

The Effect of Health Education Using Brainstorming and Audiovisual Methods on the Knowledge of Families of Tuberculosis Patients

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ABSTRACT/ABSTRAK

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Tuberculosis is an infectious disease caused by the *Mycobacterium tuberculosis* bacteria. Poor family and community knowledge about pulmonary TB has a greater risk of increasing cases of pulmonary TB, while families and communities with good knowledge about pulmonary TB can reduce the incidence of pulmonary TB cases. This study aims to determine the Effect of Health Education Using Brainstorming and Audiovisual Methods on the Knowledge of Families of Tuberculosis Patients. This study is a pre-experimental study with a one-group pre-post test design. The population is 35 families of tuberculosis patients at the Ngasem Community Health Center, Kediri Regency. The sample size is 35 families of patients selected using a non-probability sampling technique. The research instrument uses a knowledge level questionnaire. Data analysis uses the Wilcoxon test. The results of the Wilcoxon Signed Ranks Test in SPSS, with a significance value of $p \text{ value} = 0.000 < 0.05$, meaning H_1 is accepted, which means there is an Effect of Health Education Using Brainstorming and Audiovisual Methods on the Knowledge of Families of Tuberculosis Patients. Health centers can use Health Education Using Brainstorming and Audiovisual Methods to increase the knowledge of families of tuberculosis patients.

Tuberkulosis suatu penyakit menular yang disebabkan oleh kuman *Mycobacterium tuberculosis*. Pengetahuan keluarga dan masyarakat tentang TB paru yang kurang baik memiliki dampak risiko lebih besar terjadi peningkatan kasus TB paru sedangkan keluarga dan masyarakat yang memiliki pengetahuan yang baik tentang TB paru dapat menurunkan kejadian kasus TB paru. Penelitian ini bertujuan untuk mengetahui Pengaruh *Health Education* Menggunakan Metode *Brainstorming* dan *Audiovisual* Terhadap Pengetahuan Keluarga Penderita TBC. Desain penelitian ini adalah Penelitian ini merupakan penelitian pra-eksperimen dengan desain one-group pre-post test. Populasi adalah 35 keluarga pasien tuberkulosis di Puskesmas Ngasem, Kabupaten Kediri. Ukuran sampel adalah 35 keluarga pasien yang dipilih menggunakan teknik non-probability sampling. Instrumen penelitian menggunakan kuesioner tingkat pengetahuan. Analisis data menggunakan uji Wilcoxon. Hasil uji Wilcoxon Signed Ranks Test pada SPSS, dengan nilai signifikansi $p \text{ value} = 0,000 < 0,05$, berarti H_1 diterima yang artinya terdapat Pengaruh Pendidikan Kesehatan Menggunakan Metode Brainstorming dan Audiovisual terhadap Pengetahuan Keluarga Penderita Tuberkulosis. Puskesmas dapat menggunakan *Health Education* Menggunakan Metode *Brainstorming* dan *Audiovisual* untuk meningkatkan pengetahuan keluarga pasien tuberkulosis



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A. INTRODUCTION

Tuberculosis is an infectious disease caused by the bacterium *Mycobacterium tuberculosis* (Wahdi et al., 2025; Setiyowati et al., 2020; Wahdi et al., 2025; Wahdi & Puspitosari, 2021). Poor family and community knowledge about pulmonary TB increases the risk of an increase in TB cases, while families and communities with good knowledge about pulmonary TB can reduce the incidence of TB cases (Sigalingging et al., 2019). Health education about pulmonary TB can include knowledge and behaviors of patients, families, and the community regarding preventing the transmission of pulmonary TB. Lack of knowledge and behaviors about pulmonary TB can make patients a potential source of infection, which is dangerous for the environment. Therefore, it is crucial for families with pulmonary TB to have knowledge and preventive behaviors to prevent transmission to others (Maria et al., 2020).

The prevalence of pulmonary tuberculosis in Indonesia was 0.4% in 2013, and 0.4% in 2018. In East Java, the prevalence was 0.2% in 2013, rising to 0.3% in 2018 (Riskasdas, 2018). The number of tuberculosis cases in Kediri Regency reached 350 cases per 100,000 residents. The number of pulmonary tuberculosis cases at the Ngasem Community Health Center in Kediri Regency in 2022 was 95 patients, with the number of patients diagnosed with pulmonary tuberculosis increasing to 138 in 2024.

