21]

The Health Belief Model (HBM) has proven to be an effective framework for identifying and predicting health behavior.[22,23] It aims to explain and predict health-related behavior by focusing on attitudes and beliefs of an individual. Health behavior is influenced by an individual's motivation to prevent illness or achieve recovery, as well as the belief in the efficacy of such attitudes in attaining a disease-free or cured state. [24] Assessing a person's level of knowledges, attitudes, and practices can provide valuable insights for designing targeted interventions to promote behavior changes. Interventions, such as health education and counseling can be used to enhance treatment behavior of TB patients, thereby encouraging prompt treatment seeking, self-care practices, and medication adherence.[25–27]

Several studies have demonstrated the effectiveness of health education video in improving an individual's knowledges, attitudes, and practices. Yang et al.[28] also reported that the use of this method played a positive role and encouraged people to adopt healthy behavior. A study in Bengaluru, India reported an increase in medication adherence by TB patients after being given an educational video highlighting essential TB information and emphasizing the importance of completing treatment.[29] In another study, it was reported that educational video could increase disease prevention behavior.[30] Furthermore, the effectiveness of using leaflet as a health promotion medium has been extensively reported. For example, a study in France showed changes in behavior and knowledges in patients after being educated with the medium.[31] The Guix-Comellas study reported that the use of leaflet adapted to the mother tongue of the educational target group increased the success of the intervention.[32] In this study, the intervention media used were educational video and leaflet. Leaflet media was chosen because it was easy to manufacture, inexpensive, and easy to carry.[33] Meanwhile, educational video media was selected because it could provide an overview of direct experience to the audience.[34]

Previous studies have identified methodological gaps in the assessment of the effectiveness of health education interventions. Based on findings, there is a lack of data analysis options to measure the impact of these interventions on targeted samples. Therefore, this study aims to address the gap by employing N-Gain analysis to identify and measure the effectiveness of interventions given to the study subjects. The study would like to know whether health education using the video method and leaflet media is effective to increase treatment behavior of TB patients.

In an initial study undertaken at the Kenangan Health Center, data were collected from a total of 285 individuals diagnosed with TB. Among these participants, only 79 people were certified as cured in 2020. Based on the findings of interviews with 9 TB patients, some of them were unaware of the benefits of taking TB medications, leading to non-compliance. Furthermore, most of the participants exhibited a lack of motivation to seek treatment promptly and frequently forgot to take TB medications prescribed by Kenangan Health Center staff. This behavior can be attributed to a belief among these patients that they had already recovered.

METHOD

This was a quasi-experimental, quantitative study with a non-randomized pretest-posttest control group design. Furthermore, the tasks included the identification of variables, the definition of the subject and population, the collection of sample data, the use of experimental design, the recording of findings, and data analysis. This study was conducted in July 2022 at

Kenangan health center, Tegal Sari Mandala II, Medan Denai, Medan, Sumatera Utara.

The sample population consisted of 85 patients receiving treatment for TB at the study location, but only 64 agreed to participate in all the procedures. This inclusion criteria were patients receiving care at the Kenangan Health Center, who were literate or able to read and were willing to participate in TB health education and all the activities. Participants who could not be questioned because of severe and life-threatening diseases were excluded from the process. Subsequently, patients were evenly divided into two groups, namely intervention and control, which received health education through video and leaflet, respectively. The dependent variable in this study was TB patients' knowledges, attitudes, and practices, which were assessed before and after the intervention, while the independent variables were video and leaflet media. Age, gender, education, and occupation were some of the respondents' characteristics that were observed.

The intervention given was health education regarding TB treatment using video and leaflet. The pre-test was administered to both groups before the video screening session and distribution of leaflet material. An identical instrument was used to administer pre- and post-tests to both groups. The intervention was administered for ten days before a post-test because the time of the respondent's visit to the Kenangan Health Center was not simultaneous on a predetermined day. Therefore, the intervention was given to patients who came to the health center until the tenth day. Signs and symptoms, causes, routes of transmission, preventative techniques, and treatment procedures were all included in the health education materials. Treatment using video was carried out for 30 minutes and divided into two sessions. In the first session, all subjects were invited to watch the video together for 10 minutes, while the second session involved question and answer for 20 minutes. The control group was given education through leaflet containing TB information. The two groups were given a post-test on the eleventh day where the materials were the same as those used in the pre-test stage.

