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Effectiveness of a Short Education Movie on Family Knowledge of Pulmonary Tuberculosis Transmission: A Quasi-Experimental Study

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Abstract

Background: Household members of patients with pulmonary tuberculosis are at increased risk of infection because of prolonged exposure and often have inadequate knowledge regarding disease transmission. Health education using audiovisual media, such as a Short Education Movie (SEM), may improve understanding of tuberculosis transmission; however, evidence regarding its effectiveness among family members in primary healthcare settings remains limited.

Objective: This study aimed to evaluate the effect of Short Education Movie (SEM)-based health education on family members' knowledge of pulmonary tuberculosis transmission at a primary healthcare center.

Methods: A quantitative quasi-experimental study with a one-group pretest-posttest design was conducted at Mantup Community Health Center, Lamongan, Indonesia, from May to June 2026. Fifty-four family members of patients with pulmonary tuberculosis were recruited using accidental sampling. Participants completed a researcher-developed 15-item knowledge questionnaire before and immediately after receiving a single SEM-based educational intervention. Descriptive statistics were used to summarize participant characteristics and knowledge scores. Differences between pretest and posttest scores were analyzed using the Wilcoxon Signed-Rank Test, with statistical significance set at $p < 0.05$.

Results: The mean knowledge score increased from 8.59 ± 2.54 before the intervention to 12.87 ± 1.69 after the intervention. The proportion of participants with good knowledge increased from 13.0% at baseline to 70.4% following the intervention, whereas the proportion with poor knowledge decreased from 59.3% to 3.7%. The Wilcoxon Signed-Rank Test demonstrated a statistically significant improvement in knowledge after the intervention ($p < 0.001$).

Conclusion: Short Education Movie-based health education significantly improved family members' knowledge of pulmonary tuberculosis transmission. SEM represents a practical and effective educational strategy for strengthening family-centered tuberculosis prevention and may support the integration of standardized audiovisual education into community nursing practice and primary healthcare tuberculosis control programs.

Keywords: Audiovisual education; family members; health education; knowledge; pulmonary tuberculosis; Short Education Movie.

INTRODUCTION

Tuberculosis (TB) remains one of the leading infectious diseases worldwide and continues to pose a major public health challenge, particularly in low- and middle-income countries. According to the Global Tuberculosis Report 2024, an estimated 10.8 million people developed tuberculosis and approximately 1.25 million people died from the disease in 2023. Indonesia continues to rank among the countries with the highest TB burden globally, highlighting the need to strengthen preventive strategies through early case detection, health promotion, and community-based educational interventions (1).

Pulmonary tuberculosis is transmitted through airborne droplet nuclei released when infected individuals cough, sneeze, speak, or sing. Consequently, household members living with patients are at particularly high risk of infection because of their prolonged and repeated exposure. Despite ongoing national tuberculosis control programs, misconceptions regarding TB transmission remain widespread. Many individuals continue to believe that tuberculosis is transmitted through sharing eating utensils, direct physical contact, or hereditary factors, whereas awareness of airborne transmission remains insufficient. Such misconceptions may delay preventive behaviors, reduce adherence to infection-control measures, and increase the risk of household transmission (2–4).

Improving family knowledge is therefore an essential component of tuberculosis prevention. Family members play an important role not only in supporting treatment adherence but also in implementing infection prevention practices within the household. Health education has consistently been recognized as one of the most effective strategies for increasing knowledge and promoting positive health behaviors. Among various educational approaches, audiovisual media have demonstrated greater effectiveness than conventional educational methods because they simultaneously stimulate visual and auditory learning pathways, improve attention, facilitate information processing, and enhance long-term knowledge retention. Consistent with the Cognitive Theory of Multimedia Learning, combining verbal explanations with visual information promotes deeper understanding than text-based education alone (5–8).

