
Validity And Reliability Of Knowledge And Health Belief Model (HBM) In Pulmonary Tuberculosis Patients At Kedungmundu And Tlogosari Wetan Community Health Centers In Semarang City

Pipit Cahyanti¹⁾, Gilang Rizki Al Farizi*¹⁾, Yovita Dwi Arini¹⁾

1) Undergraduate of Pharmacy, STIKES Telogorejo Semarang, Central of Java, Indonesia

*Correspondence to: gilang_rizki@stikestelogorejo.ac.id

Abstract: Tuberculosis (TB) is a contagious disease caused by a Mycobacterium tuberculosis infection, also known as acid-fast bacteria. To achieve a cure for TB patients, it is possible to increase knowledge and treatment compliance behavior. The Health Belief Model (HBM) is an effective treatment widely used to improve compliance and health behavior. This study aims to measure the validity and reliability of the knowledge construct and the HBM in pulmonary tuberculosis patients at the Kedungmundu Health Center and Tlogosari Wetan Health Center, Semarang City. This research adopted a quantitative observational design with a cross-sectional approach. The results show that the validity test was based on the corrected item value of 0.361, while the reliability test used internal consistency techniques on the Cronbach Alpha value of 0.70. Meanwhile, the results of the knowledge construct had a validity value of 13 items with a corrected item value of 0.361 and reliability with a Cronbach's alpha value of 0.796. Also, the HBM construct to measure compliance and behavior had a validity value of 20 items with a corrected item of 0.361 and reliability with a Cronbach's alpha of 0.817.

Keywords: health belief model, knowledge, pulmonary tuberculosis, reliability, validity

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by the bacteria Mycobacterium Tuberculosis, known as Acid-Fast Bacteria (AFB) (Salsabila Fauzi *et al.*, 2019). This disease is the world's 13th leading cause of death and the second leading infectious killer after COVID-19, with 1.5 million people dying (World Health Organization, 2023). To achieve a cure for TB patients, the Health Research and Development Agency of the Republic of Indonesia asserts the need to strengthen treatment compliance (Rahmi *et al.*, 2017). However, the factors influencing TB treatment compliance are patient behaviors, including motivation, knowledge, and confidence in patients' treatment. On the other hand, non-compliance with treatment for TB patients can lead to prolonged periods of infection and relapse. Also, treatment failure and multidrug resistance risk can increase morbidity and mortality rates (Rumaolat *et al.*, 2022). Hence, improving compliance and treatment behavior in TB patients can be done by increasing the patient's knowledge of the disease (M Hanifa & Mutmainah, 2019).

The Health Belief Model (HBM) is an effective and helpful model for understanding, explaining, and predicting individual health behaviors, including medication adherence (Tola *et al.*, 2016). HBM has been applied to various chronic diseases, such as HIV, hypertension, type 2 diabetes mellitus, post-kidney transplantation, cystic fibrosis, brucellosis, and breast and cervical cancer (Jadgal *et al.*, 2015; Sazali *et al.*, 2023). Research conducted by Tola *et al.* (2016) stated that educational interventions using HBM theory



can significantly reduce the level of non-adherence to treatment among tuberculosis sufferers in the intervention group (p-value < 0.000). Thus, this study is intended to measure the validity and reliability of the knowledge construct and the HBM based on the research of Tola *et al.* (2016), which is modified in the Indonesian version for pulmonary tuberculosis patients at the Kedungmundu Health Center and Tlogosari Wetan Health Center, Semarang City, Indonesia.

METHODS

This research used a quantitative observational design with a cross-sectional approach. Sampling used non-probability sampling techniques with a purposive sampling approach based on inclusion and exclusion criteria, namely 30 samples. Inclusion criteria: patients diagnosed with pulmonary tuberculosis, including patients with complications, undergoing treatment for at least one month before the study with oral anti-tuberculosis (OAT) drugs, and willing to be respondents. Exclusion criteria: pulmonary tuberculosis patients aged <18 who withdrew at the time of the study. Data were analyzed using the IBM SPSS 25 (Statistical Package for Social Science 25) program. The validity test was based on the Corrected Item value (0.361), while the reliability test used internal consistency techniques on the Cronbach Alpha value (0.70).