Risk factors affecting tuberculosis include direct contact with someone with active tuberculosis, immunocompromised status (decreased immunity), for example, elderly, cancer, corticosteroid therapy, HIV, injection drug use, alcohol, people lacking adequate healthcare (poor, minority, children, young adults), pre-existing medical conditions including diabetes, chronic kidney failure, silicosis, malnutrition, immigrants from countries with high rates of tuberculosis (e.g., Haiti, Southeast Asia), institutionalization (e.g., long-term care facilities, prisons), living in crowded and substandard housing, and occupation (e.g., healthcare workers, especially those engaged in high-risk activities) (Puspasari, 2019).

Client education standards in nursing care institutions require nurses and healthcare teams at each institution to develop an educational method that encompasses theory on various treatment topics, such as diet and other nursing care. Educational methods are essential for the success of the material presented. Some methods that can be used include guidance and counseling, interviews, seminars, lectures, group discussions, role-plays, simulation games, and brainstorming (Notoatmodjo, 2012). Brainstorming is a method that uses the same principles as group discussions, but in brainstorming, the group leader provokes a problem and then each participant provides answers or responses (Wahyurin et al., 2019).

Video-based health education can improve knowledge for hemodialysis patients with diabetes mellitus (Mudzakkir et al., 2023). Education using audiovisual animation is an engaging learning experience. Audiovisuals can present information in more realistic images and sounds, thus maximizing the use of the senses of sight and hearing. Utilizing the senses to digest information will influence a person's level of comprehension (Wulandari, 2023).

Researchers used video to conduct health education to increase knowledge among families of tuberculosis patients. This aligns with findings from a computer research and publishing institute, Computer Technology Research (CTR), which stated that people can only remember 20% of what they see and 30% of what they hear. However, people can remember 50% of what

they see and hear, and 80% of what they see when they hear and experience it simultaneously (Wahdi et al., 2025; Wahdi et al., 2025)

B. METHODS

This research was conducted at the Ngasem Community Health Center, Kediri Regency. This research was a pre-experimental study with a one-group pre-post test design. The study population was 35 families of tuberculosis patients at the Ngasem Community Health Center, Kediri Regency. The sample size was 35 patient families selected using a non-probability sampling technique with purposive sampling. The research instrument used was a knowledge level questionnaire. Data analysis used the Wilcoxon test with $\alpha = 0.05$.

C. RESULT AND DISCUSSION

1. Result

a. Distribution of Respondents

Table 1. Distribution of Respondents

Respondent Characteristics	N	(%)
Age		
21-35 year	16	45.7
36-45 year	17	48.6
46-60 year	2	5.7
Gender		
Man	6	17.1
Woman	29	82.9
Education		
Elementary School	14	40
Middle School	9	25.7
High School	9	25.7
University	3	8.6

Based on table 1, data on the distribution of respondents based on age characteristics shows that almost half (48.6%) 17 are aged 36-45 years, data on the distribution of respondents based on gender characteristics shows that almost all (82.9%) 29 are female, and data on the distribution of respondents based on education characteristics shows that almost half (40.0%) 14 have elementary school education.

b. Patient family knowledge of tuberculosis before being given Health Education intervention using Brainstorming and Audiovisual Methods

Table 2. The level of knowledge of the patient's family regarding tuberculosis.

Variable	N	(%)
Good Knowledge	11	31,4
Sufficient Knowledge	23	65,7
Lack of Knowledge	1	2,9
Total	35	100,0

Based on table 2, showing data on the distribution of respondents based on the level of knowledge of the patient's family regarding tuberculosis before the intervention, the majority (65.7%) of 23 patient families had sufficient knowledge and a small proportion (2.9%) of 1 respondent had insufficient knowledge.

c. Patient family knowledge of tuberculosis after being given Health Education intervention using Brainstorming and Audiovisual Methods

Table 3. The level of knowledge of the patient's family regarding tuberculosis

Variable	N	(%)
Good Knowledge	26	74,3
Sufficient Knowledge	9	25,7
Total	35	100,0

Based on table 3, data on the distribution of respondents based on the level of knowledge of the patient's family regarding tuberculosis after the intervention was obtained, the majority (74.3%) of 26 elderly people had good knowledge and a small proportion (25.7%) of 9 respondents had sufficient knowledge.

d. The Effect of Health Education Using Brainstorming and Audiovisual Methods on the Knowledge of Families of Tuberculosis Patients

Table 4. The Effect of Health Education Using Brainstorming and Audiovisual Methods on the Knowledge of Families of Tuberculosis Patients