Previous studies have demonstrated the benefits of audiovisual education in tuberculosis control. Achjar et al. reported that health education delivered through a Short Education Movie (SEM) significantly improved family knowledge regarding pulmonary tuberculosis prevention among foster families in Lhokseumawe during the COVID-19 pandemic. Likewise, several international studies have shown that video-based educational interventions improve knowledge of tuberculosis, reduce misconceptions about disease transmission, and encourage greater family participation in prevention and treatment adherence (9,10). These findings suggest that audiovisual education is a promising strategy for strengthening community-based tuberculosis prevention programs.

However, several important knowledge gaps remain. First, most previous studies have primarily evaluated educational interventions aimed at general tuberculosis prevention rather than knowledge specifically related to pulmonary tuberculosis transmission. Second, many studies were conducted during the COVID-19 pandemic or in healthcare settings that differ substantially from routine primary healthcare services, limiting the generalizability of their findings to current clinical practice. Third, evidence regarding the effectiveness of Short Education Movie (SEM)-based education among family members accompanying pulmonary tuberculosis patients in Indonesian primary healthcare settings remains scarce. Consequently, further evidence is needed to determine whether SEM-based health education effectively improves family knowledge of pulmonary tuberculosis transmission under routine primary healthcare conditions (11,12).

Primary healthcare centers play a central role in tuberculosis control through early case detection, treatment supervision, contact investigation, and community health education. Mantup Community Health Center, one of the primary healthcare facilities in Lamongan Regency, continues to manage a substantial number of pulmonary tuberculosis cases, highlighting the importance of strengthening family-centered educational interventions. Improving family understanding of pulmonary tuberculosis transmission may contribute to reducing household exposure while supporting national tuberculosis elimination strategies (13).

Therefore, this study aimed to evaluate the effect of health education using a Short Education Movie (SEM) on knowledge of pulmonary tuberculosis transmission among family members accompanying patients receiving treatment at Mantup Community Health Center. By focusing specifically on knowledge of disease transmission in a primary healthcare setting, this study extends previous evidence on audiovisual health education and provides practical evidence to support the integration of SEM-based education into community nursing practice and tuberculosis health promotion programs.

METHODS

Study Design

This study employed a quantitative quasi-experimental design using a one-group pretest-posttest design to evaluate changes in family members' knowledge of pulmonary tuberculosis transmission following a health education intervention. Participants completed a knowledge assessment before (pretest) and immediately after (posttest) receiving education through a Short Education Movie (SEM). Because all participants received the intervention without randomization or allocation to a control group, a quasi-experimental approach was considered appropriate for evaluating the effectiveness of the educational intervention under routine primary healthcare conditions.

Study Setting and Participants

The study was conducted at Mantup Community Health Center, Lamongan Regency, Indonesia, between May and June 2026. The study population comprised family members accompanying pulmonary tuberculosis patients who resided in the same household.

Participants were recruited using an accidental sampling technique based on their attendance at the health center during the study period. A total of 54 participants fulfilled the eligibility criteria and agreed to participate.

The inclusion criteria were: (1) aged 18 years or older; (2) living in the same household as a patient diagnosed with pulmonary tuberculosis; (3) able to communicate effectively in Indonesian; and (4) willing to participate by providing written informed consent. Individuals with cognitive impairment or those unable to

complete the questionnaire independently were excluded.

Instrument

Knowledge regarding pulmonary tuberculosis transmission was assessed using a researcher-developed questionnaire consisting of 15 dichotomous items (True/False) based on the Guttman scale. The questionnaire evaluated three cognitive domains adapted from Bloom's taxonomy, namely knowledge (C1), comprehension (C2), and application (C3).

Prior to data collection, the instrument underwent psychometric evaluation involving 30 respondents with characteristics similar to those of the study population. Item validity was assessed using the Pearson product-moment correlation test, while internal consistency reliability was evaluated using the Kuder-Richardson Formula 20 (KR-20), which is appropriate for dichotomous items. Knowledge scores were classified as poor, fair, and good according to predetermined score ranges.

Intervention

The intervention consisted of a Short Education Movie (SEM) specifically developed to provide education regarding pulmonary tuberculosis transmission. The audiovisual material explained the mechanisms of airborne TB transmission, common misconceptions regarding disease spread, household transmission risks, respiratory hygiene, cough etiquette, and preventive measures using animated illustrations and real-life scenarios.

