Research Paper

A Family's Knowledge and Attitudes Toward the Prevention of Pulmonary Tuberculosis in Tasikmalaya City, Indonesia, in 2023: A Cross-sectional Study

Miftahul Falah[1*], Tukimin Bin Sansuwito[2], Regidor III Dioso[2], Nina Pamela Sari[1], Lilis Lismayanti[1], Satriya Pranata[3], Sri Wahyuni[4]

1. Department of Nursing, Faculty of Health Sciences, Universitas Muhammadiyah Tasikmalaya, Tasikmalaya, Indonesia.
2. Department of Nursing, Faculty of Nursing, Lincoln University College, Petaling Jaya, Malaysia.
3. Department of Nursing, Faculty of Nursing and Health Sciences, Universitas Muhammadiyah Semarang, Semarang, Indonesia.
4. Department of Nursing, Faculty of Health Science, Universitas YPIB Majalengka, Majalengka, Indonesia.

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ABSTRACT

Background: Disease prevention is an important component of health care. Knowledge and attitudes are supportive factors in implementing healthy behaviour for tuberculosis (TB) prevention. This study aims to identify the relationship between the level of knowledge and family attitudes in preventing pulmonary TB.

Methods: This cross-sectional study employed a quantitative analytical design. The study sample comprised a family of TB patients obtained with the total sampling technique (82 respondents). The study instrument was valid and reliable, with favourable Cronbach α values for knowledge (0.961) and attitudes (0.976). Data analysis in the study used univariate (category with cut-off point for all variables), bivariate (Chi-square) and multivariate analysis (logistic regression). The study was conducted at the Tamansari Public Health Center in Tasikmalaya City, Indonesia.

Results: A total of 82 samples participated in this study. The results showed that the majority of respondents have good knowledge (63.4%), positive attitudes (62.2%) and good prevention strategies (67.1%). Based on the results of statistical tests using the chi-square, there was a significant association between family knowledge of TB prevention (P=0.012) and family attitudes toward TB prevention (P=0.020). The most dominant factor influencing TB prevention was knowledge (odds ratio (OR)=3.333) compared with attitudes.

Conclusion: Knowledge becomes a dominant factor compared to attitudes among TB patients. A family with good knowledge can support better information relating to the disease of TB patients during treatment and may increase self-care adherence.

Keywords: Family knowledge, Attitudes, Pulmonary tuberculosis (TB), Prevention of TB

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*** Corresponding Author:**
Miftahul Falah, PhD.
Address: *Department of Nursing, Faculty of Health Sciences, Universitas Muhammadiyah Tasikmalaya, Tasikmalaya, Indonesia.*
Phone: *+62 87833430640)*
E-mail: *miftahul@umtas.ac.id*

Introduction

Tuberculosis (TB) is an infectious disease caused by the bacteria *Mycobacterium tuberculosis* and remains a major health threat globally and in Indonesia. TB has become one of the oldest infectious diseases for humans and around one billion people have died [1]. The barrier that makes TB difficult to treat and eliminate is inextricably tied to *Mycobacterium* TB's intracellular lifestyle [2]. The immunological response to *M. tuberculosis* is multifaceted and complicated [3]. Cough is a central feature of pulmonary TB, as a symptom, a marker of disease activity, and a means of transmitting infection. Cough can be followed by other symptoms such as bloody sputum, bleeding cough, shortness of breath, drowsiness, loss of appetite, weight loss, anger, night sweats if not physically active, and constant shivering for over a month [4, 5]. The physical, psychological, social, and environmental aspects of TB patients are strongly connected, and these experiences greatly impact their quality of life.

TB is still a major global public health concern, accounting for a large portion of disease and mortality. Despite advancements in diagnosis and treatment, more than 10 million new cases of TB were recorded in 2020, with an anticipated 1.5 million TB-related deaths globally [6]. About 25% of people on the planet are carriers of latent TB infections, which increases their chance of ever experiencing active disease. The World Health Organization (WHO) projects that by 2021, there will be an estimated 10.6 million TB cases worldwide, an increase of almost 600000 cases [7].