Level of Knowledge	Pre		Level of Knowledge	Post	
	N	%		N	%
Good Knowledge	11	31,4	Good Knowledge	26	74,3
Sufficient Knowledge	23	65,7	Sufficient Knowledge	9	25,7
Lack of Knowledge	1	2,9	Lack of Knowledge	0	0,0
Uji Wilcoxon	p-value 0,000				

Based on table 4, the results before the intervention showed that most (65.7%) of 23 families of patients with tuberculosis had sufficient knowledge and a small portion (2.9%) of 1 family of patients with tuberculosis had insufficient knowledge. The results after the intervention showed that most (74.3%) of 26 families of patients with tuberculosis had good knowledge and a small portion (25.7%) of 9 families of patients with tuberculosis had sufficient knowledge. The results of the Wilcoxon Signed Ranks Test, with a significance value of p value = 0.000 < 0.05, means that H_1 is accepted, which means there is an Effect of Health Education Using Brainstorming and Audiovisual Methods on the Knowledge of Families of Tuberculosis Patients

2. Discussion

a. Level of Knowledge Before Health Education Using Brainstorming and Audiovisual Methods

Based on the research results, it was found that the majority of respondents in this study were aged 36–45 years (48.6%), female (82.9%), and had an elementary school education (40%). These characteristics significantly influence their ability to receive and understand health information, particularly regarding tuberculosis. Low education levels are often associated with limited health literacy, namely a person's ability to access, understand, and use health information to make informed decisions (Notoatmodjo, 2018).

The initial knowledge measurement revealed that the majority of patient families had sufficient knowledge (65.7%), while only 31.4% had good knowledge, and 2.9% had poor knowledge. This indicates that although families had received information about tuberculosis,

the information was indefinite, unsystematic, and did not provide a comprehensive understanding. Families tended to only have a general understanding of TB but lacked a detailed understanding of how it is transmitted, the importance of adherence to long-term treatment, the family's role in supporting patients, and preventive measures at home..

This incomplete knowledge can be caused by irregularities in educational delivery, lack of support from healthcare workers, and a lack of engaging educational media. Research by Sigalingging et al. (2019) showed that families of TB patients with limited knowledge are at greater risk of inappropriate care, potentially increasing transmission to other family members.

Furthermore, the majority of respondents were women, who in Indonesian families typically serve as the primary caregivers and home caregivers. However, without a strong foundation of knowledge, this role cannot be optimally fulfilled. This aligns with the opinion of (Solikhah et al., 2019) which states that family support will be effective if the family has adequate knowledge, enabling them to provide informational, emotional, and motivational support to family members suffering from TB.

Low initial knowledge can also be linked to the intensity of interaction between the family and healthcare professionals. Families of TB patients often only receive information when the patient visits a healthcare facility for treatment, while follow-up education is minimal. Furthermore, information obtained through informal sources such as friends, neighbors, or social media is often inaccurate, leading to misperceptions, such as the belief that TB is only caused by fatigue or that long-term treatment is unnecessary.

Therefore, a sufficient level of knowledge before the intervention indicates that the family does possess some initial knowledge. However, an interactive, clear, and engaging educational approach is needed to improve this knowledge and make it applicable in real-life situations.

b. Knowledge Level After Being Given Health Education Using Brainstorming and Audiovisual Methods

The results of the study showed that after health education using brainstorming and audiovisual methods, there was a significant increase in the knowledge of families of tuberculosis patients. Before the intervention, the majority of families had sufficient knowledge (65.7%), but after the intervention, this increased to 74.3% with good knowledge, while 25.7% had sufficient knowledge, and no respondents had poor knowledge.

This increase in knowledge was closely related to the respondents' characteristics. Based on general data, most respondents were aged 36–45 (48.6%), most were female (82.9%), and had an elementary school education (40%).

These characteristics are important to consider because those in the productive age group of 36–45 generally play an active role in household maintenance and family decision-making, including caring for sick family members. However, the respondents' elementary school education reflects the low level of health literacy, necessitating simple, clear, visual, and interactive health education.

The brainstorming method used in the intervention was highly effective because it encouraged families to express their initial knowledge, experiences, and understanding of TB. This process fosters active participation, rather than passive reception of information. The discussions provide an opportunity for families to recognize their knowledge gaps, correct misperceptions, and gradually build a more accurate understanding. (Wahyurin et al., 2019). Study (Wahyuni & Maryati, 2025) stated that brainstorming enhances knowledge because learning occurs through interaction and clarification of concepts between the facilitator and participants, rather than a one-way lecture.

