Path Analysis: Factors Associated with Self Preventive Care among Patients with Type 2 Diabetes Mellitus in Surakarta

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ABSTRACT

Background: Patients with diabetes have an increased risk of morbidity and mortality from several conditions, such as cardiovascular, cerebrovascular, or kidney diseases and heart failure. In addition, economic analysis indicates that mean total costs associated with microvascular complications have almost doubled compared with those for patients without these complications. This study aimed to analyze factors associated with self preventive care among patients with type 2 diabetes mellitus in Surakarta, using a path analysis model.

Subjects and Method: A cross sectional study was conducted at Dr. Moewardi Hospital, Surakarta, Central Java, from March to April 2018. A sample of 200 type DM patients was selected by total sampling. The dependent variable was self preventive care. The independent variables were perceived severity, susceptibility, threat, benefit, cues to action, self efficacy, attitude, and family support. The data were collected by questionnaire and analyzed by path analysis.

Results: Self preventive care directly increased with perceived threat (b= 3.21; 95% CI= 1.98 to 4.44; p<0.001), perceived benefit (OR= 0.68; 95% CI= -0.11 to 1.47; p=0.092), and self efficacy (OR= 0.14; 95% CI= 0.01 to 0.26; p=0.029). Self preventive care was indirectly associated with perceived severity, attitude, family support, and cues to action.

Conclusion: Self preventive care directly increases with perceived threat, perceived benefit, and self efficacy, and is indirectly associated with perceived severity, attitude, family support, and cues to action.

Keywords: type 2 diabetes mellitus, self preventive care, Health Belief Model

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BACKGROUND

The percentage of deaths due to diabetes mellitus in 2015 is the second highest disease in Indonesia after Sri Lanka for Southeast Asia (International Diabetic Ferderation, 2015). The number of people with diabetes mellitus in the world reached 422 million people including one in three adults over 18 years of age who are overweight (WHO, 2016).

According to International Diabetic Ferderation (IDF) (2017), Indonesia is the 7th country with DM patients of 10 million after China, India and the United States, Brazil, Russia, Mexico and diabetes complications is the third leading cause of death in Indonesia.

Diabetes mellitus is the second largest non-communicable disease in Central Java, which is 16.42% (Central Java Provincial Health Office, 2015). Dr. Moewardi hospital is one of the largest referral hospitals in Central Java located in of Surakarta.

Every year, patients with diabetes mellitus have increase, data on the number of patients with type 2 DM inpatients in 2016 was 2,882 patients and outpatients were about 5,763. In 2017, type 2 DM

patients from January to October 2017, the number of inpatients was 2,399 patients and outpatients were 3,857 patients (Medical record of Dr. Moewardi hospital, 2017).

DM disease progresses slowly and progressively so there is no early detection because of the clinical features experienced by patients such as trias diabetes mellitus, ie polyuria (frequent urination), drinking and eating lots. Diabetes control efforts aimed at preventing microvascular and macrovascular complications.

According to Perkeni (2015), complications from DM can be minimized by controlling the four pillars to support the improvement of quality of life that is education, food planning, sports, and treatment planning. Self-care supports the management of diabetes mellitus health programs, because DM requires ongoing medical supervision and self-care education in patients (Rembang et al., 2017).

The goal of DM treatment will be successful if diabetes management is performed on the patient's ability to initiate and act independently through self-care activities. The ability and habits of DM patients in proper self-care will significantly affect productivity and quality of life (Rantung et al., 2015).

The purpose of this study is to find out the health belief model with self-care behavior in patients with type 2 diabetes in Dr.MoewardiHospital, Surakarta.

SUBJECTS AND METHOD

1. Study Design
This was an analytic observational study with a cross sectional design. The study was conducted at Dr. Moewardi hospital, Surakarta, Central Java.

2. Population and Samples
The target population in the study was all patients of Type 2 DM in Dr. Moewardi Hospital, Surakarta in the period of March to April 2018. A sample of 200 patients was selected for this study by total sampling.

3. Study Variables
The independent variables in this study are the perception of severity, perception of vulnerability, perception of threat, perception of benefits, cues of action, self-efficacy, attitude, and family support. The dependent variable in this study is self-care.

4. Operational Definition of Variables
Perceived severity was defined as the feeling or perception of the severity of diabetes mellitus. If DM is not treated properly, it will cause the illness worse. The data was measured by questionnaire. The measurement scale was continuous, but for the purpose of data analysis, it was transformed into dichotomous.

