

Self Care, Drug Taking Adherence, and their Association with Complication in Type 2 Diabetes Mellitus Patients

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ABSTRACT

Background: Diabetes mellitus (DM) is a major global health issue. The incidence of DM worldwide was about 6.4% (285 million people) in 2010 and it is projected to increase to 7.7% in 2030. Diabetes is associated with a number of challenges. The disease has a great influence on the patient's daily life, their relatives, nurses and physicians. Complications of diabetes represent the major causes of morbidity and mortality that are associated with this chronic metabolic disorder. This study aimed to examine the associations of self care and drug taking adherence with the risk of complication in type 2 diabetes mellitus patients.

Subjects and Method: A case control study was conducted at Dr. Soeroto Hospital, Ngawi, East Java. A sample of 150 type 2 diabetes mellitus patients was selected for this study by fixed disease sampling, consisting of 75 patients with and 75 patients without complication. The dependent variable was complication. The independent variables were self care, drug taking adherence, motivation, duration of illness, family support, and health personnel support. Data on complication of type 2 DM were obtained from medical record. The other data were collected by questionnaire. The data were analyzed by path analysis.

Results: The risk of type 2 DM complication decreased with better self care ($b = -3.34$; 95% CI = -4.47 to -2.22; $p < 0.001$) and adherence to drug taking ($b = -3.73$; 95% CI = -5.06 to -2.41; $p < 0.001$). The risk of type 2 DM complication was indirectly affected by motivation, duration of illness, education, family support, and health personnel support.

Conclusion: The risk of type 2 DM complication decreases with better self care and adherence to drug taking. The risk of type 2 DM complication is indirectly affected by motivation, duration of illness, education, family support, and health personnel support

Keywords: type 2 diabetes mellitus, complication, self care, drug taking adherence

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BACKGROUND

Diabetes mellitus (DM) is included in three major causes of death from non-communicable diseases after cardiovascular disease (17.5 million), cancer (8.2 million) and DM (1.5 million) with nearly 30% occurring in lower middle income countries (WHO, 2014). The incidence of DM globally by 2014 is about 422 million people each year (WHO, 2016), the prevalence of 2015 incidence of global DM cases increases with

a percentage of 8% compared to 2014 (IDF, 2017).

Indonesia is ranked in the top 10 countries in the world with cases in 2015 for about 10 million per population after China, India, USA, Brazil, Russia and Mexico. International Diabetes Federation (IDF) predicts an increase in the number of people with DM in Indonesia from 9.1 million in 2014 to 14.1 million in 2035 (PERKENI, 2015). Compliance of treatment

and self-care is one effort in preventing the occurrence of complications of type 2 diabetes.

Family support and support from health personnel are factors that affect the occurrence of type 2 diabetes complications (Wabe et al., 2011). East Java occupies the top 10 diabetes prevalence in Indonesia, which is ranked ninth with prevalence 6.8 one level above DKI Jakarta which is ranked tenth with prevalence 6.6. In Ngawi district in 2013, there are 1700 cases of DM (RISKESDAS, 2013). 2017 visit of DM patient in Dr. Soeroto hospital reaches 1839 visits and by 2018 has reached 983 which is only obtained in the period January to March. (Dr. Soeroto Hospital, 2018).

SUBJECTS AND METHOD

1. Study Design

This was an analytic observational study with a case control design. The study was conducted at Dr. Soeroto hospital, Ngawi, East Java, from June to July 2018.

2. Population and Samples

The source population in this study was type 2 DM patients at Dr. Soeroto hospital, Ngawi, East Java. A sample of 200 type 2 DM patients was selected by fixed disease sampling, comprising 150 DM patients with complication and 50 patients DM without complication.

3. Study Variables

The dependent variable in this research is complication. The independent variables are self-care, medication adherence, motivation, tenure, health personnel support, education, and family support.

4. Operational Definition of Variables

Complication was defined as macro and microvascular complications in patients with diabetes mellitus. The data were taken from medical record. The measurement scale was categorical.