Knowledges questionnaire consisted of six questions, where values of 1 and 0 were assigned to Yes and No answers, respectively, with the total score ranging from 0 to 6. Attitudes questionnaire contained ten statements with answer choices on a Likert scale, where strongly agree, agree, somewhat disagree, disagree, and strongly disagree were given values of 5, 4, 3, 2, and 1, respectively, with the total score ranging from 10 to 50. Furthermore, practices variable questionnaire consists of 8 questions with the answer choices Yes and No being given values of 1 and 0, respectively, with a total score range of 0 to 8. The samples were given informed consent to state their willingness to participate in this study before answering the questionnaire. All the answers from respondents on the pretest and posttest were then entered and rechecked to determine whether an error occurred.

Data analysis began by calculating the frequency distribution of TB patients' demographic data (age, gender, education, and occupation), as well as the average value of knowledges, attitudes, and practices. A normality test was first carried out using Shapiro-Wilk before the analysis was performed, and the results showed normal distribution (p-value<0.05). Furthermore, the Wilcoxon test was used to determine the differences in knowledges, attitudes, and practices of TB patients before and after being given health education using the video method and leaflet media. The Mann-Whitney test was conducted to determine the effect of knowledges, attitudes, and practices between the two groups. An N-Gain Test analysis was also carried out to compare the effectiveness of health education using the video method and leaflet media in improving treatment behavior. This study was approved by the Health Research Ethics Commission of Universitas Prima Indonesia with Number: 002/KEPK/UNPRI/VI/2022.

RESULTS AND DISCUSSION

This study used the HBM theoretical method, which had been recognized for decades as a model with the ability to describe a person's thoughts before behaving properly. According to the HBM, cognitive processes had a significant influence on an individual's behavior, which was related to health.[35] Furthermore, this study assessed whether health education using video media and leaflet was able to increase TB patients' knowledgess, attitudes, and practices score in terms of their treatment adherence. Health education was carried out to help individuals control their health independently by influencing, enabling, and strengthening decisions or actions based on predetermined values and goals.[36] The sample population consisted of 64 TB patients, which were divided into 2 groups.

The majority of the samples in the intervention (68.75%) and control (65.62%) groups were men. This finding was consistent with previous studies that TB was more prevalent among men.[37–39] This could be attributed to the frequency of their smoking behavior, which increased susceptibility to infection, as damaged lungs caused a decrease in immune function. Furthermore, other studies reported that the immunosuppressive effect caused by alcohol consumption was a risk factor for TB among men.[40,41]

