



The Correlation between Belief and Adherence to Therapeutic Regimens in Pharmaceutical Care for Tuberculosis Patients in Primary Healthcare Centres in Surabaya, Indonesia

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ABSTRACT

Adherence to therapeutic regimens is a health behaviour which can be explained through the concept of the theory of Health Belief Model (HBM) which starts from belief which plays an important role in shaping mindset and patient adherence behaviour. The purpose of this study was to determine the relationship between belief and adherence to the therapeutic regimens in pharmaceutical care models for tuberculosis patients in primary healthcare centres. This research is a quantitative cross sectional analytic study at Perak Timur, Gading, and Manukan Kulon primary healthcare centres in the Surabaya area. Data collection for tuberculosis patients was carried out at the primary healthcare centres for 2 months (from October to November 2017). The independent variable is belief in drug therapy which consists of the sub-variables of perceived threats, perceived benefits, perceived barriers, and perceptions of self-efficacy. The dependent variable was adherence to therapeutic regimens with indicators of the right dosage, right frequency, right interval, right time to take medication, and right duration of therapy. Out of a total of 61 respondents, 32 (52.46%) were found adherent; taking the combination fixed dose antituberculosis drug and 29 (47.54%) patients did not adhere. Analysis of data with the Spearman Test showed $p = 0.004$ ($p < 0.05$) which means there is a correlation between belief and adherence to therapeutic regimens. Our findings showed a significant relationship between belief and adherence to therapeutic regimens in pharmaceutical care for tuberculosis patients attending primary healthcare centres in Surabaya, Indonesia.

Keywords: Health belief model, Antituberculosis drugs, Belief, Adherence.

Introduction

Tuberculosis (TB) is a communicable disease that is a major cause of ill-health, one of the top 10 causes of death worldwide and the leading cause of death from a single infectious agent, ranking above Human Immunodeficiency Virus (HIV) infection.¹ Indonesia, TB cases rank third in the world.¹ The biggest TB cases in the world are in India 27%, China 9%, Indonesia 8%, Philippines 6%, Pakistan 5%, Nigeria 4%, Bangladesh 4%, and South Africa 3%. These eight countries, and 22 other countries, are included in 30 countries with a high burden of TB, comprising 87% of TB cases in the world. A total of 6% of TB cases in the world also occur in Europe, and America 3%.¹ A survey of TB cases in 2017 in all provinces in Indonesia, showed that East Java Province is ranked second in the number of TB cases after West Java Province. Surabaya ranked first in East Java Province with 5,428 TB cases in 2016. Therefore, this study was conducted in the city of Surabaya.²

Adherence with patients on long-term treatment with antituberculous drugs is the key to controlling tuberculosis. Tuberculosis is still a public health problem in the world even though control efforts with the strategy of directly observed treatment short-course (DOTS) have been applied in many countries since 1995. The government has a role

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in the efforts to control tuberculosis by administering antituberculosis drugs Fixed-Dose Combination (FDC) free of charge at the primary healthcare centres as the first level of health services for the community.^{3,4}

Risk factors for non-adherence can be caused by disease factors, therapeutic regimen factors, and factors of patient interaction with health workers. The therapeutic regimen factors include a large number of drugs (polypharmacy), the frequency of drug use that is difficult to follow, the duration of therapy is too long, the side effects of the drug, the patient feels cured, the cost of treatment, how to use the drug, and the taste of the drug. Decreasing the quality of life of patients caused by the side effects of drugs is an important factor in non-adherence.⁵ Evaluation, diagnosis, psychosocial support, and the active role of health workers including pharmacists are very necessary for the success of TB management.⁶