The intervention was delivered once in a face-to-face educational session at Mantup Community Health Center. Immediately after viewing the SEM, participants were given the opportunity to ask questions and receive clarification from the researcher to reinforce understanding of the educational content.

Data Collection

Data collection was conducted in three sequential stages.

First, eligible participants received an explanation of the study and provided written informed consent before completing the pretest questionnaire to assess baseline knowledge regarding pulmonary tuberculosis transmission.

Second, participants received the SEM-based educational intervention in a single session.

Finally, immediately following completion of the educational session, participants completed the same questionnaire as a posttest to evaluate changes in knowledge after the intervention.

Data Analysis

Data were analyzed using IBM SPSS Statistics.

Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participants' demographic characteristics and knowledge scores.

The distribution of knowledge scores was assessed using the Shapiro-Wilk test. Because the data were not normally distributed, differences between pretest and posttest knowledge scores were analyzed using the Wilcoxon Signed-Rank Test. Statistical significance was determined at a two-tailed p -value < 0.05 .

RESULTS

A total of 54 family members accompanying patients with pulmonary tuberculosis were included in the study, and all participants completed both the pretest and posttest assessments.

The descriptive analysis showed an increase in participants' knowledge scores following the Short Education Movie (SEM) intervention. The mean pretest knowledge score was 8.59 (SD = 2.54), which increased to 12.87 (SD = 1.69) after the educational intervention, indicating an overall improvement in participants' knowledge of pulmonary tuberculosis transmission (Table 1).

Consistent with the increase in mean scores, the distribution of knowledge categories also changed substantially after the intervention. Before receiving SEM-based education, 59.3% of participants were classified as having poor knowledge, whereas only 13.0% demonstrated good knowledge. Following the intervention, the proportion of participants with good knowledge increased markedly to 70.4%, while the proportion with poor knowledge decreased to 3.7% (Table 2).

The Wilcoxon Signed-Rank Test revealed a statistically significant difference between pretest and posttest knowledge scores ($p < 0.001$), indicating a significant improvement in participants' knowledge following the educational intervention (Table 3).

Table 1. Descriptive Statistics of Knowledge Scores Before and After the SEM Intervention

Assessment	Mean	SD
Pretest	8.59	2.54
Posttest	12.87	1.69

Table 2. Distribution of Knowledge Levels Before and After the SEM Intervention

Knowledge Level	Pretest n (%)	Posttest n (%)
Good	7 (13.0)	38 (70.4)
Fair	15 (27.8)	14 (25.9)
Poor	32 (59.3)	2 (3.7)

Table 3. Comparison of Knowledge Scores Before and After the SEM Intervention

Variable	Statistical Test	p -value	Interpretation
Pretest vs Posttest	Wilcoxon Signed-Rank Test	<0.001	Significant improvement

DISCUSSION

The present study demonstrated that health education delivered through a Short Education Movie (SEM) significantly improved family members' knowledge regarding pulmonary tuberculosis transmission. The significant increase in posttest knowledge scores indicates that SEM is an effective educational approach for enhancing family understanding of TB transmission within a primary healthcare setting. These findings highlight the potential of audiovisual education to strengthen family-centered tuberculosis prevention strategies, particularly among household contacts who are at increased risk of infection (14,15).

The effectiveness of the SEM intervention may be explained by the principles of the Cognitive Theory of Multimedia Learning, which proposes that individuals learn more effectively when information is presented simultaneously through visual and auditory channels. Dual-channel processing facilitates attention, comprehension, and long-term memory formation by enabling learners to integrate verbal explanations with visual representations. In the present study, the SEM combined narration with animated illustrations and real-life scenarios to explain airborne transmission, common misconceptions, respiratory hygiene, cough etiquette, and preventive measures. This multimodal approach likely enabled participants to understand complex concepts more effectively than conventional verbal instruction alone (16–18).

