

ORIGINAL ARTICLE

Psychometric Properties Of Knowledge, Attitude, And Practice Of Tuberculosis Preventive Behavior Scale In Bahasa Indonesia Version Among Parents

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ABSTRACT

Introduction: Children under five years old living with adult-positive tuberculosis are at a high risk of contracting the disease. Despite this, there is still a considerable lack of awareness and adherence to TB preventive behavior for children under five years of age among parent. Currently, there is no validated and reliable translation of the scale that has been studied in Indonesia. This study aimed to determine the test-retest reliability and validity of the Knowledge, attitudes, and practices behavior scales of tuberculosis in West Java, Indonesia. **Methods:** The translated instrument's language was evaluated for content validity, importance, contextual fit, and acceptability using the Content Validity Index (CVI). Exploratory factor analysis, Cronbach alpha, and intraclass correlation coefficient (ICC) was used to determine construct validity and reliability. **Result:** The factor loadings for each of the three scales (0.57–0.88). The Knowledge scales had a Cronbach alpha coefficient of 0.877, and the ICC for test-retest reliability was 0.81. The attitude scale has Cronbach alpha coefficient of 0.832, and the test-ICC tests was 0.791. The Cronbach alpha coefficient of the practice's scales item was 0.861, and the ICC was 0.772. **Conclusion:** The knowledge, attitudes, and practices behavior measures of tuberculosis prevention in Indonesia can be administered by healthcare professionals in public health centers, nursing homes, hospitals, and home care settings.

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INTRODUCTION

Children under five years old living with adult-positive tuberculosis are at a high risk of contracting the disease. In Indonesia, 80% of children under five years of age died from tuberculosis, with 96% dying before treatment due to undiagnosed cases (1). According to a nationwide TB prevalence survey, the prevalence of TB in Indonesia was nearly twice as high as previously thought (759 vs. 391 per 100,000 population) (2). In 2022, approximately 10% of the 1.3 million children worldwide - aged 5 or under, -resided in households with active tuberculosis (3).

tuberculosis prevention, as they help detect co-prevalent tuberculosis and latent tuberculosis, which may have been the source of or acquired infection from the index case. This also allows for early detection and treatment of those with latent tuberculosis to prevent incident disease (4). Using a symptom-based screening approach can enhance the cost-effective strategy of contact investigation, management, tuberculosis preventive therapy, and early disease detection (5). With symptom-based screening, there is no need for investigations to rule out active disease or diagnostic testing for tuberculosis infection, which are frequently unavailable in low-resource environments (5). Symptom-based screening in Indonesian children is a safe and effective method for identifying those who need further evaluation for tuberculosis disease and enabling community-based tuberculosis preventive therapy without further evaluation (6).

Contact investigation and management are crucial for

Despite this, there is still a considerable lack of awareness

and adherence to tuberculosis preventive behavior for children under five years of age. A study found that many parents lack adequate knowledge about the duration of tuberculosis treatment and the daily dosage of tuberculosis medication for 6 months. However, 50% of participants were aware of the consequences of not fully adhering to the prescribed treatment, indicating a need for increased awareness and education among parents (7). A study found that parents have limited knowledge about tuberculosis, leading to misconceptions about the disease. About 26.1% of respondents lack knowledge about tuberculosis, 21.8% are unaware that the correct dosage can cure tuberculosis, 23.3% are unaware of the availability of tuberculosis drugs in public health institutions, and 35% are unaware of the costs associated with tuberculosis healthcare (8). A Study found that 48.2% of the families of children with tuberculosis had a poor knowledge level. This shows that there are still families who have poor knowledge regarding the causes of disease, risk factors, signs and symptoms, and treatment of the disease (9).

Knowledge, attitudes, and practices (KAP) behavior scales have been widely utilized in various public health studies to evaluate individuals' understanding, beliefs, and actions related to health behaviors. These scales have proven effective in identifying gaps in knowledge, measuring attitudes towards interventions, and assessing adherence to recommended practices. For example, these scales to explore the knowledge, attitude, and healthcare-seeking behavior among families of children with tuberculosis (9). Assess the knowledge, attitudes, and preventative behaviors of university students in Indonesia toward Tuberculosis (TB) (10). Evaluate patient engagement in TB care programs (11). Assess the knowledge, attitude, and practices of tuberculosis patients towards dots regimen in Jimma health Center (12). These studies underscore the instrument's versatility and critical role in guiding public health interventions.