Pharmaceutical care by pharmacists is a philosophical foundation in the responsibility of drug therapy to improve the quality of life of patients.⁷ Pharmaceutical care is therapeutic communication between pharmacists and patients⁸ to meet the drug-related needs of the patients identified by pharmacists and the achievement of meeting drug-related needs expressed by patients.⁹ The expression of patients in the pharmaceutical care model is in the form of understanding of the goals and methods of drug use, patient expectations of treatment effectiveness, expression of patient concerns for treatment safety and behavioural expression of patient adherence with therapeutic regimens.⁹ The therapeutic regimen is judged based on two aspects, namely the number of drug aspects (dose-taking) and the time-time (dose-timing).^{10,11} Therapeutic regimens according to dose-taking aspects are seen from the right variable dose,¹⁰ and the exact variable frequency of use, while the time-aspect (dose-timing) is seen from the variable right interval, on time and the exact duration of drug therapy.¹⁰

Adherence to therapeutic regimens in pharmaceutical care models can be achieved through understanding, patient expectations and concerns.⁹ Furthermore, this pharmaceutical care model was developed by Athijah by adding the concept of patient's belief at the beginning of the pharmaceutical care process before patients understanding, hope and care.⁸ Adherence to therapeutic regimens is a health behaviour which can be explained through the concept of the Health Belief Model (HBM) theory. The HBM theory is used to explain behaviour change and maintain health behaviour that starts from belief towards perceived threat, perceived benefits, perceived barriers, and perceived self-efficacy.¹² This belief plays an important role in shaping the mindset and behaviour of patient's adherence. Furthermore this research was to determine the relationship between belief and adherence to the therapeutic regimen in the pharmaceutical care model for tuberculosis patients in primary healthcare centres.

Materials and Methods

Research design

This research is a quantitative cross sectional analytic study with data collection through guided free interviews with questionnaire. The location of the study was in three primary healthcare center in the Surabaya area, Indonesia which had a high prevalence of tuberculosis cases according to 2016 data, namely Perak Timur Primary Healthcare Center, Gading Primary Healthcare Center and Manukan Kulon Primary Healthcare Center. Data collection for tuberculosis patients was done at the Health Center from October to November 2017. This research has obtained a research permit from the Surabaya City Health Office with a validity period of 3 months starting from September to November 2017. This study also obtained an Ethical Approval (No.598-KEPK) from the Health Research Ethics Commission of the Faculty of Public Health, Universitas Airlangga, Indonesia.

Population, Samples, and Sampling Techniques

The study population included TB patients who took antituberculosis drugs FDC from the primary healthcare center in the Surabaya area during two months from October to November 2017. The primary healthcare center sampling technique was conducted by purposive sampling with the criteria of three primary healthcare centres which had the highest prevalence of tuberculosis patients in the Surabaya area during the year 2016 according to data from the Surabaya City Health Office obtained on October 6, 2017. The three primary health care centres were Perak Timur Primary Healthcare Center, Gading Primary Healthcare Center and Manukan Kulon Primary Healthcare Center (Table 1).

The inclusion criteria for the study were TB patients at least 15 years old, willing to be respondents, communicate well, had or were still getting an intensive FDC antituberculosis drugs. The sample size (n) was calculated using the simple random sampling formula with notation N (total population size), P (population proportion), and d (degree of error) as shown below.¹³

$$n = \frac{N Z^2 P (1-P)}{2 d^2 + Z^2 P (1-P)}$$

As shown in Table 1, the total population of TB patients in Perak Timur Primary Healthcare Center, Gading Primary Healthcare Center and Manukan Kulon Primary Healthcare Center during year 2016 was 421 patients and the average number of patients in 3 months was 106 patients. If N = 106 patients and in this study set $1-\alpha = 95$ with P = 0.05 and d = 0.2, then there will be a sample of at least 51 patients. There were 61 total respondents during two months from October to November 2017.

Data source

This study used primary and secondary data. The primary data source were the answers to the questionnaire (self-report) related to adherence in taking antituberculosis drugs according to the therapeutic regimens, i.e. right dosage, right frequency, right interval, right time to take medication, and right duration of therapy. Another primary data were the answers to the questionnaire regarding belief. Secondary data in the form of patient treatment cards (TB-01 Card) and patient identity cards (TB-02 Card) to see the type of antituberculosis drugs, antituberculosis drugs therapy stages, and the number of antituberculosis drugs tablets that should be taken by the patient. Another secondary data is the data on the highest number of tuberculosis cases in health centres within the Surabaya city in 2016 which were used as the basis for determining the location of the study.