The Ministry of Health in Indonesia reports the highest number of cases in West Java (105794 cases), East Java (71791 cases), Central Java (65014 cases), DKI Jakarta (41441 cases) and North Sumatra (35.035 cases). According to the Indonesian Ministry of Health, they are the five provinces with the highest number of cases. West Java is a densely populated, humid area conducive to the growth of pulmonary TB cases [8, 9]. One city in the province of West Java is Tasikmalaya, where 2837 cases of TB were reported in 2022, 1476 cases in 2021, 1041 cases in 2020 and 1435 cases in 2019. The number of TB patients appears small, yet they are quite numerous. Pulmonary TB is similar to the "ice mountain phenomenon" in that some individuals are terrified of becoming ill and getting sputum tested. Poor knowledge and negative attitudes contribute to an increase in TB patients in some areas. They remain quiet about the illness they have for a reason—a low sense of self-worth and a fear of rejection from their family and communities. The level of knowledge and negative attitudes toward TB will make it difficult to diagnose and cure the patients [10-12].

Poor knowledge about TB is a significant factor contributing to its high incidence and treatment challenges. Studies have shown that TB patients often have better knowledge than the general population. However, knowledge remains inadequate regarding transmission, symptoms and prevention. Factors associated with poor TB knowledge include older age, lower education, and lack of prior TB diagnosis. Limited knowledge can lead to delayed treatment, poor adherence, and increased risk of recurrence [13]. Misconceptions about TB transmission persist, and stigma remains a concern. Community interventions and health education programs can improve TB knowledge. Enhancing TB-related knowledge is crucial for better healthcare-seeking behavior, treatment adherence, and ultimately, TB control and eradication efforts [14].

Negative attitudes toward TB patients can significantly impact treatment adherence and outcomes. Studies have shown that health care workers, including resident doctors and nursing students, often display fear, a lack of compassion, and avoidance toward TB patients. These attitudes can reinforce societal stigma and affect patients' treatment-seeking behavior [8]. However, positive attitudes and knowledge about TB among healthcare providers and patients are associated with better treatment adherence. Training programs for health care workers and structured patient education can improve knowledge, attitudes and treatment outcomes. Additionally, community-based directly observed treatment (CB-DOT) can be effective, but patients' perceived attitudes toward treatment observers can influence adherence. Addressing knowledge gaps and positive attitudes is crucial for improving TB control efforts [14].

Several studies have assessed the knowledge, attitudes, and practices (KAP) of TB patients in various countries. These studies consistently found that many patients had some awareness of TB symptoms and transmission, but there were significant knowledge gaps and misconceptions. Factors associated with better TB knowledge included higher education levels, urban residence, and male gender [15]. Despite knowledge gaps, most patients demonstrated favourable attitudes towards TB treatment. However, stigma and negative community attitudes remained challenges. Educational interventions were effective in improving TB knowledge and attitudes among patients. The studies highlighted the need for enhanced TB awareness programs, particularly targeting less educated groups and addressing misconceptions, to support TB control efforts [8].

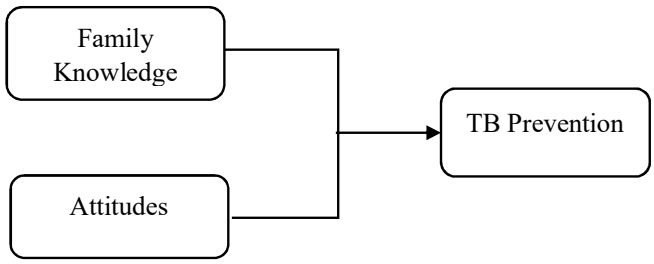

Figure 1. Study design

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TB patients' family knowledge and positive attitudes affect TB transmission prevention efforts. Knowledge is essential to prevent the spread of TB [16]. It covers awareness of and precautions against TB transmission in households with close relatives. The patient's family is very significant to the patient. A thorough understanding of the family can stop the disease from spreading to other family members. Previous studies show that of 23 families with good knowledge, 17(73.9%) were involved in TB prevention. Also, of 21 families with positive attitudes toward TB, 16(76.2%) had good performance in preventing TB transmission. In another study, 17 families had good knowledge and effective disease prevention (85%) and of the 30 respondents with high knowledge, 70% had a role in preventing the spread of TB inside the family [17, 18]. Attitudes towards TB were generally positive, although some studies reported negative attitudes. Preventive practices were often found to be inadequate. Many studies emphasized the need for improved TB education and awareness programs to address misconceptions and enhance prevention efforts. This finding aligns with the research that found a relationship between knowledge and family attitudes with the prevention of TB transmission [18-20]. The better the knowledge and the family attitudes of TB patients, the better the efforts of TB prevention [21]. Knowledge and attitudes determine family behaviour. Therefore, regarding treatment and prevention, TB disease transmission within the family plays a major role in preventing the transmission to other family members. This study investigates the association between family attitudes and knowledge regarding preventing pulmonary TB.