However, despite their extensive application, Indonesia currently lacks a validated and reliable translation of the KAP behavior scales tailored to tuberculosis. Given Indonesia's high burden of TB and unique socio-cultural dynamics, using an unvalidated scale may result in inaccurate assessments, limiting the effectiveness of interventions. The absence of localized and culturally sensitive tools creates a significant gap in understanding TB-related knowledge, attitudes, and practices among diverse populations in Indonesia. Addressing this gap is essential for developing targeted and evidence-based TB control strategies. This study aimed to address this gap by determining the test-retest reliability and validity of the KAP behavior scales for use in Indonesia, ensuring their suitability for measuring TB-related behaviors in this context. By validating the instrument, this research seeks to enhance its applicability in Indonesian TB programs, providing a robust tool for public health

practitioners and researchers to design, monitor, and evaluate interventions effectively.

MATERIALS AND METHODS

Study design

This research was performed in West Java, Indonesia, using a cross-sectional descriptive design. The research was carried out between January to February 2024. The research received ethics permission from the institutional review board (0145/KEPK/STIKEP/PPNI/JABAR/VIII/2023) and written consent was obtained from participants prior to data collection.

Sample

The participants in this study were parents diagnosed with tuberculosis who live with children under 5 years of age as confirmed by their nurse in public health center and recorded in medical records was 170 individuals. Criteria for inclusion in the research were adults diagnosed with tuberculosis, under treatment for tuberculosis, and having children 5 years of age. Exclusion criteria were having cognitive and mental retardation and other underlying medical conditions such as diabetes and heart failure.

Instrument

Knowledge, attitudes, and practices behavior scales were adopted from previous research (13–16). The knowledge scale contained 22 statements with the response categories "True", "False" or "I don't know". The knowledge scale assessed individuals' understanding of tuberculosis, including symptoms, transmission mode, use of personal protective equipment, coughing protocol, ventilation, isolating coughing patients, and the relationship between tuberculosis and human immunodeficiency virus. The attitude scale covered topics like tuberculosis/human immunodeficiency virus, education, transmission awareness, disease prevention, personal protective gear, and household well-being. The attitude scale comprised 18 statements with the response categories "Strongly agree", "Agree", "Disagree", or "Strongly disagree". Twelve statements made up the practice scale, which were grouped according to how they related to the usage of PPE, administrative control measures, and environmental control measures. Twelve statements with the response choices "Always," "Often," "Sometimes," or "Never" were included in the practice scale (13–16).

Procedure

Translation

Knowledge, attitudes, and practices (KAP) behavior measures for TPT are not available in Indonesian language. An expert bidirectionally translated the questionnaire and then assessed its content validity. A panel discussion was conducted to establish a consensus on the progression of the translation. In order

to perform a reverse translation, the translated material was submitted to both an individual translator and a proficient bilingual specialist who is a native speaker in the relevant subjects. The result of backward translation is to obtain language-specific certification.

Content validity

The translated instrument's language was evaluated for content validity, importance, contextual fit, and acceptability using the Content Validity Index (CVI) (17). A panel of five experts, comprising three nursing faculty members and two clinical practitioners, were invited to scrutinize the Bahasa questionnaire once it had been translated in both directions. An expert panel was tasked with analyzing and providing a quantitative value to each item on the questionnaire. The relevance of each item in the preliminary final instrument was evaluated using a Likert scale that ranged from 1 (irrelevant) to 4 (extremely relevant). The CVI was computed for each unique item (18). The CVI was computed utilizing Aiken's V formula, which is defined as $V = \sum s / [n(c-1)]$ (19). The formula includes variables V, s, c, and n. V represents the validity coefficient of Aiken, s represents the value gained by subtracting 1 from the rating scale, c represents the maximum score on the rating scale, and n indicates the total number of experts. The predetermined criterion for a substantial CVI was established at 0.70 or higher (20).

Construct validity

Exploratory factor analysis was used to determine construct validity (EFA). It was anticipated that each item's factor loading would be higher than 0.40. Along with the chi-square wellness test (X^2/df), comparative fit index (CFI), non-standardized NNFI (nonstandard fit index), standardized root averages square residual (SRMR), and goodness-of-fit index (GFI), the CFA test was examined as a "good-of-fit" index. We considered that a good fit was suggested by GFI 0.90, NNFI 0.90, CFI 0.90, SRMR 0.10, and RMSEA 0.08 at X^2/df 2.0.

Reliability

The test's internal consistency was assessed using the Cronbach alpha coefficient. The connection between item-total scores was also used for this purpose. The test-retest reliability for evaluating sustainability (ICC) was ascertained using the intraclass correlation coefficient. An acceptable ICC was more than 0.70 (21). The item-total correlation coefficient must be higher than 0.30 in order to be deemed significant (21). SPSS version 20 was used to conduct the analysis (SPSS, Inc., Chicago, IL).

