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RESEARCH ARTICLE

An evaluation of the validity and reliability of the tuberculosis patient knowledge questionnaire

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Abstract

Background: Poor knowledge of tuberculosis (TB) patients on tuberculosis affects adherence. It is necessary to measure patient awareness of the disease and treatment to assess the extent to which patients know about the disease and its treatment. A good questionnaire has been tested for validity and reliability. Currently, some studies need to show the validity process of the TB knowledge questionnaire directly. **Objective:** To measure the validity and reliability of the tuberculosis patient knowledge questionnaire. **Method:** Accidental sampling was used in the research approach. By comparing the corrected item-total item values, the construct validity and reliability of the final knowledge questionnaire were evaluated. Additionally, an internal consistency test with an alpha coefficient (Cronbach's Alpha) was used to assess the questionnaire's reliability. **Result:** A total of 93 respondents were picked from different Bengkulu healthcare centers. The validity test results indicate the corrected item-total item > 0.30 . According to the findings of the reliability test, Cronbach's alpha > 0.60 throughout. **Conclusion:** This study proves the validity and reliability of the knowledge questionnaire as a tool for measuring knowledge.

Introduction

Tuberculosis (TB) is an infectious disease caused by mycobacterium tuberculosis (Barberis *et al.*, 2017). TB cases worldwide in 2021 are estimated to be up to 10.6 million people. The ASEAN region contributed 45% of the total TB cases compared to other regional countries. TB is still a burden of disease in Indonesia. Indonesia is the second country after India, with the highest number of TB patients globally. TB cases continue to increase every year. In 2020 and 2021, there was an increase in TB cases by 3.6%. TB cases in Indonesia in 2021 reached 969,000 people, and 15,186 TB cases died (WHO, 2022).

Non-compliance increases illness duration and severity, death, disease, and spread (Mekonnen & Azagew, 2018). Lack of knowledge about the disease and how to take medicine is one of the factors causing non-compliance (Hussar, 2005). A key factor contributing to nonadherence is the lack of understanding of the importance of routine antituberculosis treatment.

Since defaulters were found to have little to no understanding of TB and its management, proper knowledge about TB and its treatment can help increase adherence to anti-TB (Kulkarni *et al.*, 2013). Research conducted in Ethiopia shows high TB patient adherence (Ajema *et al.*, 2020). Lack of adequate knowledge may affect TB patient adherence (Loh *et al.*, 2023). According to a study conducted in Papua, Indonesia, several factors that can improve the adherence of TB patients are lack of information about TB from health workers, low knowledge about the cause of TB, transmission of TB, and the effect of incomplete TB treatment (Ruru *et al.*, 2018). Research conducted in Malaysia states that many TB patients still have misperceptions about the causes, transmission, and prevention of TB (Balakrishnan *et al.*, 2021). A community-based study in India showed that TB patients' knowledge of reason and information was inadequate (Easwaran *et al.*, 2015).

Measuring TB knowledge through instruments or measurement tools is challenging, as only a few studies

have been found that reveal the validity process of the devices or the psychometric parameters being assessed, and very few have demonstrated validity and reliability (Figueroa et al., 2017).

A good questionnaire is a valid and reliable questionnaire that makes it possible for other studies to be replicated (Sani, 2018). In addition, some studies need to include validity and reliability tests of the questionnaire (Kigozi et al., 2017; Nautiyal et al., 2019), which causes doubts about other researchers using the questionnaire.

Methods

This is a prospective study. It was purpose sampling. The minimum number of respondents conducting the validity test is 30 (Zainuddin, 2014). In this study, three trials were conducted to obtain a valid and reliable questionnaire, so 93 respondents were obtained. Participants in this study were TB patients ≥ 17 years of age who were outpatients at a health centre and able to read and communicate in Bahasa, Indonesia. The study was conducted at several healthcare centres in Bengkulu, Indonesia, such as Pasar Ikan, Jalan Gedang, Lingkar Timur, Penurunan, Perumnas, Curup and Kepala Curup. The Health Research Ethics Committee Faculty of Pharmacy Airlangga University approved the study protocol (No.26/LE/2023). This research was conducted from April to June 2023.

The questionnaire was developed by referring to sources based on the national guidelines for medical services: management of tuberculosis (Kemenkes, 2019). TB patients who were taking medication at the health care centre were asked for their availability to complete the questionnaire. The questionnaire had five indicators: causes, transmission, prevention, symptoms, and treatment. It consisted of favourable and unfavourable questions. It also contained closed-ended questions with "yes" or "no". The scoring of this questionnaire used a Guttman scale. For favourable questions, a score of 1 is given for "yes" answers and a score of 0 for "no" answers, while for unfavourable questions, a score of 1 is given for "no" answers and a score of 0 for "yes" answers. (Yusuf A, 2014).

The adjusted item-total correlation was calculated; this illustrates the correlation between a specific item and all other items to construct validity using the measure. A medium correlation is shown by an item-total correlation between 0.30 and 0.49. In contrast, a strong correlation is indicated by a correlation of more than 0.50 for reliability tests using The Cronbach alpha instrument (Hajjar, 2018). A generally accepted rule is that an alpha of 0.6-0.7 indicates an acceptable level of

reliability, and 0.8 or greater is an excellent level (Ursachi et al., 2015).

Results

This questionnaire was developed based on five indicators: causes, transmission, prevention, symptoms, and treatment of TB. The questions on the cause aspect were arranged with unfavourable sentences. The questions on the transmission aspect were arranged with favourable sentences (*favourable questions consist of questions that are positive (supportive) aspects of the variable, while unfavourable questions consist of questions that are negative (non-supportive) aspects of the variable*). The questions on the prevention aspect were arranged with unfavourable sentences. The questions on the symptom aspect were arranged using favourable sentences. On the treatment aspect, two question items were arranged with favourable sentences, and one other question item was arranged with unfavourable sentences.