Methods

Study design

The study used a quantitative design and cross-sectional approach. The variables in the study were family knowledge, attitudes and TB prevention (Figure 1). This study found a relationship between the level of knowledge and family attitudes in preventing pulmonary TB.

Samples and locations

The sample in the study was a family with pulmonary TB patients referred to the Tamansari Public Health Center, Tasikmalaya, Indonesia in 2023 (total of pulmonary TB patients: 82 patients). All families with TB patients were identified and joined the WhatsApp group. This area focuses on handling the TB program and has become one of the highest cases in Tasikmalaya. The total sampling techniques used in this study included 82 respondents. All respondents were interviewed and filled out the questionnaire.

Data collection

Institutional review board permission was received from the health office of Tasikmalaya City (register: 128). Data collection was held from January to June 2023 with the cooperation of the Tamansari Public Health Center. Data collection in this study used a questionnaire (knowledge: 25 questions, attitudes: 25 questions, and TB prevention: 24 questions). Validity and reliability tests were conducted in the study. The reliability test found the acceptable values of Cronbach α for knowledge (0.961) and attitudes (0.976). The researcher meets with respondents and conducts informed consent before completing the survey. Ensure all questions are answered and saved into a box file—all data were entered into SPSS software, version 27 for data analysis.

Study instruments

The study used a questionnaire of knowledge (1: Right and 0: False), attitudes (4: Agree, 3: Agree, 2: Disagree and 1: Totally disagree) and TB prevention (3: Always, 2: Sometimes and 1: Never) developed from a previous study [7]. Skewness value with standard error for the knowledge subscale was -1.470; for the attitude subscale, -1.432; and for the prevention subscale, -1.342 (ranging between -2 and 2). Also, the cut-off point for the knowledge subscale was 18.45 (with a score ≥18.45 indicating good knowledge); for the attitude subscale, 68.99 (with a score ≥68.99 indicating positive attitude),

and for the prevention subscale, 54.28 (with a score ≥54.28 indicating good performance). The instruments passed validity (conducted for 20 respondents at Purbaratu Public Health Centre) and reliability tests. The reliability test found the acceptable values of Cronbach α for knowledge (0.961) and attitudes (0.976).

Data analysis

Data analysis in the study used univariate, bivariate, and multivariate analyses. Univariate analysis was conducted to determine characteristic knowledge (good and poor), attitudes (positive and negative) and prevention practices among respondents (cut-off point). Bivariate analysis was conducted using a chi-square test to gain insight into relationships between variables, and multivariate analysis was used in logistic regression testing to find the dominant factor. The IBM SPSS software, version 27 application was used in the study. P<0.05 was Considered significantically.

Results

A total of 82 participants completed this study. Table 1 presents demographic characteristic as follows: Gender, 42 males (51.2%) and 40 females (48.7%); age, 11-20 years, 12(14.6%), 21-30 years, 20(24.3%), 31-40 years, 25(30.4%), >40 years, 25(30.4%); education, elementary school, 30(36.5%), Junior high school, 11(13.4%), senior high school, 20(24.3%), university, 21(25.6%); marital status, married, 60(73.1%), not married, 22(26.8%).

Frequency distribution of family knowledge about pulmonary TB disease shows that 52 people (63.4%) had good knowledge, and 30 people (36.6%) had poor knowledge. According to family attitudes, the data shows that 51 people (62.2%) had positive attitudes and 31 (37.8%) had negative attitudes. Based on data on TB prevention, the TB prevention of families with pulmonary TB patients was good in 55 people (67.1%) and poor in 27 people (32.9%) (Table 1).