RESULTS

Around 30 of the 200 patients invited to participate in this study withdrew. The total number of participants in the current study was therefore 170 individuals. The test-retest reliability was determined by dividing the sample ($n = 170$) into two groups and retesting one group two

weeks later. The average age of the participants was 55.67 (SD = 10.65) years; 52.4% of them were female, 72.4% were married, and 49.4% had completed elementary school. The mean length of HD was 4.38 years (SD = 3.55) and the number of comorbidities was 2.11 (SD = 0.54) (Table I).

Table I. Sociodemographic characteristics of the sample (n=170)

Variables	N(%)
Age, years (Mean $\pm$ SD)	55.67 $\pm$ 10.65
Age Group	
20-30	15 (8.8%)
31-40	28 (16.5%)
41-50	42 (24.7%)
>50	85 (50.0%)
Gender	
Female	89 (52.4%)
Male	81 (47.6%)
Marital Status	
Married	123 (72.4%)
Not married	47 (27.6%)
Educational Attainment	
Primary school	49 (28.8%)
Secondary school	68 (40.0%)
Higher than secondary school	53 (31.2%)

Table II depicts the factor loadings for each of the three scales (0.57–0.88), suggesting adequate construct validity. The study's representative sample was appropriate, according to the Kaiser–Meyer–Olkin (KMO) rating of 0.944. A significant result ($X^2 = 1786.12$; $p < 0.001$) from the Bartlett test indicated that factor analysis was required.

The Cronbach alpha coefficient for the knowledge scales was 0.877, and the ICC for test-retest reliability was 0.81. It was discovered that the item-total scale correlations varied from 0.516 to 0.732. The Cronbach alpha coefficient for the attitude scale is 0.832, and two weeks later, the test-ICC test was 0.791. The correlations between the measure's item and total scores varied from 0.587 to 0.791. The Cronbach alpha coefficient of the practice's scales item was 0.861, and the ICC was 0.772. The scale's item-total score correlations ranged from 0.502 to 0.683 (Table III).

DISCUSSION

This psychometric study confirmed the reliability and validity of the knowledge, attitudes, and practices behavior scales, as well as each domain score. These results provide credence to the feasibility of using the knowledge, attitudes, and practices behavior scales of TB prevention and in its component scales in parents who are diagnosed with TB and living with children under 5 years of age. Clinical practice evaluation of knowledge, attitudes, and practices behavior scales of TB prevention is crucial. However, the complexity arises from the fact that patients' reports of their behavior serve as the sole means of obtaining information in regularly scheduled clinical practice. On the other hand, there

Table II. Factor loading of individual items with exploratory factor analysis.

Knowledge, attitude, practice	Factor loading	Eigen Value	Variance explained (%)
Knowledge		6.74	43.73
1. Prolonged cough is a symptom of TB (True)	0.63		
2. Unintentional weight loss is a symptom of TB (True)	0.81		
3. Fever every day for more than 1 week is a symptom of TB (True)	0.65		
4. Night sweats are a symptom of TB (True)	0.79		
5. TB patients with negative sputum smears can be considered infectious (False)	0.88		
6. TB can be spread through blood (False)	0.57		
7. Patients with TB commonly infect others by talking or singing (False)	0.63		
8. N95 respirators work just as well when wet or visibly dirty (False)	0.81		
9. Wearing a surgical mask can help healthcare workers protect themselves from TB (False)	0.65		
10. An N95 respirator provides an airtight seal on the face that the user does not need to check (False)	0.79		
11. Patients who are coughing should be given tissues or surgical masks to cover their mouths until TB has been excluded (True)	0.88		
12. If coughing/sneezing patients or suspects are using tissues or surgical masks, there no need for staff to wear N95 respirators (False)	0.57		
13. Before a TB suspect has a confirmed diagnosis, having him wear a surgical mask is unnecessary (False)	0.65		
Attitude		5.67	38.66
1. Do you think you could get TB?	0.61		
2. Do you worry about TB?	0.58		
3. If your friend had TB, would you still hang out with them?	0.79		
4. Would you share dishes, plates, and glasses with a TB-infected relative?	0.64		
5. Would you call TB is stigmatized disease?	0.59		
6. Would you like to know more about TB?	0.60		
7. Would you accept regular TB tests?	0.61		
8. Do you think government's public health is threatened by TB?	0.58		
9. Do you believe your region needs better TB control?	0.79		
Practice			
1. I give tissues/surgical masks to coughing patients	0.76	4.54	40.76
2. I may turn off fans if they become too noisy or cause cold air to blow around	0.88		
3. I move TB suspects to the front of the queue to minimize the amount of time that they spend in the waiting area around other patients	0.65		
4. I open windows, when possible, to increase natural ventilation	0.66		
5. I move TB suspects to a separate waiting area	0.58		
6. I ask each patient who enters the clinic if they are coughing and for how long	0.76		
7. I use an N95 respirator in the TB consultation room	0.83		
8. I explain to patients why it is important to keep windows open	0.65		
9. Patients with suspected TB are isolated from other patients	0.66		
10. I interact with patients while using a N95 respirator	0.47		
11. I use an N95 respirator when collecting sputum from a patient	0.51		
12. I order sputum specimens when I suspect TB	0.43		

