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Using storybooks to enhance health awareness among schoolchildren at risk of tuberculosis

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Abstract

Background: In 2020, Indonesia ranked third globally for the highest number of tuberculosis (TB) cases, with an estimated 969,000 cases. In 2022, Pekalongan recorded 150 pediatric TB cases, with many contacts refusing TB preventive therapy. Children living in the same household as adults with positive acid-fast bacilli (AFB) TB are at high risk of contracting *Mycobacterium tuberculosis*. One preventive measure is introducing age-appropriate education to enhance their understanding.

Purpose: To examine the impact of education through storybook media on tuberculosis awareness among school-aged children living with TB patients.

Method: A quasi-experimental one-group pretest-posttest design. Using purposive sampling, 30 children who shared a household with TB patients participated. They received health education interventions through storybooks and leaflets. A TB knowledge questionnaire and an observation sheet for cough etiquette practices were used as research instruments.

Results: There was a significant improvement in children's knowledge and cough etiquette practices after receiving health education through storybooks and leaflets, as demonstrated by the Wilcoxon test (p -value < 0.05).

Conclusion: Health education using storybooks effectively enhances knowledge and improves cough etiquette skills in school-aged children.

Keywords: Children's Health Education; School Children; Story Books; Tuberculosis Prevention.

INTRODUCTION

In 2020, Indonesia ranked third globally for the highest number of TB cases, with an estimated 969,000 cases. This equates to one person being infected with TB every 33 seconds and represents a 17% increase from 2020, which recorded 842,000 cases (Indonesia KNCV Foundation, 2022). The TB incidence rate in Indonesia is 354 per 100,000 population, meaning that 354 out of every 100,000 people are affected by TB. The mortality rate from TB in Indonesia has reached 150,000 cases (equivalent to one death every 4 minutes), a 60% increase compared to 2020, which recorded 93,000 deaths with a mortality rate of 55 per 100,000

population. The TB cases in 2022 are considered the highest since TB was designated a national priority program. As a result, the Ministry of Health has intensified efforts to tackle TB and included it as a key component of health transformation in Indonesia (Ministry of Health of the Republic of Indonesia, 2022).

TB affects all age groups, with the majority of cases occurring in the productive age group. In 2021, there were 1.2 million TB cases among children, with a mortality rate of 15% (Soedarsono, 2021). TB in children and adolescents is often neglected by healthcare providers and can be

challenging to diagnose and treat (World Health Organization, 2024). In Pekalongan, TB cases among children reached 150 in 2022. Additionally, some health workers in Pekalongan have reported that many individuals in close contact with TB patients decline preventive therapy. Addressing TB in children is a high-priority issue, making it crucial to educate and raise awareness about TB among children to enable early prevention, especially for those living with TB patients.

Children who live in the same household as adults with positive acid-resistant TB bacteria are at high risk of contracting *Mycobacterium tuberculosis*. Environmental sanitation factors such as inadequate ventilation, overcrowded living conditions, high humidity, and insufficient natural lighting can prolong the presence of *Mycobacterium tuberculosis* in the air, increasing the risk of infection (Azzahrain, Afifah, & Yamani, 2023).

Health education using illustrated storybooks containing information about tuberculosis can be an effective medium. Research shows that individuals retain 10-30% of what they read and up to 50% when they apply or practice what they have seen and read. This approach targets not only cognitive learning (knowledge) but also psychomotor skills, enabling children to practice proper cough etiquette (Dale, 1946).

Storybooks are an engaging and effective medium for conveying important messages to children. Providing education on balanced nutrition through storybooks has been shown to significantly impact schoolchildren. Reading books helps improve concentration, enhances logical thinking, fosters imagination and creativity, and offers numerous other benefits (Padmiswari, Wulansari, & Antari, 2022). Storybooks that include relevant information about disease transmission can encourage children to learn and adopt preventive behaviors, such as avoiding objects that may be contaminated with germs causing infectious diseases (Conrad, Kim, Blacker, Walden, & LoBue, 2020).