Table 1. Demographic characteristics of respondents on gender, age, education, marital status, family knowledge, attitudes and prevention

Variables		No. (%)
Gender	Male	42(51.2)
	Female	40(48.7)
Age (y)	11-20	12(14.6)
	21-30	20(24.3)
	31-40	25(30.4)
	>40	25(30.4)
Education	Elementary school	30(36.5)
	Junior high school	11(13.4)
	Senior high school	20(24.3)
	University	21(25.6)
Marital status	Married	60(73.1)
	Not married	22(26.8)
Family knowledge	Good	52(63.4)
	Poor	30(36.6)
Attitudes	Positive	51(62.2)
	Negative	31(37.8)
Prevention	Good	55(67.1)
	Poor	27(32.9)

Table 2. The relationship between family knowledge and attitudes toward TB prevention

Variables		No. (%)			P (Chi-square)
		Prevention		Total	
		Good	Poor		
Knowledge	Good	40(76.9)	12(23.1)	52(100)	0.012
	Poor	15(50)	15(50)	30(100)	
Attitudes	Positive	39(76.5)	12(23.5)	51(100)	0.020
	Negative	16(51.6)	15(48.4)	31(100)	

Family knowledge and attitudes are significantly associated with TB prevention, knowledge (P=0.012) and attitudes (P=0.020) (Table 2).

Family knowledge is a dominant factor in TB prevention compared to attitudes (OR=3.333), presented in Table 3.

Discussion

The study showed that most participants had a good level of knowledge. The study showed that families provide good information about preventing TB to patients. The same result showed that most respondents had good knowledge about preventing pulmonary TB [9, 21, 22]. Good knowledge is obtained through many factors, such as mass media, experience and environmental information from trusted people (family members, relatives, etc.) and health workers during respondents' visits to report TB [9]. There is a relationship between good family literacy and good prevention of TB in families [19, 23-25]. This research states that respondents have secondary school education or higher, so they also support preventing the transmission of this disease in the family or community. Several resource people actively asked for information from the community health center staff to learn more about preventing TB transmission. According to the study, patients can assist others to reinforce their beliefs, modify poor living habits, and acquire positive oral behaviours by discussing, preaching and learning from one another's experiences [26]. The crucial solution for TB management is providing education for patients and healthcare providers [27]. Previous studies found that knowledge can be improved by case management mode [28] and health education. Consequently, effective health education intervention for vulnerable diseases will positively impact the results [29]. Promoting knowledge will improve health quality [30]. Knowledge may be influenced by gender (males higher than females) and age group (30-39 years old) [31]. Increasing a person's age will also increase their knowledge to prevent transmission of pulmonary TB to other people [9].

Poor knowledge about TB is associated with a lower socioeconomic and educational level. Poor knowledge is also a communication challenge between patients and health workers, one of the factors of TB infection prevention and control during treatment [32]. This study revealed gaps in knowledge among TB patients [33]. On the other hand, in 2013, two hospitals were chosen for preliminary research on TB preventive knowledge, attitudes, and behaviours. A questionnaire assessing TB patients' KAP among nurses was used to interview them. Only 20% of them were determined to be knowledgeable. Also, 80% of family members correctly replied that TB is typically connected with the lungs, and 80% claimed it is treatable and curable. However, 60% were still ignorant that the bacteria *M. tuberculosis* cause TB. Regarding TB treatment, 80% of family members correctly picked the completion of a 6-month course of anti-TB medicine [34].

Table 3. Dominant factor of tb prevention in families with pulmonary TB disease

Variables	B	P	OR 95% CI	R^2
Knowledge[a]	1.123	0.026	3.333 (1.272-8.736)	0.118
Attitudes[b]	1.027	0.042	3.047 (1.171-7.929)	

[a]Good vs poor, [b]Positive vs negative.