Research variable

The research variable consisted of independent variables and dependent variables. The independent variable is belief in drug therapy which consists of the sub-variables of perceived threats, perceived benefits, perceived barriers, and perceptions of self-efficacy with the question item indicators as in Table 2.

The dependent variable was adherence to therapeutic regimens with five indicators such as right dosage, right frequency, right interval, right time to take medication, and right duration of therapy with each indicator is worth 1, as shown in Table 3.

Research instrument

The research instrument consisted of an explanation sheet, an informed consent form, the researcher as an interviewer, and a questionnaire. Testing the validity of researchers as interviewers is done by means of role-playing training among researchers with patient simulations. Questionnaires were carried out in the form of validity tests and content validity by conducting interviews with expert panels to ensure all questions were represented. The questionnaire includes patient characteristics such as patient demographic data, the presence of FDC side effects during the intensive stage, questions related to the patient's belief in drug therapy, and indicators of adherence with therapeutic regimens.

The indicator of the belief variable is described in the statement using a Likert scale consisting of four alternative answers by giving the following scores. Favourable statements are answers that support statements while unfavorable statements are answers that do not support statements. The answer score of the 25 indicator statements of the belief variable is summed to obtain a value. The reason for choosing four categories of answers is by removing the answer in the middle, sometimes because this answer has a double meaning, can be interpreted as not yet able to decide, or give a neutral answer or even doubt.

The questionnaire of adherence to therapeutic regimens used the Guttman scale consisting of statements about patient behaviour in taking FDC drugs with five indicators. Completing this questionnaire was accompanied by the researcher after the patient received an explanation before approval and filled out informed consent. Adherence to therapeutic regimen in TB patients is indicated by a total score of 5 of self-reported questionnaire. Non-adherence is indicated if the total score is less than 5.

Data analysis

The answers on the questionnaire sheets were analyzed by correlation with Statistical Product and Service Solutions (SPSS) version 16 for Windows and sought the relationship between belief in drug therapy and adherence to therapeutic regimens. The value of the belief in the form of numbers and the score for adherence to therapeutic regimens were also in the form of numbers which were processed by statistics. Data normality tests were carried out with the One-Sample Kolmogorov-Smirnov Test. If the data show normal distribution, parametric tests using the Pearson test are used to test the correlation. If the data is not normally distributed then the Spearman non-parametric test is used for the correlation test.

Results and Discussion

The total number of respondents was 61 who were in Perak Timur, Gading, and Manukan Kulon Primary Healthcare Centres as shown in Table 4. According to table 1, there were 421 patients during year 2016 and the average number of patients in 3 months was 106 patients. There were at least 51 patients according the sample size formula. There were 61 total respondents during the two months of the study, from October to November 2017.

Table 4 shows that out of a total of 61 TB patients in this study, 32 (52.46%) of TB patients were adherent to the antituberculosis drugs FDC and 29 (47.54%) patients were non-adherent. This table also shows that 41 (67.21%) TB patients experienced side effects of antituberculosis drugs which have the potential to cause non-adherence. Drug side effects are one of the factors other than disease factors in therapeutic regimens that affect adherence to the therapeutic regimens. Other therapeutic regimen factors such as the number of drugs (multiple drug therapy), the frequency of drug use, the patient feels cured, the duration of therapy, the cost of treatment, how to use drugs and the taste of the drug have been reported to lead to discontinuation of one of the prescribed antituberculosis drug combinations, thereby leading to patient non-adherent.^{14,15}

On the basis of the data as presented in Table 5, there were 18 (72%) of the total 25 tuberculosis patients in Perak Timur primary healthcare center who were not adherence to the therapeutic regimens according to indicator 5, indicating that an explanation regarding the rules for taking medication in tuberculosis patients was needed in the pharmaceutical care of the patients in the primary healthcare centres.