Macro complication was defined as coronary heart disease (CHD), congestive heart failure and stroke. Microvascular complications are nephropathidiabetic, retinopathy (blindness) and neuropathy. The data were collected by medical record.

Self-care was defined as a self-care activity undertaken by research subjects to control the DM, including dietary regulation, physical exercise, blood sugar monitoring, regular medication, and foot care.

Drug adherence compliance was defined as a condition that illuminates patient compliance in using appropriate medications based on the guidance from health personnel.

Family support was defined as the support provided by the family to support subjects given in the form of good behavior such as emotional support (attention, compassion and empathy), spiritual support (teaching worship, and invitations to places of worship), informational support (advice, advice and information), as well as in the form of instrumental support (assistance of personnel, funds, and time).

Health personnel support was defined as the support provided by health personnel in the form of behavior such as advice and information on appropriate medical knowledge related to DM.

Motivation was defined as a boost from within the subjects reaching a specific goal in terms of treatment of type 2 diabetes mellitus.

Duration of illness was defined as the time since the patient was diagnosed with DM by the doctor until the time of data collection, which was obtained through anamnesis.

Education was defined as the last formal level of education pursued by to obtain a diploma. The data were collected by questionnaire. The measurement scale was categorical.

5. Data Analysis

Sample characteristics were describe by univariate analysis. Bivariate analysis used Chi square. Multivariate analysis used path analysis to determine the direct and indirect effects of the relationships between study variables. Path analysis steps included model specification, model identification, model fit, parameter estimate, and model respecification.

7. Research Ethics

The research ethics include informed consent, anonymity, confidentiality and ethical clearance. The ethical clearance in this study was conducted at the Faculty of Medicine, Sebelas Maret University No. 116 / UNS.6 / KEPK / 2018.

RESULTS

1. Study subjects characteristics

The characteristic frequency distribution based on Table 1 shows that most subjects are male (135, 67.5%). Half of the study subjects were at age ≥ 41 years (52.0%), <senior high school (52.0%), and working at house (53.5%).

The subjects of the study were mostly complicated with 150 (75.0%), the duration of DM type 2 disease was mostly ≥ 5 years at 128 (64.0%), with less self-care for about 115 (57.5%). Strong family support is about 101 (50.5%), strong health personnel support is about 106 (53.0%). They were mostly high motivated for about 105 (52.5%). The drug compliance is largely disobedient for about 108 (54.0%).

2. Path Analysis

Path analysis was run on Stata 13. Path analysis model in this study was depicted in Figure 1. The results of path analysis were described in Table 2.

The risk of complication among type 2 diabetes mellitus patients was directly and negatively affected by good self-care and regular drug adherence.

The risk of complication among type 2 diabetes mellitus patients decreased with good self-care ($b = -3.34$; 95% CI= -4.47 to -2.22; $p < 0.001$) and regular drug adherence ($b = -3.73$; 95% CI= -5.06 to -2.41; $p < 0.001$).

The risk of complication among type 2 diabetes mellitus patients was indirectly affected by motivation, education, tenure, family support, and health personnel support.

Table 1. Characteristics of Subjects

Variable	n	%
Gender		
Male	135	67.5
Female	65	32.5
Age		
< 41 years old	96	48.0
≥ 41 years old	104	52.0
Education		
Low (<senior high school)	104	52.0
High (\geq senior high school)	96	48.0
Occupation		
Working at home	107	53.5
Working outside of house	93	46.5
Duration of illness		
< 5 years	72	36.0
≥ 5 years	128	64.0
Self-Care		
Poor	115	57.5
Good	85	42.5
Family Support		
Weak	99	49.5
Strong	101	50.5
Health Personnel Support		
Weak	94	47.0
Strong	106	53.0
Motivation		
Low	95	47.5
High	105	52.5
Drug adherence		
Irregular	108	54.0
Regular	92	46.0

Good self-care was positively affected by strong motivation ($b = 0.61$; 95% CI= 0.042 to 1.18; $p = 0.035$). Drug adherence was positively affected by strong motivation ($b = 2.66$; 95% CI= 1.79 to 3.53; $p < 0.001$),

strong health personnel support (b= 1.85; CI 95%= 0.96 to 2.74; p<0.001), and education ≥senior high school (b= 1.02; CI 95%= 0.25 to 1.80; p= 0.010), but negatively affected by duration of illness ≥5 years (b = -0.85; 95% CI= -1.78 to -0.29; p= 0.045).