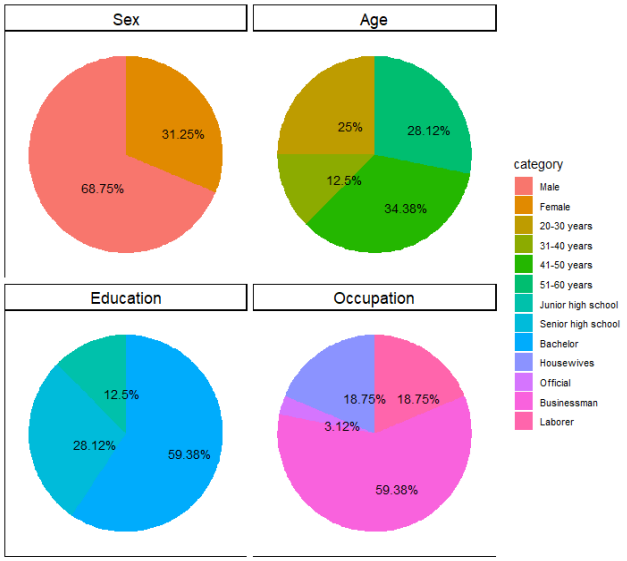

Figure 1. Characteristics of TB patients in the video group

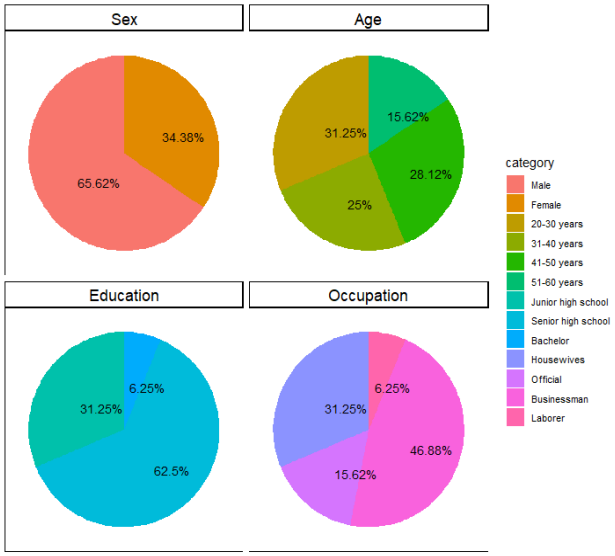

Figure 2. Characteristics of TB patients in leaflet group

Table 1. Knowledges score component values before and after treatment

Knowledges	Intervention Group		Control Group	
	Pretest n (%)	Posttest n (%)	Pretest n (%)	Posttest n (%)
TB is a lung disease caused by Mycobacterium TB.	20 (62.5)	29 (90.6)	16 (50.0)	22 (68.8)
TB treatment requires supervision and is carried out on a regular and disciplined basis.	9 (28.1)	19 (59.4)	16 (50.0)	22 (68.8)
Pulmonary TB can be transmitted through the air by splashing mucus or phlegm when TB patients coughs/ sneezes.	15 (46.9)	31 (96.9)	13 (40.6)	24 (75.0)
Symptoms of pulmonary TB disease Continuous cough Coughing up blood or phlegm Pain in the chest and shortness of breath Fever, weakness, night sweats No chills	15 (46.9)	31 (96.9)	9 (28.1)	21 (65.6)
TB prevention Covering mouth and nose when coughing or sneezing Using masks Not throwing phlegm or spit carelessly Sleeping in a room with other people	22 (68.8)	26 (81.3)	13 (40.6)	21 (65.6)
The consequences if TB treatment is not carried out regularly Increase and exacerbate shortness of breath and chest pain Weak body, decreased appetite, decreased body weight Sputum mixed with blood, prolonged fever No chills or fever	10 (31.3)	29 (90.6)	8 (25.0)	23 (71.9)

Table 2. Attitudes score component values before and after treatment

Attitudes	Test	Intervention Group				Control Group			
		Strongly Agree n (%)	Agree n (%)	Doubtful n (%)	Disagree n (%)	Strongly Agree n (%)	Agree n (%)	Doubtful n (%)	Disagree n (%)
Taking TB medicine must be on time	Pretest	-	12 (37.5)	20 (62.5)	-	-	14 (43.8)	18 (56.3)	-
	Posttest	1 (3.1)	23 (71.9)	8 (25.0)	-	-	16 (50.0)	16 (50.0)	-
TB patients must take their medicine at the right dose	Pretest	1 (3.1)	14 (43.8)	15 (46.9)	2 (6.3)	-	10 (31.3)	18 (56.3)	3 (9.4)
	Posttest	5 (15.6)	21 (65.6)	6 (18.8)	-	-	19 (59.4)	10 (31.3)	-
TB patients are allowed to take medication not on time	Pretest	2 (6.3)	7 (21.9)	18 (56.3)	5 (15.6)	-	4 (12.5)	21 (65.6)	3 (9.4)
	Posttest	2 (6.3)	24 (75.0)	6 (18.8)	-	-	23 (71.9)	6 (18.8)	-
Pulmonary TB patients are allowed to stop taking medicine when the pain goes away	Pretest	-	4 (12.5)	24 (75.0)	4 (12.5)	-	4 (12.5)	21 (65.6)	3 (9.4)
	Posttest	-	23 (71.9)	9 (28.1)	-	-	15 (46.9)	14 (43.8)	-
If taking the medicine is not on time, treatment can be continued directly without repeating from the beginning	Pretest	1 (3.1)	16 (50.0)	13 (40.6)	2 (6.3)	-	8 (25.0)	21 (65.6)	1 (3.1)
	Posttest	4 (12.5)	23 (71.9)	5 (15.6)	-	-	15 (46.9)	16 (50.0)	-
So that other people do not get infected with TB, TB patients should not talk too closely	Pretest	2 (6.3)	17 (53.1)	11 (34.4)	2 (6.3)	-	9 (28.1)	14 (43.8)	4 (12.5)
	Posttest	5 (15.6)	27 (84.4)	-	-	-	15 (46.9)	13 (40.6)	-
Sputum disposal should be in a special pot and given Lysol liquid	Pretest	2 (6.3)	13 (40.6)	16 (50.0)	1 (3.1)	-	9 (28.1)	19 (59.4)	1 (3.1)
	Posttest	5 (15.6)	27 (84.4)	-	-	1 (3.1)	15 (46.9)	15 (46.9)	-
When coughing or sneezing, people with pulmonary TB must cover their mouths to prevent the spread of TB germs	Pretest	3 (9.4)	17 (53.1)	11 (34.4)	1 (3.1)	6 (18.8)	4 (12.5)	13 (40.6)	1 (3.1)
	Posttest	5 (15.6)	23 (71.9)	4 (12.5)	-	15 (46.9)	14 (43.8)	2 (6.3)	-
To prevent transmission of pulmonary TB disease, a clean environment is needed	Pretest	5 (15.6)	18 (56.3)	8 (25.0)	1 (3.1)	4 (12.5)	8 (25.0)	18 (56.3)	5 (15.6)
	Posttest	9 (28.1)	21 (65.6)	2 (6.3)	-	32 (100)	13 (40.6)	14 (43.8)	-
Opening windows or ventilation is not an effort to prevent pulmonary TB disease	Pretest	4 (12.5)	16 (50.0)	11 (34.4)	1 (3.1)	6 (18.8)	16 (50.0)	10 (31.3)	-
	Posttest	8 (25.0)	21 (65.6)	3 (9.4)	-	12 (37.5)	16 (50.0)	4 (12.5)	-