The questionnaire was administered three times to obtain a valid and reliable questionnaire. The first validity test showed that out of 20 items, four were valid, while 16 were invalid. In the second validity test, the results show that out of ten items, two were valid, while eight were invalid. The third validity test shows that out of 15 items, six were valid, while nine were invalid.

A total of 93 respondents agreed to participate in this study. The characteristics of the respondents can be seen in Table I. The majority of respondents were male (56.52%), aged 32-46 (43.48%), had senior high school education (88.04%), and had a continuation phase (72.83%).

This questionnaire consists of 13 question items and five indicators. The symptom indicator consists of three question items. The cause indicator consists of two question items. The transmission indicator consists of two question items. The prevention indicator consists of three question items. The treatment indicator consists of three question items (see Appendix A).

Table I: Demographic of respondents (n = 93)

Variable	n (%)
Age	
17–31	30 (32.61%)
31–46	40 (43.48%)
47–61	17 (18.48%)
>62	5 (5.43%)
Gender	
Male	52 (56.52%)
Female	40 (43.48%)
Education	
No formal school	
Did not complete elementary school	
Complete elementary school	1 (1.09%)
Complete junior high school	3 (3.26%)
Complete senior high school	81 (88.04%)
Complete higher education	7 (7.61%)
Treatment	
Intensive phase	25 (27.17%)
Continuation phase	67 (72.83%)

The result of the construct validity test using the corrected item-total-item. The fixed item-total thing was more than 0.30. Meanwhile, the reliability test result showed that the total value of Cronbach's alpha was more than 0.60. Both the construct validity and reliability test results are shown in Table II.

Table II: Validity and reliability test

Questionnaire item	Corrected item-total correlation	Cronbach alpha coefficient
Q1	0.330	0.621
Q2	0.307	0.621
Q3	0.557	0.659
Q4	0.557	0.659
Q5	0.370	0.621
Q6	0.369	0.621
Q7	0.368	0.621
Q8	0.428	0.624
Q9	0.336	0.624
Q10	0.434	0.624
Q11	0.326	0.624
Q12	0.332	0.624
Q13	0.320	0.621

Discussion

The validity and reliability test of this questionnaire was conducted in Bahasa, Indonesia. Validity is a way of measuring the accuracy and precision of a tool in performing its measurement function. A valid instrument must not only be able to produce accurate data but must also provide a careful description of the data. If a question is invalid, the research is useless (Sani, 2018). The instrument should be considered valid if the Pearson correlation (r) value is much higher than the r table or if the correlation coefficient is greater than or equal to 0.3 ($r \geq 0.3$). A valid questionnaire is characterised by a Pearson correlation (r) value of more than 0.3. This means that the questions in the questionnaire are strongly correlated with each other and measure the same construct.

Reliability is a method used to show the extent to which the instrument used can be trusted and relied upon. Reliability indicates the degree of consistency of an instrument in measuring the same problem over time. Reliability estimates are used to evaluate the stability of measures administered at different times to the same individuals or using the same standard (test-retest reliability) or the equivalence of sets of items from the same test (internal consistency) or of different observers scoring a behaviour or event using the same instrument (interrater reliability) (Kimberlin & Winterstein, 2008). The deciding factor in drawing conclusions from the reliability test is the value of Cronbach's alpha statistical result ≥ 0.6 , so the question is reliable (Sani, 2018).

The results of this study are in line with the results of the study of Elmi et al. (2014), which showed that the knowledge questionnaire (general knowledge, mode of transmission and prevention) showed that all question items had a corrected item-total correlation > 0.3 and each domain had a Cronbach alpha value in the domain regarding general knowledge about TB infection, knowledge about TB transmission and knowledge about TB prevention of 0.60. The results of a similar study showed that the short-questionnaire of tuberculosis patients' knowledge about antituberculosis and hepatotoxicity (SQ-KSH-TB) consisting of seven questions showed that the r -count value was greater than 0.3 and the KR-20 reliability coefficient obtained was 0.716 (Perwitasari et al., 2023).

Several studies on the validity of TB knowledge questionnaires have shown that there are no TB knowledge questionnaires that consist of five aspects, namely causes, transmission, prevention, symptoms, and treatment of TB. Therefore, a knowledge questionnaire with five aspects is an element of novelty in this study. The TB patient knowledge questionnaire,

which consisted of five indicators, such as causes, transmission, prevention, symptoms, and treatment of TB, with 13 question items, was declared valid and reliable. It could also be used to measure the knowledge of TB patients.

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Appendix A: TB patient knowledge questionnaire

Indicators	Number	Questions	Yes	No
Causes	1	A virus causes TB		
	2	Smoking can cause TB disease.		
Transmission	3	TB is transmitted from sputum droplets of TB patients		
	4	TB transmission occurs in a stuffy home environment.		
Prevention	5	Prevention of TB can be done by avoiding touching the mouth		
	6	Prevention of TB can be done by avoiding intercourse between husband and wife, one of whom has TB		
	7	Using separate toiletries from TB patients can prevent TB disease.		
Symptoms	8	One of the symptoms of TB is coughing for more than two weeks		
	9	One of the symptoms of TB is fever.		
	10	One of the symptoms of TB is sweating at night for no apparent reason.		
Treatment	11	The number of TB medicine caplets taken depends on the patient's weight.		
	12	All caplets of TB medication in one day, taken at each medication time.		
	13	The use of herbal medicine can cure TB.		

Instructions for completion:

Mark (✓) in the "YES" column if you think the answer is correct and "NO" if you think the answer is wrong.