Motivation was positively affected by strong support family (b= 2.51; 95% CI= 1.81 - 3.20; p<0.001), negatively affected by duration of illness ≥5 years (b= -1.03; 95% CI= -1.78 to -0.29; p= 0.007).

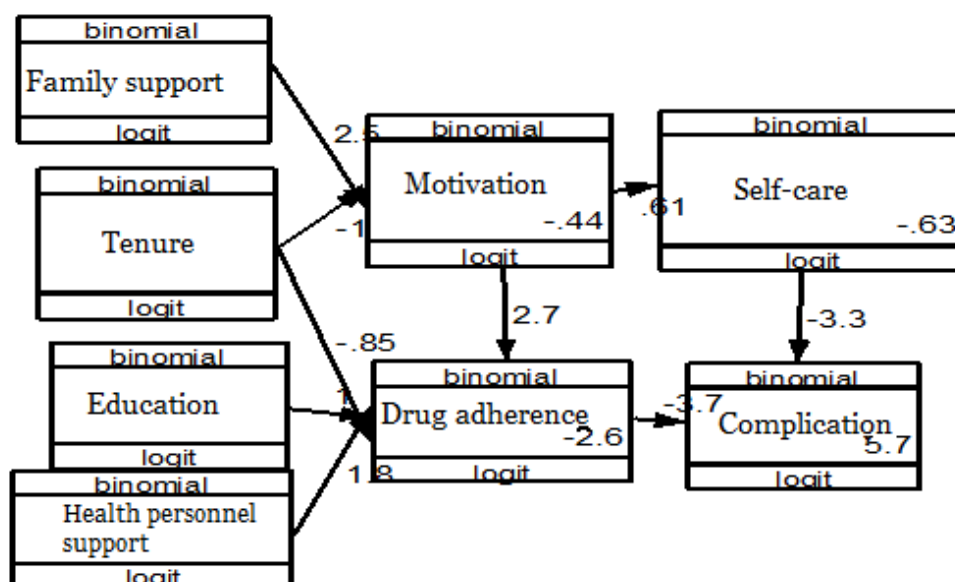


Figure 1. Structural model of path analysis with estimate

Table 2. The results path analysis on the factors associated with complication among type 2 diabetes mellitus patients

Dependent Variable	Independent variable	b	95% CI		p
			Lower Limit	Upper Limit	
Direct Effect					
Complication	← Good self care	-3.34	-4.47	-2.22	<0.001
Complication	← Drug adherence	-3.73	-5.06	-2.41	<0.001
Indirect Effect					
Self-care	← Strong motivation	0.61	0.04	1.18	0.035
Drug adherence	← Duration of illness ≥5 years	-0.85	-1.78	-0.29	0.045
Drug adherence	← Strong motivation	2.66	1.79	3.35	<0.001
Drug adherence	← Strong health personnel support	1.85	0.96	2.74	<0.001
Drug adherence	← Education ≥senior high school	1.02	0.25	1.80	0.010
Motivation	← Duration of illness ≥5 years	-1.03	-1.78	-0.29	0.007
Motivation	← Strong family support	2.51	1.81	3.20	<0.001
Observation Score = 200					
Log Likelihood = -377.41					

DISCUSSION

1. The relationship between self-care and complication

The result of the study showed that there was a negative association between self care and complication in type 2 DM patients. Self care aimed at optimizing metabolic control, optimizing quality of life, and preventing acute and chronic complications (Sulistria, 2013). An *et al.* (2013) explained that age, gender, duration of illness, and self care were related to the risk of macrovascular and microvascular complications.

Self-care was one of the efforts to prevent complications and to reduce the high mortality rate due to DM (Ministry of Health RI, 2015). Diabetic patients needed effective self-control to prevent complication (Mehrarvar *et al.*, 2016). Effective control of Type 2 diabetes mellitus depend on self care, diet, physical exercise, glucose monitoring, and drug management (Powers *et al.*, 2016).