Furthermore, the use of audiovisual media reinforces information through a combination of visuals (images, animations) and auditory (audio-visual explanations). This medium is particularly suitable for respondents with lower levels of education, as visual information is

easier to grasp and remember than abstract text or oral explanations. (Fadyllah & Prasetyo, 2021) stated that audiovisual media can improve understanding and memory because it engages more of the five senses during the learning process, making information clearer and more concrete.

Furthermore, for families of tuberculosis patients, understanding the duration of treatment, the correct way to take medication, the dangers of discontinuing treatment, and how to prevent transmission within the home are often difficult to grasp through verbal explanations alone. When this information is conveyed through videos and images, families more easily understand the consequences of the disease, thus fostering awareness and motivation to support the patient's treatment.

Research by Latief et al. (2022) supports this finding, stating that audiovisual TB education can improve family knowledge because visuals can more realistically depict the disease process and its prevention. This is also confirmed by Wahdi & Puspitosari (2021), who stated that increasing family knowledge directly influences the success of TB treatment, as families play the most important role in monitoring medication adherence and maintaining the home environment to prevent transmission. Thus, the increase in knowledge among families following education using brainstorming and audiovisual methods demonstrates that the combination of interactive methods and easy-to-understand media is highly effective, especially in groups with low health literacy. This intervention not only increases knowledge but also has the potential to change family attitudes and behaviors regarding TB care, thus supporting long-term therapy success.

c. The Effect of Health Education Using Brainstorming and Audiovisual Methods on the Knowledge of Families of Tuberculosis Patients

The results of the study showed a significant effect between providing health education using brainstorming and audiovisual methods on improving the knowledge of families with tuberculosis. As demonstrated by the Wilcoxon test with a p-value of 0.000 ($p < 0.05$), the educational intervention was proven to produce meaningful changes in the level of family knowledge. This can be seen from the change in knowledge category before and after the intervention. Before the intervention, the majority of respondents were in the fair knowledge category (65.7%), while after the intervention, the majority of respondents increased to good knowledge (74.3%), and there were no longer any respondents with poor knowledge.

This increase in knowledge indicates that the information provided through appropriate educational methods was well received and understood by families. The brainstorming method plays a role in creating an active learning atmosphere, as families not only listen to explanations but also engage in the process of thinking, expressing opinions, asking questions, and discussing daily experiences related to TB prevention and care behaviors. This process creates meaningful learning, as respondents convey new information using their previous knowledge or experience. This aligns with the opinion of (Wahyuni & Maryati, 2025) which states that the interactive process of brainstorming encourages participants to more easily understand, remember, and internalize information.

Furthermore, the use of audiovisual media reinforces the information presented. Audiovisuals facilitate the understanding of often abstract concepts of TB, such as airborne transmission, lung tissue damage, and the consequences of interrupting treatment. When families see visuals through images, animations, or videos, their cognitive processes are quicker to absorb and remember the material, especially for respondents with low educational backgrounds (40% have an elementary school education). Due to limited health literacy, traditional educational methods such as lectures are often ineffective for this group. Audiovisual media makes health messages simpler, clearer, and more relevant to everyday life, helping families understand what to do practically, rather than just theoretically. This is

consistent with research. (Fadyllah & Prasetyo, 2021) which explains that audiovisuals improve knowledge retention because they involve more senses in the learning process. In addition to improving conceptual understanding, delivering education through brainstorming and audiovisuals also has an impact on building family awareness and a sense of responsibility in supporting the TB treatment process. Families become more aware that TB treatment should not be stopped, must be carried out for 6–9 months, and must be implemented strictly to prevent drug resistance that can worsen the patient's condition. This education changes the family's perspective from previously considering TB as a common disease, to realizing that TB is a contagious infectious disease that requires environmental behavioral controls, such as opening ventilation, drying bedding, wearing masks when interacting, and implementing proper cough etiquette..

Other research by Latief et al. (2022) also showed that audiovisual interventions and group discussions significantly increased family participation in supporting TB patients, both emotionally, informationally, and practically.

Thus, the results of this study demonstrate that the combination of brainstorming and audiovisual methods is highly effective in increasing the knowledge of families with TB. This increased knowledge is not only cognitive but also influences the family's attitudes and concrete actions regarding TB prevention and treatment. Interactive, visual-based education has proven to be an appropriate approach, especially for communities with low health literacy.

D. CONCLUSION AND SUGGESTIONS

Providing education using brainstorming and audiovisual methods can increase the knowledge of families of tuberculosis patients.

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