Perceptions of vulnerability were defined as views or perceptions of a person about the risk of vulnerability itself about diabetes mellitus. The data were measured by questionnaire. The measurement scale was continuous, but for the purpose of data analysis, it was transformed into dichotomous.

Perceptions of threat were defined as the feelings or perceptions of a person which are the result of not taking any precautions or healing. The data were measured by questionnaire. The measurement scale was continuous, but for the purpose of data analysis, it was transformed into dichotomous.

Perceived benefit was defined as person's feelings or perceptions about perceivedbenefits in performing self-care behavior. The data were measured by questionnaire. The measurement scale was continuous, but for the purpose of data analysis, it was transformed into dichotomous.

Cues to action were media, people, or events that drive people to change the behavior in the treatment of diabetes mellitus. The data were measured by question-

naire. The measurement scale was continuous, but for the purpose of data analysis, it was transformed into dichotomous.

Self-efficacy was defined as one's belief in doing self-care behavior of diabetes melitus. The data were measured by questionnaire. The measurement scale was continuous, but for the purpose of data analysis, it was transformed into dichotomous.

Attitude was defined as the tendency of a person in doing or responding to self-care behavior diabetes mellitus. The data were measured by questionnaire. The measurement scale was continuous, but for the purpose of data analysis, it was transformed into dichotomous.

Family support was defined as a familyencouragement that affects self-care behavior of diabetes mellitus that includes emotional, financial, instrumental, and information support. The data were measured by questionnaire. The measurement scale was continuous, but for the purpose of data analysis, it was transformed into dichotomous.

Self-care behavior was defined as a self-care behavior of diabetes mellitus patients consisting of monitoring blood sugar, maintaining diet, regular exercise, having adequate rest, not smoking, and avoiding stress. The data were measured by questionnaire. The measurement scale was continuous, but for the purpose of data analysis, it was transformed into dichotomous.

5. Data Analysis

Univariate analysis aims to explain and describe the characteristics of each research variable based on primary and secondary data. Bivariate analysis was done to study self-care relationship with the independent variable by using chi square test and calculation of odds ratio (OR) with level of trust (CI) equal to 95%. The data analysis was done using path analysis to know the direct or indirect influence of variable.

6. Research Ethics

The research ethics of this study include informed consent, anonymity, confidentiality and ethical clearance. The ethical clearance in the study was conducted at Dr. Moewardihospital Surakarta with number: 450/ IV/ HREC/ 2018.

RESULTS

1. Study Subjects Characteristics

The frequency distribution of study subject characteristics is described in Table 1.

Table1. Subjects Distribution

Characteristics	n	%
Education		
<SHS	98	49
>SHS	102	51
Perceived severity		
Low	93	46.5
High	107	53.5
Perceived vulnerability		
Low	75	37.5
High	125	62.5
Perceived threat		
Low	62	31
High	138	69
Perceived benefit		
Low	88	44
High	112	112
Cues to Action		
Low	72	36
High	128	64
Self-efficacy		
Weak	82	41
Strong	118	59
Attitude		
Low	35	17.5
High	165	82.5
Family support		
Low	75	37.5
High	125	62.5
Self-care		
Low	98	49
High	102	51

2. Path Analysis

Path analysis model results the number of observed variables were 9, including 3 endogenous variables and 6 exogenous variables. Degree of freedom (df)= 28 shows that the path analysis is over identified. Path analysis model was depicted in Figure 1.

Table 2 shows a positive association between perceived threat and preventive care among patients with type 2 diabetes mellitus. Strong perceived increased preventive care in patients with type 2 DM (b= 3.21; 95% CI= 1.99 to 4.43; p<0.001).

There was a positive association between perceived benefit and preventive care among patients with type 2 diabetes mellitus. Strong perceived benefit increased preventive care in patients with type 2 DM (b= 0.68; 95% CI= -1.11 to 1.47; p= 0.092).

There was a positive association between self-efficacy and preventive care among patients with type 2 diabetes mellitus. Strong self-efficacy increased preventive care in patients with type 2 DM (b= 0.14; 95% CI= 0.014 to 0.26; p= 0.029).