TB patients' attitudes significantly influence treatment adherence and outcomes. Positive attitudes towards treatment improve adherence, while negative attitudes can lead to non-adherence. Many patients trust their physicians and accept treatment, but some experience depression due to lengthy treatment durations. TB often worsens patients' social relationships and living standards, leading to social phobia [8]. Knowledge about TB is generally good among patients, but there is a gap between knowledge and practice, particularly regarding safe sputum disposal. Health care providers should focus on enhancing patients' understanding of TB and its treatment, addressing stigma, and creating a supportive environment to foster positive attitudes and improve adherence [20, 35]. Based on the research results, the respondents' attitudes were positive. Judging from these data, most respondents seem to have a good view of TB prevention, and family attitudes play an important role in preventing TB transmission [36]. A positive attitude among respondents will enable them to carry out a supportive attitude in maintaining their health, including preventing TB. A similar study found that most respondents have a positive attitude towards preventing TB. In other studies, according to the findings, 40% of the five family members of TB patients have good views toward TB prevention. All of the family members felt empathy for TB patients and were eager to help and contact the patients; however, 60% of them were still concerned about the possibility of transmitting TB infection while dealing with TB patients. They also agreed that excellent communication with TB patients is essential as a family member. However, only 80% employed suitable terminology while speaking with TB patients [35]. Families already know that TB can spread through fluids from the mouth, whether coughing, sneezing, or saliva. In other words, the result is that some families have a positive attitude about preventing TB transmission and tend to accept and know about the disease [17, 37].

The research results showed that most respondents have made good efforts to prevent pulmonary TB disease. One of the preventive measures is that respondents always seek medical treatment if they have a cough for more than 2 weeks, do not spit phlegm anywhere, always wear masks when talking to TB sufferers and never isolate TB sufferers in social situations. The study found that respondents were aware that isolating people with illnesses would increase the burden on those people's minds, apart from the fact that there was a strong brotherhood or kinship and a strong home environment. In addition, respondents can independently take precautions such as using masks and encouraging patients to wear masks [12, 38]. Human effort or behaviour is all human activities that can be directly observed (walking, singing, laughing, etc.) and those that cannot be observed by outsiders (thinking, acting, fantasizing, etc.). The ways to prevent TB include to cover their mouths for patients when coughing so that the germs that come out are not inhaled by healthy family members, not to throw phlegm anywhere, have other family members checked, eat nutritious food (enough carbohydrates, protein and vitamins), separate the patient's use of eating and drinking utensils, pay attention to the condition of the house, good ventilation and lighting, give bacillus calmette-guérin (BCG) immunization to babies, open the windows of the house to kill TB bacteria and minimize transmission to the family, and dry the bed of the TB patient lungs [18, 37].

Based on the results, the variable with the highest odds ratio (OR) was knowledge, meaning that this variable had the greatest relationship to TB prevention efforts. This finding indicates that respondents with good family knowledge have a 3.07 times greater chance of making good prevention efforts than those with low-income family knowledge after controlling for attitude variables. Regarding these data, knowledge can directly influence prevention efforts after the family has a positive attitude [39]. It is reasonable because it will increase the family's knowledge of preventing pulmonary TB [40]. Based on this description, it can be stated that the better the knowledge of preventing pulmonary TB, the higher the respondent's attitude will have a positive influence on preventing pulmonary TB [41]. This finding aligns with the research that found a relationship between knowledge and family attitudes with the prevention of TB transmission [18-20]. The better the knowledge and the family attitudes of TB patients, the better the efforts of TB prevention [21]. Knowledge and attitudes determine family behaviour. Therefore, regarding treatment and prevention, TB disease transmission within the family plays a major role in preventing the transmission to other family members. In conclusion, TB prevention will be better if respondents have knowledge and a positive attitude from their family.

Conclusion

There was a significant association between family knowledge and attitudes in preventing pulmonary TB. Knowledge is a dominant factor compared to attitudes in TB patients.

Implications and limitations

Health care professionals must strengthen coordination and cooperation with patients' families, especially

in lessons for TB prevention. The family has strong rules to control their member from the disease. This study focused on family knowledge, attitude, and TB prevention and was conducted in only one public health centre in Indonesia. Further analysis can explore other variables that may influence TB patients.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of Universitas Muhammadiyah Tasikmalaya, Tasikmalaya, Indonesia (Code: 4454/TMS/2023). The participants received the study's explanation (goal and procedures) before responding to the questionnaires. They were also allowed to process and ask for clearer explanations for their doubts to facilitate informed consent. The participants were volunteers and granted the right to withdraw from the study.

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Authors' contributions

Formal analysis and investigation: Miftahul Falah, Tukimin bin Sansuwito and Regidor III Dioso; Data curation, resources, visualization, validation, supervision, review, editing and project administration: Nina Pamela Sari, Lilis Lismayanti, Satriya Pranata, and Sri Wahyuni; Conceptualization, methodology and writing of the original draft: All authors.

Conflict of interest

The author declared no conflict of interest.

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