The relationship between diabetes self-care management and blood glucose level among type 2 diabetes mellitus patients

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Article Info

ABSTRACT

There are still many patients with diabetes mellitus (DM) with uncontrolled blood sugar levels. Self-care was needed to control blood glucose levels. The aim of this study was to analyze the relationship between diabetes self-care management and blood sugar levels in type 2 DM (T2DM) patients. This study was used a correlational design. Data was collected from the Internal Medicine Polyclinic of William Booth Hospital Surabaya. The dependent variable was blood glucose and the independent variable was diabetes self-care management. The 99 respondents were selected using the purposive sampling technique. The inclusion criteria were patients with T2DM, the ages between 45-and 64 age years old. We used the summary of diabetes self-care activities to assess self-care management and blood sugar level was measured using a capillary blood glucose test. Chi-square was used to calculate the relationship between diabetes self-care management and blood glucose level. This study showed that most of the respondents with good diabetes self-care management had good blood sugar levels and there was a significant relationship between diabetes self-care management and blood sugar levels among T2DM patients (p<0.05). Increasing diabetes self-care management among T2DM patients was required to control blood glucose levels.

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1. INTRODUCTION

Diabetes mellitus (DM) is still a worldwide problem [1], and it was increased in developing countries [2]. Diabetes is a chronic condition due to elevated blood glucose levels due to the pancreas cannot produce insulin inadequate [2]. The insulin function was to regulate blood sugar. In addition, there are still many patients with DM with uncontrolled blood sugar levels. This condition is triggered by genetic and lifestyle factors or poor diabetes self-care management. Poor diabetes self-care management has an impact on increasing blood sugar levels [3].

Data shows that globally in the worldwide there are 425 million people or 8.8% of people who are estimated to suffer from DM. This situation is estimated to increase to 629 million people in 2045. Meanwhile, the number of people with DM in the Asia Pacific region in 2017 was 159 million people and is also expected to increase by 15% or around 183 million people in 2045 [4]. Indonesia is ranked 6th out of 10 countries with the highest number of people with DM. There were 10.3

million people suffering from DM in 2017. The prevalence of DM in Indonesia increased to 2.0% from 1.5% among those aged >15 years old. While in East Java province, people with DM have increased every year, especially in Surabaya City.

The factor that influences high blood glucose levels in patients with DM is poor diabetes self-care management [5]. Diabetes self-care management refers to patient management disease, consisting of medication adherence, diet, physical exercise, blood glucose control, foot care, and smoking cessation [6]–[8]. Self-care management enables people to prevent, recognize, and manage the disease. This condition is diminished long-term complications, increase on health outcome, quality of life, as well as well-being [9], [10].

Previous studies mentioned that diabetes self-care management can control blood sugar levels and also reduce the risk factor for complications among people with DM [9], [10] Understanding the relationship between diabetes self-care management and blood glucose level can be used as evidence for future intervention. Based on the background, the aim of this study was to analyze the relationship between diabetes self-care management and blood sugar levels in type 2 DM (T2DM) patients.

2. METHOD

This study was used a correlational design. Data were collected in October-December 2021 at the Internal Medicine Polyclinic of William Booth Hospital Surabaya. The dependent variable of this study was blood glucose and the independent variable in this study was diabetes self-care management.

The population in this study was all T2DM. The total sample in this study was 99 respondents. The respondents were selected using the purposive sampling technique. The inclusion criteria of this study were patients with T2DM, the ages between 45-and 64 age years old, and the exclusion of criteria in this study were patients who disagree to join this study and have complication such as diabetic foot ulcer (DFU). The data was collected using self report questionnaires. The demographic questionnaire was used to obtain information about age, gender, education, and occupation among respondents. The summary of diabetes self care activities was used to assess self-management in T2DM patients. The questionnaire was developed by Toobert and Glasgow and had good reliability with Cronbach alpha: 0.74 [11]. The summary of diabetes self care activities (SDCAS) had 15 items. The dimensions of this questionnaire were diet, physical exercise, blood glucose monitoring, taking medication, foot care, and smoking status. The score ranges from 0 (0 days) to 7 (seven days). Blood sugar level was measured using capillary blood glucose test [12]. Equipment used includes lancet, test strip, and glucometer. Blood glucose is measured in mg/dL (milligrams per deciliters), normal range between 110 to 180 mg/dL. We used an observation sheet to document the results of blood sugar levels.

The procedure of this study was granted by ethical clearance No. 09/STIKES-WB/ETIK/X/2021 from Stikes William Booth Surabaya, Indonesia. The data was collected after obtaining permission from the director of William Booth Surabaya, Indonesia. Respondents who agreed to join in this study must signed the informed consent. The questionnaire was delivered to respondents and they are allowed to withdraw after reading the questionnaire. All data were keyed ini SPSS. Descriptive statistic was used for all variables. Chi-square was used to calculate the relationship between diabetes self-care management and blood glucose level, with statistical significance ($p < 0.05$).