2. The relationship between drug-taking adherence and complication

The result of the study showed that there was a negative association between drug-taking adherence and complication in type 2 DM patients.

Vries *et al.* (2014), explained that drug taking adherence was one of the determinant factors in reducing the risk of complications. Adherence was a term used to describe a patient in doing the treatment according to the doctor's instructions (Wiffen *et al.*, 2010). The adherence of DM patient treatment was influenced by the duration of DM, distance to health service, family support, and health personnel support (Cebeci *et al.*, 2016).

3. The relationship between motivation and complication through self-care

The result of the study showed that there was a positive association between

motivation and self care. Tandra (2014), stated that the low motivation of DM patients was usually caused by low motivation and support from family members. Weak motivation decreased self care in type 2 DM patients.

Self-care in type 2 DM patient is a program that need to be run throughout the life of DM patients and it became a full responsibility for DM patients. The purpose of doing self-care action was to control blood glucose (Sulistria, 2013). According to Haas *et al.* (2014), the activities which included in DM self-care were dietary pattern, physical exercise, monitoring blood sugar levels, taking the drug regularly, and foot treatment.

4. The relationship between motivation and complication through drug taking adherence

The result of the study showed that there was a significant relationship between motivation and complication through drug taking adherence.

Tamara and Nauli (2014), stated that motivation from the family was the most important support. People need motivation from each other in the form of consolation, attention, acceptance, or help from others. Nurleli (2016), explained that motivation could be a very influential factor in determining the beliefs and values of individual health in order to improve drug taking adherence.

5. The relationship between duration of illness and complication through drug taking adherence

The result of the study showed that there was a significant relationship between duration of illness and complication through drug taking adherence. Drug taking adherence was one of the determinant factors to prevent the occurrence of type 2 DM complications over a long-term treatment (Mogre *et al.*, 2017). Cebeci *et al.*

(2016), stated that patients who have DM for >5-10 years were more likely to have macrovascular and microvascular complications of type 2 DM than those who have <5 years for DM.

6. The relationship between health personnel support and complication through drug taking adherence

The result of the study showed that there was a significant relationship between health personnel support and complication through drug taking adherence.

An and Nichol (2013), mentioned that another factor that might affect treatment adherence was the support from health personnel, this support might increase family support so there was an encouragement and also motivation for regular drug consumption. The exchange of information regarding the prevention of complications, appropriate diet, physical activity, and self-care for patients with type 2 DM increased the motivation of DM patients to continue the treatment so that the DM patients' quality of life would be improved.

7. The relationship between education and complication through drug taking adherence

The result of the study showed that there was a significant relationship between education and complication through drug taking adherence.

Education was a process of changing knowledge, attitudes, skills, and understanding to develop self-potential in order to form a positive change in people to the school's environment (Ahmadi, 2014).

Tandra (2014) also stated that the adherence of DM patients in drug-taking was affected by many factors such as age, education, occupation, information, motivation, and support from family members. Thus, it was expected that high level of

education could improve the drug taking adherence.

8. The relationship between family support and complication through motivation

The result of the study showed that there was a significant relationship between family support and complication through motivation.

Family support and health personnel support were factors that affected the complications of type 2 diabetes mellitus. The support was provided in the form of information and suggestions to improve the quality of life of patients with type 2 DM through self care and treatment adherence (Wabe *et al.*, 2011). The lack of family support affected the motivation for effective control of type 2 diabetes mellitus, the controls including dietary pattern, physical exercise, glucose monitoring, and drug management, therefore, to increase self-care motivation, high family support was needed to improve motivation in order to do the treatment properly and to prevent complication (Powers *et al.*, 2016).

Based on the results of the study, it can be concluded that the risk of complications in type 2 diabetes mellitus decreased with lack of self-care and drug-taking adherence, high motivation, strong support of health personnel, and the risk of complications in type 2 diabetes mellitus increased with the duration of illness ≥ 5 years and high level of education.

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