The specific goal of this study was to examine the effect of using storybook-based education about tuberculosis on schoolchildren living in the same household as TB patients. This research is critical in addressing the rising trend of TB cases, particularly as many individuals in close contact with TB patients

decline preventive therapy. A lack of understanding about TB may contribute to this reluctance. Health education interventions targeting children can serve as a preventive measure, focusing on vulnerable groups to help curb TB transmission.

RESEARCH METHOD

The research utilized a quantitative approach with a quasi-experimental design, specifically a one-group pretest-posttest method. This involved delivering health education interventions to school children about tuberculosis (TB) using storybooks and leaflets. The materials, including the storybook titled *Hore Tibi Sembuh* and the *Find and Treat TBC* campaign leaflet, were adopted from the Ministry of Health. Parents participated in the study by assisting their children in learning about TB prevention through these storybook materials. A post-test was conducted one week after the intervention to evaluate its effectiveness.

The study population consisted of school children living in the same household (close contacts) as patients with positive acid-fast bacilli (AFB) TB, as identified through data from the Health Office and Health Centers. A purposive sampling method was used to select participants. After securing a research permit from the Health Centers, the researchers identified accessible work areas, selecting five Health Centers and recruiting 30 school children who met the inclusion criteria.

The research instrument was a TB knowledge questionnaire, designed by the researchers and tested for validity (construct and content) and reliability in groups with similar characteristics to the sample. The research team included six assistants who acted as educators and conducted evaluations.

Univariate analysis was used to determine the frequency distribution of external variables and respondent characteristics. Bivariate analysis measured differences in the outcome variables, namely knowledge and cough etiquette practices, before and after the health education intervention using storybooks.

This study was approved by the Ethics Committee of the Semarang Ministry of Health Polytechnic, with ethical clearance letter number No. 0666/EA/KEPK/2024.

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RESEARCH RESULTS**Table 1. Characteristics of the Participants (N=30)**

Variable	Results
Age (n/%) (Mean±SD)(Range)(Year)	(9.40±1.632)(7-12)
7	5/16.68
8	4/13.33
9	7/23.33
10	6/20.00
11	4/13.33
12	4/13.33
Gender (n/%)	
Male	17/56.70
Female	13/43.30
Education (n/%)	
Elementary School grade 1	2/6.70
Elementary School grade 2	6/20.00
Elementary School grade 3	4/13.30
Elementary School grade 4	8/26.70
Elementary School grade 5	4/13.30
Elementary School grade 6	5/16.70
Junior high school grade 1	1/3.30

Table 1 shows that the average age of participants is 9.40 years, more than half of them are male (56.70%) and most are in grade 4 of elementary school (26.70%).

Table 2. Knowledge and Practice of Cough Etiquette before and after the intervention

Variable	Pre-test	Post-test	Z	p
	Mean (min-max)	Mean (min-max)		
Knowledge	38.00 (0-70)	82.00 (50-100)	-4.815b	0.001
Cough Etiquette Practices	3.53 (2-8)	9.33 (6-10)	-4.804b	0.001

Description: n: sample; p: significance; (*) p < 0.05: significant difference; analyzed by Wilcoxon test

Table 2 shows that the value of the knowledge variable according to the research instrument is in the range of 0-100 and for cough etiquette 0-10. The average pre-test knowledge is 38.00 and the average post-test knowledge is 82.00. The average pre-test cough etiquette practice is 3.53 and the average post-test cough etiquette practice is 9.33.

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Table. 3 The correlation between Knowledge and Cough Etiquette Practices with External Variable

External variable	p	
	Knowledge about TB	Cough Etiquette Practices
History of TB in the family	0,103	0,263
Previous information about TB	0,061	0,001*
Home learning culture	0,831	0,234

Table 3 shows that there is a significant correlation between cough etiquette practices and previously received information about TB (p value $<0,05$). This indicates that individuals who have received prior information about TB are more likely to practice proper cough etiquette, emphasizing the importance of education in promoting healthy behaviors. However, no significant correlation was found between cough etiquette practices and other external variables, such as a history of TB in the family ($p=0.263$) or home learning culture ($p=0.234$).