RESULT AND DISCUSSION

The initial testing of the questionnaire, known as validity and reliability testing, occurs before its distribution to the research sample. This validity test aims to see whether the questionnaire reveals something researchers will measure (Ghozali, 2018; GR Al Farizi *et al.*, 2022). While the questionnaire statement is declared valid if it has a corrected item value of ≥ 0.361 (Sugiyono, 2018). Meanwhile, reliability testing aims to determine whether the questionnaire will produce a result of constant or reliable value when used at different times and places. Besides, the questionnaire statement is declared reliable if it has a value of Cronbach Alpha ≥ 0.70 (Ghozali, 2018; Sonia *et al.*, 2023). Hence, validity and reliability tests of the questionnaire were carried out on 30 respondents, divided into two places: the Kedungmundu Health Center with 18 respondents and the Tlogosari Wetan Health Center with 12 respondents outside of the total research sample.

Knowledge Construct Validity Test

Table 1. Knowledge Questionnaire Statements Based on Indicators

Questionnaire	Indicator	Questionnaire Statement
<i>Knowledge</i>	The cause of Tuberculosis	1. TB is caused germs/bacteria by fungi/viruses, not
		2. Disruption of TB treatment (non-adherence or missing follow-up) is the primary cause of drug-resistant TB strain development and therapy failure.
		3. Non-compliance with TB treatment can lead to the development of drug-resistant TB.
How to transmit and prevent TB		4. TB cannot be transmitted through the spread of saliva droplets by an infected person when coughing or sneezing.
		5. Transmission of TB can be prevented by covering the mouth and nose when coughing and sneezing, not throwing phlegm anywhere, and opening the windows of the house and car when traveling.
Clinical symptoms of TB		6. The main symptoms of TB are a cough > 2 weeks, chest pain, excessive sweating at night, decreased appetite, weight loss, fatigue, and coughing up blood with phlegm.
Length of treatment and recovery from disease Tuberculosis		7. TB treatment requires six months for new patients and eight months for existing patients.
		8. TB medication is given every month and taken regularly according to the instructions for use.
		9. The treatment period for drug-resistant TB is much longer than that for first-line TB treatment.



Questionnaire	Indicator	Questionnaire Statement
		10. If treated properly, TB disease cannot be cured.
		11. Drug-resistant (resistant) TB is a type of TB that can be cured with the first stage of TB drugs.
		12. It is possible to stop TB treatment if you still show symptoms, even though the treatment period has not been completed.
		13. TB treatment does not have follow up examinations during the treatment period.
	Side effects of Tuberculosis treatment	14. Side effects of TB drugs usually subside gradually on their own or with supportive treatment (administering drugs according to symptoms of side effects).
		15. Gastritis, fatigue, nausea, and blurred eyes are not symptoms of the side effects of TB drugs.
		16. If a TB patient has drug side effects, he or she must continue TB treatment without consulting a health professional.

Table 2. Knowledge Questionnaire Validity Test Results

Statement (Code)	Corrected Item	Validity	Result
P1	0,530	0,361	Valid
P2	0,674	0,361	Valid
P3	0,295	0,361	Invalid
P4	0,494	0,361	Valid
P5	0,502	0,361	Valid
P6	0,632	0,361	Valid
P7	0,631	0,361	Valid
P8	0,750	0,361	Valid
P9	0,753	0,361	Valid
P10	0,428	0,361	Valid
P11	0,350	0,361	Invalid
P12	0,461	0,361	Valid
P13	0,475	0,361	Valid
P14	0,147	0,361	Invalid
P15	0,511	0,361	Valid

Source: Primer, 2024

Based on Table 2, testing the validity of the knowledge questionnaire above, it can be seen that 16 initial statement items were tested, consisting of eight positive (favorable) items and eight negative (non-favorable) items. Besides, based on the results of the validity test, three statement items were invalid because it had a corrected item value of 0.361, namely statement number 3 (indicators of causes of TB disease) with a corrected item value of 0.295 and statement number 14 (indicators of TB drug side effects) with a corrected item value of 0.147.

Knowledge Construct Reliability Test

Table 3. Knowledge Questionnaire Reliability Test Results

Construct	Cronbach's Alpha	N of Items	Results
Knowledge	0,796	16	Reliability

Based on Table 3, the result of the knowledge questionnaire reliability test shows a Cronbach's Alpha value of 0.796, which means the questionnaire was declared reliable because it had a Cronbach's Alpha value of 0.70. Hence, it can be used as a knowledge measuring tool in this research.