Based on data analysis using the One-Sample Kolmogorov-Smirnov normality test, it turns out that belief value ($p = 0.088$) is normally distributed, while the value in the number of exact indicators of adherence ("5-right" indicators) are not normally distributed ($p = 0.000$). Thus, the correlation test between the two variables was then performed using the Spearman correlation test.

The Spearman Correlation Test was performed to identify the correlation between belief variable and the "5-right" indicators of the adherence to the therapeutic regimen. It shows that a relationship between the two variables exists. The significance of this relationship is at $p = 0.004$ which is less than 0.05 and the correlation coefficient ($r_{calculated}$) = 0.362 which is less than 0.213 (r_{tabel}) at $\alpha = 0.05$ which means that this relationship is significant.

The independent variable was belief in drug therapy with indicators such as perceived threat, perceived benefits, perceived barriers, perceived self-efficacy according to table 2. The answers from respondents were measured using a Likert scale. This belief plays an important role in shaping the mindset and behaviour of patient compliance. HBM reveals why and under what circumstances people will adopt protective behaviour.¹⁶ Whether someone will take action related to health, depends on the condition of the mind in which he is ready to act. Awareness of the vulnerability and severity of disease provides an impetus to act. Awareness of effectiveness and obstacles will affect the personal selection of the best actions. Therefore, the behaviour of wanting to treat TB patients is built on good belief.

According to the analysis of TB treatment factors by applying HBM, TB knowledge and perceptions of disease susceptibility are the main influencing factors. TB knowledge has a positive effect on behaviour and intention to seek active health. Feeling the severity of the disease has a positive impact on the behaviour to maintain treatment. Perception about the benefits of healthy behaviour also has a positive impact on preventive and active behavioural search. Knowledge of TB, perceptions of disease susceptibility, perception of disease severity, perceptions of the benefits of healthy behaviour, and lack of free knowledge/policies have a direct and positive impact on the intention to seek health. Similar to Chang's research, the application of the Health Beliefs model to prevent tuberculosis with general

knowledge of TB, perceptions of the benefits of TB prevention behaviour, and perceived barriers to adoption behaviour.¹⁷

This study also shows that the age of the respondent is a demographic factor that needs more attention. The behaviour to continue to treat TB is negatively related to increasing age and duration of therapy. In the same way, the intention to seek active health is negatively related to age. In HBM, various factors play different roles in maintaining TB treatment and protective behaviour. Perceptions of disease susceptibility and perceptions of disease severity have indirect effects on behaviour through perceptions of the benefits of healthy behaviour. Meanwhile, the perception of disease vulnerability has a positive impact on the perception of the severity of the disease. Vulnerability and severity of disease perception reflect understanding of TB by the population of respondents affected by TB which have a direct effect on the perception of the benefits of healthy behaviour, and an indirect influence on behaviour of the willingness to maintain treatment.¹⁸

According to Rodri'guez-Reimann¹⁹ gender and culture in HBM have been introduced to analyze TB treatment behaviour of Mexican respondents in the United States. They found that women were more concerned with TB treatment assistance, correlative factors, and behavioural goals.¹⁹ In other words, the vulnerability of diseases perceived by women and their benefits from healthier behaviour is easier and they pay more attention to instructions from the media.

Table 1: Primary healthcare centres with the highest number of cases of tuberculosis in Surabaya in 2016

No	Name of Primary Healthcare Centre	Number of Tuberculosis Cases
1	Perak Timur	198
2	Gading	113
3	Manukan Kulon	110
4	Tanah Kalikedinding	109
5	Sidotopo Wetan	90
6	Tambakrejo	85
7	Wonokusumo	81
8	Asemrowo	80
9	Rangkah	80
10	Kedungdoro	79

Table 2: Variable indicators of belief

Sub-variable	Question Item Indicator
<i>perceived threat</i>	1. Disease complications occur
	2. Development of disease
<i>perceived benefits</i>	1. Controlling disease
	2. Prevent complications of disease
<i>perceived barriers</i>	1. Unwanted effects occur
	2. Rules for the use of complicated drugs
<i>perceived self-efficacy</i>	1. Read the instructions for using the drug
	2. Using drugs correctly
	3. Given the time to take medicine