Table 3. Practices score component values before and after treatment

Practices	Intervention Group		Control Group	
	Pretest n (%)	Posttest n (%)	Pretest n (%)	Posttest n (%)
If I have a cough for longer than three weeks, I go to the doctor right away	8 (25.0)	31 (96.9)	4 (12.5)	22 (96.9)
I tell my doctor or health care provider if I have TB	11 (34.4)	25 (78.1)	7 (21.9)	24 (78.1)
If I have TB symptoms, I immediately go to the doctor after realizing that the symptoms I'm experiencing may be related to TB	12 (37.5)	27 (84.4)	3 (9.4)	28 (84.4)
I believe masks are the right way to prevent infectious diseases that can be transmitted through the air	19 (59.4)	30 (93.8)	14 (43.8)	21 (93.8)
I cover my mouth when I cough	22 (68.8)	28 (87.5)	14 (43.8)	22 (87.5)
I use separate cutlery from the rest of the family	19 (59.4)	27 (84.4)	9 (28.1)	20 (84.4)
I always open the door every morning so that the air and sunlight enter the house	11 (34.4)	30 (93.8)	4 (12.5)	21 (93.8)
I always hang my bedding out in the sun	17 (53.1)	29 (90.6)	8 (25.0)	19 (90.6)

Table 4. Comparison of knowledges, attitudes, and practices scores before and after treatment

Variables	Intervention Group/Video				p-value	Control Group/Leaflet				p-value
	Mean	SD	Min	Max		Mean	SD	Min	Max	
Knowledges										
Pretest	4.59	1.521	2	8	<0.001	1.25	0.672	1	4	<0.001
Posttest	9.00	0.508	7	10		7.03	1.231	5	9	
Attitudes										
Pretest	34.84	5.419	21	43	<0.001	31.56	1.105	29	34	<0.001
Posttest	39.69	3.623	32	46		34.59	1.266	31	37	
Practices										
Pretest	3.69	1.355	1	6	<0.001	1.97	0.595	1	3	<0.001
Posttest	7.16	1.167	4	8		5.28	1.170	3	8	

Based on age, the control and intervention groups were dominated by patients within the age range of 41-50 years. The prevalence of TB was reported to increase with age due to the comorbidities that were commonly found in the elderly population..[42] Previous studies reported that the group with participants aged 25-54 years had the highest percentage of TB cases.[43] Furthermore, the majority of the samples in the intervention group had a bachelor's degree (59.38%), while the controls had graduated from high school (62.50%). This finding was in line with the results of previous studies, where there was an increase in the incidence of the disease among individuals with secondary and tertiary education.[44] Entrepreneurs were found to be the most common occupations in both the video and leaflet groups, accounting for 59.38% and 46.88% of the population, respectively. Based on the results, it was difficult to link the type of work with the prevalence of TB because there was little information on the subject. However, a study found that the working category was statistically more likely to have pulmonary TB.[45]

Tables 1, 2, and 3 show the results of knowledges, attitudes, and practices score components before and after being given treatment in the intervention and control groups. The results showed that there was an increase in the value of each knowledges, attitudes, and practices score after being given treatment in the form of video and leaflet. Health education through video and media leaflet played an important role in encouraging TB patients to seek treatment. Previous studies also reported that it had an essential role in the dissemination of accurate information, as well as improvement of attitudes and habits.[22]