Health Belief Model (HBM) Construct Validity Test

Table 4. Health Belief Model (HBM) Questionnaire Statements Based on Indicators Questionnaire

Questionnaire	Indicator	Questionnaire Statements
<i>Health Belief Susceptibility Model (HBM)</i>		1. All humans are at risk of contracting resistant or susceptible types of TB germs at any time.
		2. Children, the elderly, and people who have other diseases (HIV, cancer, diabetes, etc.) are at higher risk of developing active TB than healthy people.
		3. If I do not complete my treatment properly, I may develop a drug-resistant strain of TB.
<i>Severity</i>		4. The treatment period for drug-resistant types of TB is longer than types of TB that are susceptible to treatment.
		5. If I do not complete the treatment properly, then I might get sick again from TB disease (relapse).
		6. If I do not follow prevention methods properly, TB is very contagious that it can infect my entire family.
<i>Barrier</i>		7. Consuming too many pills is dangerous for humans and can damage the digestive tract or other organs.
		8. Taking TB medication on an empty stomach is very dangerous for your health.
		9. I do not like being seen at the TB clinic by someone who knows me.
		10. The support of family and friends did not really help in undergoing TB treatment.
		11. If I forget to take medication, it can interfere with my ability to comply with treatment.
<i>Benefit</i>		12. If I take and finish my treatment correctly, TB medication can effectively cure TB.
		13. TB treatment can improve my quality of life.
		14. If I take my medication correctly, I will not develop a drug-resistant strain of TB, and I will not transmit it to my family.
		15. If I complete my treatment correctly, TB cannot recur, and I am free from re-treatment
<i>Cues to action</i>		16. My interest in healing motivates me to follow my treatment properly.
		17. The advice and support of my family and friends influenced my decision about whether to complete my treatment properly.
		18. Community support motivates me to complete my treatment properly.
		19. Health workers' advice and support, as well as good communication, can motivate me to complete the treatment correctly.
<i>Self-efficacy</i>		20. I believe I can take medication correctly until my treatment is finished.
		21. I believe I have the capacity to tolerate the side effects of TB drugs.
		22. I believe I can ask for supportive treatment for the side effects of TB drugs before stopping my treatment.
		23. I believe I can overcome people's negative talk about my illness and come to the treatment centre with confidence.
		24. I believe I have the physical ability to come and take medication regularly.
		25. I believe I can overcome the behaviours that



Questionnaire	Indicator	Questionnaire Statements
		motivate me to bother stopping my therapy, such as drinking alcohol and smoking until I complete my treatment properly.

Table 5. Validity Test Results of the Health Belief Model (HBM) Questionnaire

Statement (Code)	Corrected Item	Validity	Result
P1	0,535	0,361	Valid
P2	0,691	0,361	Valid
P3	0,710	0,361	Valid
P4	0,516	0,361	Valid
P5	0,420	0,361	Valid
P6	0,516	0,361	Valid
P7	0,072	0,361	Invalid
P8	0,691	0,361	Valid
P9	0,380	0,361	Valid
P10	0,416	0,361	Valid
P11	0,359	0,361	Invalid
P12	0,387	0,361	Valid
P13	-0,022	0,361	Invalid
P14	0,469	0,361	Valid
P15	0,420	0,361	Valid
P16	0,514	0,361	Valid
P17	0,393	0,361	Valid
P18	0,428	0,361	Valid
P19	0,435	0,361	Valid
P20	0,344	0,361	Invalid
P21	0,656	0,361	Valid
P22	0,588	0,361	Valid
P23	0,254	0,361	Invalid
P24	0,741	0,361	Valid
P25	0,514	0,361	Valid

Source: Primer, 2024

In Table 5, it can be seen that 25 initial statement items were tested for the validity of HBM. Based on the validity results, 5 statement items were invalid because it had a corrected item value of <0.361, namely statement number 7 (barrier indicator) with a corrected item value of 0.072, statement number 11 (barrier indicator) with a corrected item value of 0.359, statement number 13 (benefit indicator) with a corrected item value of -0.022, statement number 20 (self-efficacy indicator) with a corrected item value of 0.344, and statement number 23 (self-efficacy indicator) with a corrected item value of 0.254.

Health Belief Model (HBM) Construct Reliability Test

Table 6. Reliability Test Results of the Health Belief Model (HBM) Questionnaire

Construct	Cronbach's Alpha	N of Items	Result
Health Belief Model (HBM)	0,817	25	Reliability

Source: Primer, 2024

Based on Table 6, the results of the reliability test of the Health Belief Model questionnaire obtained a Cronbach's Alpha value of 0.817, which means the questionnaire was declared reliable because it had a Cronbach's Alpha value of ≥ 0.70 . Hence, it could be used as a measuring tool for compliance and behavior in this research.



