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The Association between Knowledge, Family Support, and Blood Sugar Level in Type 2 Diabetes Mellitus Patients

Ratna Herawati[1)], Eti Poncorini Pamungkasari[2)], Sugiarto[2)]

[1)]Masters Program in Family Medicine, Universitas Sebelas Maret
[2)]Faculty of Medicine, Universitas Sebelas Maret

ABSTRACT

Background: Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia. The incidence of DM has increased due to lack of knowledge about DM and changes in lifestyle. The purpose of this study was to analyze the relationship of knowledge about DM, family support, and blood sugar levels in type 2 DM patients in Jebres health center, Surakarta.
Subjects and Method: A cross sectional study was conducted at Sibela and Ngoresan Surakarta health center. The study subjects were 100 DM patients selected by purposive sampling. Socioeconomic data, knowledge and family support were measured by questionnaires. Blood sugar levels were measured using a spectrophotometer. The data were analyzed using a multiple logistic regression.
Results: A total of 66 DM patients had a high level of knowledge, 58 patients received strong family support, and 76 people had normal blood sugar levels. High knowledge about DM (OR= 0.87; p= 0.001) and strong family support (OR= 0.99; p= 0.017) lowered blood sugar levels in DM patients.
Conclusions: High knowledge about DM and strong family support reduce blood sugar levels in DM patients.

Keywords: knowledge about DM, family support, blood sugar level, type 2 diabetes mellitus

Correspondence:
Ratna Herawati. Masters Program in Family Medicine, Universitas Sebelas Maret. Jl. Ir Sutami 36A, Surakarta 57126, Central Java. Email: ratna_herawati_dokter@yahoo.co.id.

BACKGROUND

Diabetes mellitus is a group of metabolic diseases with characteristics of hyperglycemia that occur due to abnormalities in insulin secretion, insulin action or both (Corwin, 2015). Data from the World Health Organization (WHO) revealed that the global burden of diabetes mellitus in 2000 was 135 million, this burden will continue to increase. In 2030, it was estimated that Indonesia would have 21.3 million people with diabetes mellitus (MOH, 2012). An increase in the number of diabetes mellituspatients is caused by a lack of knowledge of the management of diabetes mellitus (Basuki, 2009).

Diabetes mellitus is a disease related to lifestyle. Socioeconomic factors are factors that influence lifestyle. Communities with middle and upper economies have a lifestyle that can lead to obesity, where it can cause degenerative diseases, one of them is diabetes mellitus (Hoesada, 2012; Suiroka, 2012). Occupation, in addition to dealing with income, is also related to the main activities carried out daily by diabetes mellitus patients. Activity will produce energy expenditure. Doing some activities will affect blood sugar levels (Inyang, 2015).

Diabetes mellitus is a chronic disease that cannot be cured but is very potential to be prevented and controlled through the 4 pillars of diabetes mellitus management which include education, diet, exercise, and

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treatment therapy. Diet which is one of diabetes mellitus therapy aims to help patients improve eating habits, so it can control glucose levels. The main obstacle in handling diabetes mellitus diet is the saturation of patients in following a diet therapy that is indispensable to achieve success (Lopulalan, 2010). The role of the family greatly influences the diet compliance, non-compliance with the diabetes mellitusdiet will lead to complications that will eventually aggravate the disease even cause death, so that the active role of health personnel is needed to provide information about diabetes mellitus to patients and their families so that families can provide motivation for diabetes mellitus patients to always carry out the diabetes mellitus diet (Misnadiarly, 2014; Setiadi, 2010; Rifki, 2012).

A preliminary study conducted by researchers in Jebres Surakarta sub-district showed that residents in the sub-district of Jebres were on the socioeconomic level of the middle to lower class. It also showed the fact that the information provided by health personnel so far is the target of diabetes mellitus patients, not families of diabetes mellitus patients. This shows the lack of information given to the families of diabetes mellitus patients, even though the role of the family is needed in the treatment of Diabetes Mellitus patients, especially in diet implementation.

The purpose of this study is to analyze the relationship between socioeconomic factors, patient knowledge and family support with blood sugar levels in type 2 diabetes mellitus patients in Jebres sub-district health center Surakarta.

SUBJECTS AND METHOD

1. Study Design

This was a cross sectional study conducted at Sibela Mojosongo and Ngoresan community health centers, Jebres, Surakarta, Central Java, from November 2017 to January 2018.

2. Population and Samples

The study population was all Diabetes Mellitus patients who visited Sibela and Ngoresan Health Centers. The sampling technique was purposive sampling.