Table 4 shows the mean, SD, minimum and maximum values for TB patients' knowledges, attitudes, and practices before and after being given health education through video and leaflet. The two groups experienced significant changes and increments in scores after the intervention. However, the increase in knowledges, attitudes, and practices scores was higher in the intervention group compared to the control. It could be concluded that health education through video had a more

significant effect compared to leaflet. The analysis results using the Wilcoxon Signed Rank Test also showed that

there were differences in knowledges (p <0.001), attitudes (p <0.001), and practices (p <0.001) of TB patients before and after being given the interventions through video and media leaflet. Health education intervention programs were very helpful in increasing knowledges, attitudes, and practices about TB.[46] These findings were consistent with previous studies, which obtained similar results.[47]

Previous studies with different interventions showed that health education using audio-visual media through the lecture method increased knowledges, attitudes, and TB prevention practices in Islamic boarding schools. The results also revealed that there were significant differences in these variables after treatment.[48] Another study found that poster calendar interventions and leaflet media could be used to improve pulmonary TB patients' knowledges and attitudes at the Martubung Health Center.[49]

The Mann-Whitney test results showed that health education using video and leaflet had a significant effect on TB patients by increasing knowledges (p=<0.001), attitudes (p=<0.001), and practices (p=<0.001). These findings also indicated that there was a significant increase in the mean knowledges, attitudes, and practices score of the intervention group compared to the controls. Furthermore, the role of health education was crucial for the dissemination of accurate information to TB patients who were undergoing treatment to encourage their contribution to controlling the disease. This was in line with previous studies that the intervention was essential in empowering patients and promoting their involvement in fighting TB.[50]

Health education was reported to be more effective when it actively engaged individuals in empowering themselves and the surrounding community.[51] The information gap, which eventually affected attitudes of individuals and led to the creation of habits, was one of the barriers to changing behavior.[52,53] The use of health promotion media in educating behavior was relatively effective as it helped in obtaining knowledges/literacy at the individual and community levels.[54] These findings showed that the intervention involving the use of media, such as video or leaflet, was more effective in influencing treatment behavior of TB patients. The utilization of exhibits that could be viewed immediately with the eye made it easier for subjects to learn about TB. The difference in knowledges, attitudes, and practices scores occurred because the material presented was intriguing, clear, and backed by media, allowing the messages to be well understood. The media used also helped in preventing audience boredom, leading to active participation in the lesson.

Previous studies showed that were no studies on the use of N-Gain score analysis to analyze the success of administering treatment to samples. Based on these findings, it could not be inferred that the interventions used previously were effective in increasing behavior of TB patients undergoing treatment. However, this current study utilized the N-Gain analysis the results revealed a mean N-Gain value of 79.52 and 49.74 for the intervention and control groups, respectively. This indicated that health education interventions through video were effective in increasing behavior of TB patients compared to leaflet, as shown in Table 5. These findings were in line with similar studies even though they focused on different problems and populations.[55–57] Video had the advantage of being a media format that could standardize its information content and reach more people. Furthermore, educational content on this medium could be replayed several times and used to communicate difficult concepts packed in print format.[58,59] Previous studies in Bengaluru reported that adherence to TB treatment was increased with video-based interventions as they provided a better understanding.[29]

Table 5. N-Gain test results

	Mann-Whitney			N-Gain	
Variables	**Group**	**Mean**	**P value**	**Intervention Group/ Video**	**Control Group/Leaflet**
Knowledges	Intervention	46.05	<0.001	76.62	49.74
	Control	18.95			
Attitudes	Intervention	44.73	<0.001		
	Control	20.27			
Practices	Intervention	43.83	<0.001		
	Control	21.83			

This study had several limitations. Some of the samples did not fill out the questionnaire due to the limited time and inadequate funds. Besides, interventions in the form of video and leaflet given to the samples were carried out only once, indicating that further studies providing the intervention repeatedly were required. The distance between the participant's home and the study location was lengthy and this caused lateness. Meanwhile, this study had the advantage of applying N-Gain analysis to analyze the effectiveness of health education interventions using video and leaflet.

CONCLUSION

The HBM-based health education interventions improved knowledges, attitudes, and practices of TB patients regarding treatment adherence. After receiving the interventions, the participants showed improvement in the average value of the study variables. However, some TB patients exhibited poor knowledges, such as a lack of understanding about TB causes, treatment, and prevention. The majority of participants demonstrated a positive attitudes toward TB therapy after receiving interventions using video and leaflet approaches. These findings also revealed that interventions through video were effective in increasing behavior compared to leaflet. Therefore, there was a need to increase health education through video methods that were more attractive to TB patients, as it could improve treatment adherence.

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