CONCLUSION

This research is intended to measure compliance and behaviour in pulmonary tuberculosis patients at the Kedungmundu Health Center and Tlogosari Wetan Health Center in Semarang City. It focuses on the validity and reliability of the knowledge construct and the HBM. The results showed that the knowledge construct has a validity value of 13 items (corrected item ≥ 0.361) and reliability (Cronbach's Alpha 0.796), while the health belief model (HBM) construct has a validity value of 20 items (corrected item ≥ 0.361) and reliability (Cronbach's Alpha 0.817).

AUTHOR CONTRIBUTION

GRA and YDA provide conceptual contributions in developing theories or concepts that form the basis of research. PC Contributed to the implementation and analysis of the research, as well as drafting the manuscript.

CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

REFERENCES

- Ghozali, Imam. 2018. Aplikasi Analisis Multivariate dengan Program IBM SPSS 25. Semarang: Badan Penerbit Universitas Diponegoro
- GR Al Farizi, F Gloria, and VZ Maula., 2022. Validity and Realibility Test of Developed Servqual Instrument for Outpatients Pharmacy Services at Pratama Annisa Primary Healthcare Semarang. *Science and Community Pharmacy Journal* 1(1), pp. 26-32
- Jadgal, K., N Moghadam, T., A Seiouki, H., Zareban, I., and Sharifi R, J. 2015. Impact of Educational Intervention on Patients Behavior with Smear-positive Pulmonary Tuberculosis: A Study Using the Health Belief Model. *Materia Socio Medica*, 27(4), 229
- M Hanifa, & N Mutmainah. 2019. Pengaruh Pemberian Edukasi Obat Terhadap Tingkat Kepatuhan Minum Obat Pada Pasien Tuberkulosis Paru Di Balai Besar Kesehatan Paru Masyarakat Surakarta Tahun 2019. *Journal Of Pharmacy*, 1(1), 111–122
- Rahmi, N., Medison, I., & Suryadi, I. 2017. Hubungan Tingkat Kepatuhan Penderita Tuberkulosis Paru. *Jurnal Kesehatan Andalas*, 6(2), 345–350
- Rumaolat, T Sukartini, and Supriyanto. 2022. Peningkatan Kepatuhan Minum Obat Tuberkulosis Paru Melalui Pendidikan Kesehatan Berbasis Media Visual. *Jurnal Penelitian Kesehatan Suara Forikes*, 13(3), 575–579
- Salsabila Fauzi, Y., Indriyani, R., Wulan Sumekar, D. R., & Wibowo, A. 2019. Efikasi Diri pada Kepatuhan Minum Obat Anti Tuberkulosis (OAT). *Jurnal Kesehatan*, 10(3)
- Sazali, M. F., Rahim, S. S. S. A., Mohammad, A. H., Kadir, F., Payus, A. O., Avoi, R., Jeffree, M. S., Omar, A., Ibrahim, M. Y., Atil, A., Tuah, N. M., Dapari, R., Lansing, M. G., Rahim, A. A. A., & Azhar, Z. I. 2023. Improving Tuberculosis Medication Adherence: The Potential of Integrating Digital Technology and Health Belief Model. *Tuberculosis and Respiratory Diseases*, 86(2), 82–93
- Sonia., GR Al Farizi., Ovikariani., 2023. Relationship Between Knowledge And Behavior Levels Of Antibiotic Usage Among Pharmacy Patients In Sub-Districts Puguh And Tegorejo Kendal. *Media Farmasi; Jurnal Ilmu Farmasi* 20(1), pp. 35-43. DOI: 10.12928/mf.v20i1.25497
- Sugiyono., 2018. Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Bandung: Alfabeta
- Tola, H. H., Shojaeizadeh, D., Tol, A., Garmaroudi, G., Yekaninejad, M. S., Kebede, A., Ejeta, L. T., Kassa, D., & Klinkenberg, E. 2016. Psychological and educational intervention to improve



tuberculosis treatment adherence in Ethiopia based on health belief model: A cluster randomized control trial. *Plos One*, 11(5)

World Health Organization., 2023. Global Tuberculosis Report 2023. Geneva. Switzerland: WHO