Tabel 2. Path analysis results of factors associated with self care behavior in type 2 diabetes mellitus

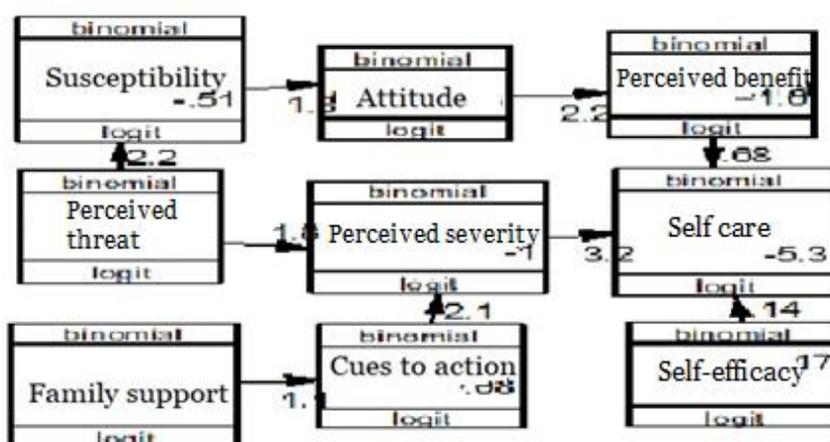| Dependent variable		Independent variable	b	95% CI		p
				Lower Limit	Upper Limit	
Direct Effect						
Self care behavior	←	Perceived threat	3.21	1.98	4.43	<0.001
Self care behavior	←	Perceived benefit	0.68	-0.11	1.47	0.092
Self care behavior	←	Self efficacy	0.14	0.01	0.26	0.029
Indirect Effect						
Perceived threat	←	Perceived severity	1.82	0.94	2.70	<0.001
Perceived threat	←	Cues to action	2.05	1.24	2.86	<0.001
Perceived threat	←	Perceived threat	2.16	1.50	2.84	<0.001
Perceived benefit	←	Attitude	2.16	1.23	3.10	<0.001
Attitude	←	Perceived susceptibility	1.82	0.97	2.68	<0.001
Cues to action	←	Family support	1.11	0.50	1.71	<0.001
N observasi =200						
Log likelihood= -609.01						

Figure 1. Structural Model of Path Analysis with Estimate

There was a positive association between perceived severity and perceived threat. Strong perceived severity increased perceived threat (b= 1.82; 95% CI= 0.94 to 3.70; p<0.001).

There was a positive association between cues to action and perceived threat. High cues to action increased perceived threat (b= 2.05; 95% CI= 1.240 to 2.863; p<0.001).

There was a positive association between perceived severity and perceived susceptibility. Strong perceived severity increased perceived threat (b= 2.17; 95% CI= 1.50 to 2.84; p<0.001).

There was a positive association between attitude and perceived benefits. Positive attitude increased perceived benefit (b= 2.16; 95% CI= 1.23 to 3.10; p<0.001).

There was a positive association between perceived susceptibility and preventive care among patients with type 2 diabetes mellitus. Strong perceived susceptibility increased preventive care in patients with type 2 DM (b= 1.82; 95% CI= 0.968 to 2.680; p<0.001)

There was a positive association between family support and cues to action. Strong family support increased cues to action (b= 1.11; 95% CI= 0.50 to 1.71; p <0.001)

DISCUSSIONS
1. The effect of perceived threat on DM 2 self care

This study showed that there was a positive effect of perceived threat on preventive care in patients with type 2 DM, and it was statistically significant. The result of analysis in this study showed that people with strong perceived threat increased preventive care in patients with type 2 DM.

This was due to the first judgment felt from the perceived threat of risk, which triggered the people to assume that illness or pain was a threat. When people have a high threat, there would be a preventive behavior to prevent the severe disease or complications (Shabibi et al., 2017)

2. The effect of perceived benefit on DM self care

This study showed that there was a positive effect of perceived benefit on preventive care in patients with type 2 DM. The result of analysis in this study showed that people with high perceived benefit increased preventive care in patients with type 2 DM. Health behavior was influenced by perceived benefits. The benefit refers to the individual assessment of benefits in reducing the risk of complications. If someone believed that a particular action could reduce the susceptibility to the problem and decrease the severity, they would engage in the preventive behavior. For example, a person who believed that reducing salt could help in managing and reducing the risk of hypertension would be more likely to obey than someone who did not believe in the benefit of salt (Onoruoiza et al., 2015).

3. The effect of self efficacy on DM 2 self care

This study showed that there was a positive effect of self efficacy on preventive care in patients with type 2 DM. The result of analysis in this study showed thatpeople with high self efficacy would increase DM 2self-care. This explained that someone who has good self-efficacy would be more obedient to the preventive behavior.

Individuals with strong self-efficacy have great expectations for the success of goal achievement, whereas individuals with low self efficacy have doubts in achieving their goals. DM patients with behavioral changes were necessary to achieve the goal of DM management such as sugar levels in normal limits.