3. RESULTS AND DISCUSSION

Table 1 showed the demographic characteristic of respondents. Most of the respondents were 56-65 years old (63.6%), male (57.6%), graduated from senior high school (42.4%), and unemployed (60.6%). Table 2 showed distribution of diabetes self-care management. Most of respondents has good diabetes self-care management (54.5%), followed by moderate (36.4%) and low diabetes self-care management (9.1%). Table 3 showed that most of respondents has good blood glucose level (60.6%). Table 4 showed that the correlation between diabetes self-care management and blood glucose level. There were 94.4% respondents who have good diabetes self-care management tend to have good blood glucose level. The statistical significance values showed that there was correlation between diabetes self-care management and blood glucose level.

This study showed that most of the respondents had a good diabetes self-care management was developed from the self-care theory by Dorothea Orem [13]. One of the factors that influence diabetes self-care management is knowledge about diabetes. It refers to diet, physical activity, blood glucose control, and footcare [14]. Good knowledge will increase self-efficacy to perform self-care management, especially for glycemic control [15]. Health education for T2DM patients is needed to control blood glucose and preventing complications. This study also exhibited that most of the respondents have normal blood sugar levels. Hyperglycemia occurred when the blood glucose level more than 125 mg/dl while fasting and more than 180 mg/dl for two hours postprandial [16].

Table 1. Demographic characteristic of participants

Characteristic	Total participants	
	Frequency (n)	Percentage
Age (years old)		
46-55	36	36.4
56-65	63	63.6
Gender		
Female	42	42.4
Male	57	57.6
Education		
Out of school	3	3.0
Elementary school	18	18.2
Junior high school	24	24.2
Senior high school	42	42.4
Bachelor degree	12	12.1
Occupation		
Unemployed	60	60.6
Self-employee	9	9.1
Private sector	24	24.2
Civil servant	3	3.0
Labors	3	3.0

Table 2. Frequency distribution of diabetes self-care management

Diabetes self-care management	Frequency (f)	Percentage
Low	9	9.1
Moderate	36	36.4
Good	54	54.5
Total	99	100

Table 3. Frequency distribution of blood glucose level

Blood glucose	Frequency (f)	Percentage
Low	39	39.4
Good	60	60.6
Total	99	100

Table 4. Correlation between diabetes self-care management and blood glucose level

Diabetes self-care management	Blood glucose level				Total		
	Low		Good				
	f	%	f	%	f	%	
Low	9	100%	0	0.00%	9	100%	
Moderate	27	75%	9	25%	36	100%	p-value 0.000
Good	3	5.56%	51	94.44%	54	100%	

This study showed that most of the respondents with good diabetes self-care management had good blood sugar levels and there was a significant relationship between diabetes self-care management and blood sugar levels among T2DM patients. High blood sugar level can cause acute and serious long term complication [17]. diabetes self-care management is required to control blood glucose level among T2DM. diabetes self-care management refers to medication adherence, diet, physical exercise, blood glucose control, foot care, and smoking status [6]–[8].

One of management to control blood glucose level was dietary carbohydrate, it had effect on blood glucose level [18]. Previous study mentioned that low carbohydrate intake had effect to reduce blood sugar level among T2DM patients [19], [20]. Further, eating habits also had effect on metabolic syndrome and blood glucose level [21], [22].

Exercise is one of strategy in diabetes self-care management. It can control blood glucose levels and enhance insulin sensitivity [23]. Previous study also mentioned that physical exercise such as yoga can control glucose level among pregnant women with gestational DM [24]. Prescribed medication adherence is part of diabetes self-care management to control blood sugar. Many patients difficulty to follow the recommendation treatment [25]. Previous study mentioned that that there was a relationship between medication adherence and blood glucose levels [26]. Medication adherence in self-care is needed to prevent

complication. Self-monitoring is also required in diabetes self-care management. Self-monitoring includes blood glucose controlling, foot care, and measuring body weight [27]–[29]. Self-monitoring can reduce complications, such as diabetic foot ulcer [30]. In addition, smoking cessation also become strategy to control blood glucose level and prevent complications [31]. Some limitations in this study were considered, such as duration of disease and comorbid. Further study is needed to consider these cofounding factors. In addition, longitudinal study was needed, because this study used cross sectional design. Nevertheless, this study proved that there was a significant relationship between diabetes self-care management and blood sugar levels among T2DM patients.

4. CONCLUSION

This study showed that most of the respondents with good diabetes self-care management had good blood sugar levels and there was a significant relationship between diabetes self-care management and blood sugar levels among T2DM patients. Increasing diabetes self-care management among T2DM patients was required to control blood glucose level, such as medication adherence, diet, physical exercise, blood glucose control, foot care, and smoking cessation.

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