Table III. Reliability of knowledge, attitudes, and practices behavior scales

Scale	Cronbach's (n = 170)	Item-total correlation (n = 170)	Intraclass correlation coefficient (n = 170)
Knowledge	0.876	0.516—0.732	0.811
Attitude	0.832	0.587—0.811	0.791
Practice	0.861	0.502—0.683	0.772

is controversy surrounding precision and agreement with other information sources, necessitating further investigation into their validity. According to the results of the factor analysis, all of the items were statistically significantly related to the appropriate subscale (factor loading > 0.40). Having sufficient knowledge about a particular disease, its origins, modes of transmission, and preventive practices can be beneficial to a person because it can inform them about what to anticipate and what to do next (22). Patients who have a positive attitude about the condition exhibit a positive self-image, create an optimistic mindset about the future, demonstrate a strong desire to recover, and cultivate a high level of empathy for other people (23). Knowledge serves to reinforce various attitudes and beliefs; nonetheless, attitudes are the primary factor in bringing about changes in behavior (24). Accordingly, patients who have a positive attitude are more likely to engage in effective self-preventive care and to protect others from infection (25). Lack of knowledge about tuberculosis affects patient behavior, treatment adherence, and diagnosis delays, negatively impacting health-seeking behavior and making management more difficult due to delayed diagnosis (11). Research suggests that TB stigma is more prevalent in areas lacking optimal knowledge, attitude, and preventative behavior. The success of TB control relies on patient motivation, and stigma can discourage individuals from self-presentation, diagnosis, and behavior modification to prevent disease spread (26).

EFA analysis of the knowledge, attitudes, and practices behavior scales of the TB prevention scale revealed one-dimensionality, consistent with the original study's findings. It is hypothesized that the Indonesian population has the hardest time managing knowledge, attitudes, and practices behavior scales of TB prevention patterns. The three rating scales were reliable concerning the factor score determinacy coefficient. Cronbach's alpha may not be the best reliability indicator for scales with few items in limited dimensions (27–29). The cross-cultural adaptation of this scale required inter-observer analysis and test-retest reliability, in which the results showed substantial agreement (30).

This research faced certain limitations that highlight areas for further exploration and development. One limitation was the absence of investigation into specific psychometric properties, such as discriminant validity. Future research should prioritize evaluating these properties to ensure a comprehensive understanding of the instrument's reliability and validity. This step is crucial for enhancing the robustness of the findings and establishing the instrument's utility across diverse contexts. Another limitation was the study's limited generalizability, as data were collected from a single institution. Expanding future studies to include multiple institutions and diverse geographical locations will provide a broader and more representative sample.

This approach can address potential biases and improve the applicability of the findings to different populations. Additionally, the participant demographics presented another constraint, with the majority having low educational attainment. Future research should aim to include a more heterogeneous sample in terms of educational background, socioeconomic status, and other demographic variables. This inclusion will allow for the examination of potential variations in responses and provide a more nuanced understanding of the phenomenon under study. Furthermore, the study employed a cross-sectional design, which limits the ability to infer causality or assess changes over time. Future research should consider longitudinal or experimental designs to explore causal relationships, temporal stability, and the effects of interventions over extended periods. Finally, qualitative investigations could complement quantitative analyses by exploring participants' experiences, perceptions, and contextual factors that influence their responses. Incorporating mixed-methods approaches will allow researchers to triangulate data, deepen insights, and enhance the interpretive richness of findings. By addressing these limitations, future studies can refine research methodologies, improve the generalizability of results, and contribute to the advancement of theoretical and practical knowledge within the field.

CONCLUSION

For the Indonesian population, the behavior measures measuring knowledge, attitudes, and practices of behavior scales of TB prevention have been successfully translated and cross-culturally adjusted. The TB preventive knowledge, attitudes, and practices behavior scores may help predict how this intervention may affect patients' self-care behaviors. Health care providers can administer the TB prevention knowledge, attitudes, and practices behavior scales in Indonesian in public health facilities, nursing homes, hospitals, and home care settings. To assess the knowledge, attitudes, and practices of behavior scales of TB prevention across various ethnic groups and educational levels, more research should be done. Future research should also use structural equation modeling to test the TB prevention knowledge, attitudes, and practices behavior scales.

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