The findings of this study are consistent with previous research demonstrating the effectiveness of audiovisual education in tuberculosis control. Lolong et al. reported that a Short Education Movie significantly improved family knowledge regarding pulmonary tuberculosis prevention during the COVID-19 pandemic. Similarly, international studies have shown that video-based educational interventions improve tuberculosis-related knowledge, correct misconceptions regarding disease transmission, and encourage greater family participation in prevention and treatment adherence. The consistency of these findings across different populations and healthcare settings reinforces the value of audiovisual education as an effective strategy for tuberculosis health promotion (16,19).

An important contribution of the present study is its focus on knowledge of pulmonary

tuberculosis transmission, rather than general tuberculosis prevention. Furthermore, the intervention was evaluated among family members accompanying pulmonary tuberculosis patients in a routine primary healthcare setting, a population with a particularly high risk of household exposure. By demonstrating significant improvements in this context, the present findings extend existing evidence regarding the applicability of SEM-based education in everyday community health services (20).

Improving family knowledge has important implications for tuberculosis control because inadequate understanding remains a major barrier to effective prevention. Misconceptions regarding disease transmission may contribute to inappropriate preventive practices, delayed health-seeking behavior, and persistent stigma within the community. Therefore, educational interventions that improve understanding of airborne transmission and appropriate infection prevention measures may support household protection while strengthening broader tuberculosis control efforts.

From a nursing perspective, these findings support the integration of Short Education Movie-based education into routine health education delivered by community and primary healthcare nurses. Compared with conventional face-to-face lectures alone, audiovisual education provides standardized educational content, increases participant engagement, and can be delivered repeatedly with consistent quality. Because SEM is relatively inexpensive and easy to implement, it represents a practical educational resource for strengthening community-based tuberculosis prevention programs, particularly in resource-constrained primary healthcare settings.

Several limitations should be considered when interpreting these findings. First, the use of a one-group pretest–posttest design without a comparison group limits the ability to attribute improvements exclusively to the intervention. Second, participants were recruited using accidental sampling from a single primary healthcare center, which may reduce the generalizability of the findings. Third, knowledge was assessed immediately after the intervention, preventing evaluation of long-term knowledge retention or changes in preventive behavior. Future studies should employ controlled experimental designs with larger and

more diverse samples, include multiple healthcare facilities, and incorporate longer follow-up periods to determine whether improvements in knowledge are sustained and translated into behavioral change.

Overall, this study adds to the growing evidence supporting audiovisual health education for tuberculosis prevention. By specifically demonstrating the effectiveness of a Short Education Movie in improving family knowledge of pulmonary tuberculosis transmission within a primary healthcare setting, the study provides practical evidence to support the integration of innovative audiovisual education into community nursing practice and family-centered tuberculosis control programs.

CONCLUSION

This study demonstrates that health education delivered through a Short Education Movie (SEM) significantly improves family members' knowledge of pulmonary tuberculosis transmission. The findings indicate that SEM is an effective audiovisual educational strategy for enhancing family understanding of disease transmission and supporting tuberculosis health education within primary healthcare settings.

By focusing specifically on knowledge of pulmonary tuberculosis transmission among family members of patients, this study extends existing evidence on audiovisual health education and highlights the value of family-centered educational interventions for reducing the risk of household transmission. The findings also support the integration of SEM-based education into routine nursing practice and community tuberculosis control programs to strengthen the quality, consistency, and accessibility of health education.

Future research should employ controlled experimental designs with larger and more diverse samples, involve multiple healthcare facilities, and include longer follow-up periods to evaluate knowledge retention, preventive behaviors, household transmission, and the long-term effectiveness of SEM-based educational interventions.

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Author Contributions

ESH: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft.

DK: Supervision, Methodology, Validation, Writing – Review & Editing.

AA: Supervision, Validation, Writing – Review & Editing.

CONFLICT OF INTEREST

The authors declare that there are no financial, personal, professional, or institutional relationships that could be perceived as influencing the conduct, results, or interpretation of this study. The authors have no conflicts of interest related to the publication of this manuscript.

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