DISCUSSION

According to Piaget's theory of cognitive development, school-age children fall into the pre-operational stage (ages 2–7) and the concrete operational stage (ages 7–11). During the pre-operational stage, children begin to use words and images to represent their understanding of the world, while in the concrete operational stage, they develop the ability to classify, organize, and understand relationships between different concepts. The school-age children in this study were appropriately suited for the use of storybook media. Reading books offers numerous benefits, such as improving concentration, enhancing logical thinking, fostering imagination, and boosting creativity (Padmiswari et al., 2022).

Research has explored the relationship between children's knowledge and gender, with mixed results. For example, studies have found a correlation between gender and school children's knowledge about COVID-19, with girls tending to show more interest and engagement in reading compared to boys (Yossy & Fatimah, 2022; Khaleel, 2017; Wulandari, Rahman, Pujianti, Sari, Laily, Anggraini, & Prasetyo, 2020). Conversely, other research indicates no significant relationship between gender and knowledge of snacking behavior (Pitriyanti, Septiati, Putri, & Karmini, 2024). These findings

suggest that various factors influence children's knowledge, often depending on the specific topic being studied. This study did not specifically analyze the correlation between gender and knowledge, though this may be a subject for future exploration.

A history of TB in the family can affect the knowledge of family members about TB including children. Experience can shape a person's knowledge, attitude and behavior towards something. There is a relationship between experience, knowledge, self-efficacy and health education interventions with children's psychosocial skills (Penyami, Hartini, & Prabandari, 2020).

Differences in knowledge and practice of cough etiquette before and after intervention indicate that health education using story books and leaflets is effective in increasing children's knowledge and skills to prevent TB. Story books containing relevant explanations about disease transmission can motivate children to learn and take preventive measures by avoiding objects that can be contaminated with germs that cause infectious diseases (Conrad et al., 2020). It is further explained that involving children in learning about disease transmission can encourage adaptive health behavior. The study further explained that storybook media that are often read to children for 2 weeks and sensory games can increase the likelihood of children trying vegetables that they have not known before (Nekitsing, Blundell-birtill, Cockcroft, Fildes, & Hetherington, 2019). Storybook media can improve children's knowledge, attitudes, and behavior to carry out actions that can support their health.

Several studies in Indonesia have also proven the effectiveness of storybook media in increasing children's knowledge. There was an increase in the average knowledge of school children from 4.82 to 6.99 after being given education with picture storybook media (Gunawan, Suhardi, & Makawawa, 2023; Anggito & Sartono, 2022). There was a

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significant influence of providing health education with picture storybook media on increasing elementary school children's knowledge about balanced nutrition (Padmiswari et al., 2022).

This study focuses on outcomes beyond cognitive aspects, such as knowledge, by also addressing affective and psychomotor domains. Effective health promotion should aim to ensure that participants, especially children, can actively apply the practices taught during educational activities. Health promotion goes beyond merely increasing knowledge and changing behavior; it also emphasizes creating supportive environmental changes that enhance individuals' ability to lead healthy lives rather than just adopt healthy behaviors (Susilowati & Susilowati, 2016).

In the context of tuberculosis (TB) prevention, the goal is not just to impart knowledge but to equip individuals with the ability to take preventive actions, such as practicing proper cough etiquette. This is particularly critical for children living in the same household as TB patients, as they face a significantly higher risk of contracting TB bacteria. Studies suggest that individuals retain 10–30% of what they read, but retention increases to 50% when they actively apply or practice what they have learned (Lee & Reeves, 2007).

Educational interventions using storybooks have shown significant positive impacts on school children's knowledge about balanced nutrition. Reading books offers various benefits, including improving concentration, enhancing logical thinking, fostering imagination, and boosting creativity, among others (Padmiswari et al., 2022).

Parental involvement in helping and accompanying children in learning, especially health education, is very important. Parental assistance is a good strategy to provide education on preventing HIV transmission to children. (Edwards, Mkwana, Mitchell, Bland, & Rochat, 2020). The role of parents in promoting children's health shows significant meaning, especially in regulating eating patterns so that obesity can be prevented (Koyama, Fujiwara, Isumi, & Doi, 2020).

CONCLUSION

Health education on TB prevention using story books and leaflets can improve the knowledge and skills of cough etiquette practices of school children

who live with TB patients. We recommend further studies to analyze other factors that influence children's knowledge of TB so that interventions with a nursing approach can be attempted for TB prevention practices in children.

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