Self-efficacy was one of the key factors for achieving behavioral change. Self-efficacy was the patient's belief in acting and behaving which in accordance with the expectations of patients and health personnel. Self-efficacy can affected behavioral change by influencing a person's thinking, self-motivation, and action (Rahman and Sukmarini, 2017).

A study by Masoompour et al. (2017), stated that self-efficacy was related to self-care behavior. Self-efficacy was the first element of DM patients in making health behavior changes and controlling blood sugar levels. People who have high self-efficacy also have better self-care behavior.

4. The effect of perceived severity on DM 2 self care.

This study showed that there was an indirect effect of perceived severity on preventive care in patients with type 2 DM through perceived threat. The results of analysis showed that people with strong perceived severity would increase perceived threat and improve DM 2 self-care.

A person who felt that pain or severity would became severe if she/he did not make any prevention and felt that it was a threat that can affect the psychological, she/he would increase the prevention efforts and became more obedient (Kugbey et al., 2017).

According to a study by Vazini and Barati (2014), perceived threats (vulnerability & severity) affected self-care behavior which mean that with the enhancement of perceived threat, self-care was also increased, perceived threats including social relations disturbances and disease severity.

5. The effect of cues to action on perceived threat

This study showed that there was an indirect effect of cues to action on DM 2 self-caret hrough perceived threat. The results of analysis showed that people with high cue to action would increase the perceived threat and improved DM 2 self-care.

Cues to action was needed to encourage individual involvement in health promotion. Cue to action can be external and internal. Physiological cues such as pain and symptoms which belong to internal cues. External cues including media and events that can change health behavior(Onoruoiza, Musa, Umar, & Kunle, 2015).

A study byBlake (2017)stated thatcues to actionwere related toDM 2 self care (p= 0.004) with the availability of information, media, and health services, it can lead to changes in behavior to improve health status.

6. The effect of perceived severity on perceived susceptibility

This study showed that there was an indirect effect of perceived severity on preventive care in patients with type 2 DM through perceived susceptibility.

The results of path analysis showed that people with high perceived severity would increase perceived susceptibility. This showed that those two perceptions were interrelated because perceived severity and perceived susceptibility could affect perceived threats that could increase DM 2 self-care (Kiti, 2018).

7. The effect of attitude on perceived benefit

This study showed that there was an indirect effect of attitude on DM 2 self-care through perceived benefit. The results of analysis showed that people with good attitude would increase perceived benefit which can improve DM 2 self-care. Behavior was influenced by perceived benefit in the form of action. Actions arised from the perceived benefits of individual assessment in reducing the risk of disease (Onoruoiza et al., 2015).

Attitudes affected the perceived benefits that could change health behavior. If a person has a good attitude and high perceived benefit, then the DM 2 self-care was also increased (Kumaat, 2017).

8. The effect of perceived susceptibility on attitude

This study showed that there was an indirect effect of perceived susceptibility on DM 2 self-care through attitude and perceived. The results of analysis showed that people with high perceived susceptibility would have high self-care.

A person with high perceived susceptibility felt that he or she was susceptible to illness or complications if he/she did not change his/her behavior. Perceived susceptibility was a subjective perception of a person from contracting to a disease that could affect the prevention of disease which influenced by a person's readiness to act (Onoruoiza et al., 2015).

Perceived susceptibility was one of the important factors in influencing behavioral and attitude changes. Susceptibility was an effective factor in behavioral changes among diabetic patients in self-care, patients should know that susceptibility might affect the susceptibility to complications of diabetes mellitus (Khorsandi et al., 2017).

9. The effect of family support on cues to action

This study showed that there was an indirect effect of family support on DM 2 self-caret hrough perceived benefit. The result of analysis showed that people with high family support would increase cues to action in order to change their health behaviors. One of the pillars in supporting behavioral changes was family. Family was the main support system for problems that occur in family members. In general, people who received the attention and help from the nearest person or group of people tend to follow medical advice than those who did not get support at all. (Prawirasatra, Wahyudi, & Nugraheni, 2017).

Support provided by families to family members who have DM could improve the quality of life. With the enhancement of DM patients' quality of life, it could increase self-confidence and DM patients could survive in suffering from DM (Mirza, 2017). DM 2 self care was directly affected by perceived threat, perceived benefits and self efficacy, and DM 2 self care was indirectly affected by perceived severity, cues to action, attitudes, perceived susceptibility, and family support.

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