Table 3: Five indicators of variables in therapeutic regimen adherence (the 5 right)

Indicator	Information
Right dosage	The number of FDC antituberculosis drugs caplets taken in one consumption.
Right frequency	Frequency of all the amounts of FDC antituberculosis drugs caplets consumption by the tuberculosis patient in a day.
Right interval	Take the FDC antituberculosis drugs caplets at the same hour every day.
Right time to take medication	Take the FDC antituberculosis drugs caplets in 2 hours before meal or 4 hours after meal on an empty stomach.
Right duration of therapy	Take the FDC antituberculosis drugs caplets at the primary health care centres as scheduled.

Table 4: The baseline characteristics of patients in the three primary healthcare centres

Data	Number of respondent; (percentage)
Number of respondents	61
Gender	
Male	30 (49.18%)
Female	31 (50.82%)
Age (years)	
15 - 30	14 (22.95%)
31 - 45	27 (44.26%)
46 - 60	15 (24.59%)
Older than 60	5 (8.20%)
Phase of FDC medication therapy	
Intensive phase	33 (54.10%)
Continuation phase	28 (45.90%)
Antituberculosis drug received based on WHO classification	
Category I	53 (86.89%)
Category II	8 (13.11%)
Experience with FDC drug side effects	
Patients with drug side effects	41 (67.21%)
Patients without drug side effects	20 (32.8%)
Patient's adherence to FDC antituberculosis drug	
Adherence	32 (52.46%)
Non- Adherence	29 (47.54%)

Therefore, women have stronger predictions about the behavioural abilities of TB treatment. In this study there was no significance correlation between gender and adherence to the therapeutic regimen, and is similar to the quantitative review study that assesses gender differences in accessing TB diagnostic and maintenance services.²⁰ In addition, health insurance and policy awareness have a positive impact on active health-seeking behaviour.

Another study by Li²¹ on late initial health search for new pulmonary TB cases among migrant populations in East China concluded that interventions to improve health-seeking behaviour among migrant populations in China should focus on strengthening labor, medical security and their health education.²¹ This result is similar to the Poss

study, who reported that with the help of standards, the guiding factors of subjective behaviour, vulnerability, attitudes, and intentions can be predicted well. With intentions and vulnerabilities, screening of behaviour can be predicted well with belief in drug therapy.²² However, this study did not assess subjective behaviour as a predictive factor in health belief. In addition, groups with guiding factors, have higher levels of behaviour, which indicates that awareness and publicity are important for TB health promotion. With health education assistance and health promotion methods such as distribution of educational materials, the level of awareness and knowledge of TB by migrant populations is increasing and people now perceive the vulnerability and severity of the disease and the benefits of healthy behaviour, which can increase TB preventive behavioural intentions to seek health. Therefore, health education and health promotion are important factors that boost confidence in TB patients, and must be popularized in TB prevention and treatment.

Research Limitations

The limitations of the study are that the number of study samples is only 61 respondents during the two-month study period from October to November 2017.

Table 5: The Frequency of Patients' Adherence in three primary health care centres

Adherence	Perak Timur	Gading	Manukan Kulon
Adherence	7 (28%)	22 (75.86%)	3 (42.86%)
Non- Adherence	18 (72%)	7(24.14%)	4 (57.14%)
Number of Patients	25 (100%)	29 (100%)	7 (100%)

Conclusion

Our findings showed that belief in drug therapy plays an important role in patient's adherence behaviour. It is therefore recommended that the healthcare worker explains to TB patients to take their antituberculosis fixed dose combination (FDC) drugs in the right dosage, right frequency, right interval, right time to take medication, and right duration of therapy.

Conflict of interest

The authors declare no conflict of interest.

Authors' Declaration

The authors hereby declare that the work presented in this article is original and that any liability for claims relating to the content of this article will be borne by them.

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