Inclusion Criteria:

1. Diabetes mellitus patients who approve informed consent
2. Diagnosed with type 2 diabetes
3. Aged 35-70 years
4. Diabetes mellitus patients who take routine medication
5. Diabetes mellitus patients who still have a family (husband/wife/ child)

Exclusion Criteria:

1. Diabetes mellitus patients who can not read and write
2. Diabetes mellitus patients who are first diagnosed with diabetes mellitus
3. Diabetes mellitus patients with other diseases (stroke, heart, kidney failure who routinely do hemodialysis).

3. Operational Definition of Variables

Socio-economic factors were factors that determine the level of one's position in society, including socio-economic, income, education and work activities.

Income was all income earned by the family, in the form of money. The data were collected by questionnaires. The measurement scale was continuous, but for the purpose of data analysis, it was transformed into a dichotomy, low for Rp 1,650,000 and high for >Rp 1,650,000.

Occupation was the main activity carried out by the study subject. The data were measured by physical activity index when working according to Baecke et al. (2014). The measurement scale was continuous, but for the purpose of data analysis, it was transformed into a dichotomy, low for 1251.67 and high activity >251.67.

Education was a learning process for individual to achieve higher knowledge and understanding of certain object. The measurement scale was categorical, coded 0 for <senior high school and 1 for ≥senior high school.

Knowledge about Diabetes Mellitus was defined as an understanding and knowledge of Diabetes Mellitus patients about the Diabetes Mellitus disease. The measurement scale was continuous, but for the purpose of data analysis, it was transformed into a dichotomy, score <89.47 and good knowledge if ≥89.47.

Family support was family involvement (husband/wife/child) in the daily care. Family support in this study was the patient's perception of family involvement in daily diabetes mellituscare, especially those related to diet. The support includes emotional, appreciation, information, and instrumental supports. Continuous measurement scale, for the purposes of data analysis, was changed to a dichotomy. The family support was lacking if the score was<216.29 and family support is good if the score was 16216.29.

Blood sugar levels were fasting blood sugar levels in people with diabetes mellitus. Blood sugar levels were measured using a spectrophotometer. The measurement data was continuous, for the purposes of data analysis it was converted into a dichotomy, code 0 for GDP levels GDP126 mg/dl and 1 for GDP level <126 mg/dl.

The instrument test was conducted on 30 people with diabetes mellitus from other health centers with the same characteristics. Validity test results for questionnaires about knowledge, from 20 questions, there were 15 valid questions. Valid questions were followed by the reliability testing. Reliability test results result in r alpha= 0.92. This shows that the question has been reliable.

Validity test results for work activeties, from 8 statements for work activities, there are 6 valid statements. Reliability test results show that the value of r= 0.647. This shows that the the questionnaire has been reliable (r> 0.06).

Validity test results for family support, out of 20 statements for family support, there were 17 valid statements. Reliability test results showed the value of r= 0.890. This shows that the statements for the family support questionnaire were reliable.

4. Research Ethics

Research has been conducted with the number of ethical health: 1.021/XI/HREC/-2017.

RESULTS

From the characteristic of the data, the majority of diabetes mellitus patients were female, which were 69 people (69%), and the male was 31 people (31%). The age of those who suffer the most from diabetes mellitus was more than 40 years old, which were 96 people (96%) while those who were less than 40 years old were 40 people (4%).Most of the respondents, which were 55 people (55%) suffered from diabetes mellitus for less than 5 years, and 16 people (16%) suffered from diabetes mellitus for more than 10 years. Most of the diabetes mellitus patients were housewives, which were 42 people (42%), including entrepreneurs were 20 people (20%), employees of 14 people (14%), unemployed were 11 (11%), factory workers were 9 people (9%), farmers of 3 people (3%), and 1 civil servant (1%).

Table 3 showed the results of multiple logistic regression analysis. Table 3 showed that high education (OR= 0.66; 95% CI= 0.09 to 4.42; p= 0.767), income (OR= 0.78; 95% CI= 0.21 to 2.98; p= 0.718), work activity (OR= 0.99; 95% CI= 0.99 to 1.01; p= 0.540) reduced blood sugar level among

type 2 DM patients, but they were statistically non-significant. High knowledge about DM (OR= 0.87; 95% CI= 0.81 to 0.92; p= 0.001), and strong family support (OR= 0.99; 95% CI= 0.99 to 1.01; p= 0.042) reduced blood sugar level amon type 2 DM patients and statistically significant.

Table 1. The Results of Multiple Logistic Regression Analysis on the Relationship of Knowledge, Family Support, and Blood Sugar Level among Type 2 DM Patients

Variables	OR	95% CI		p
		Lower Limit	Upper Limit	
High Education	0.66	0.09	4.42	0.676
Income	0.78	0.21	2.98	0.718
High Work Activities	0.99	0.99	1.01	0.540
High Knowledge about DM	0.87	0.81	0.92	0.001
Strong Family Support	0.99	0.99	1.01	0.042
Constants	0.71			710.11

DISCUSSIONS

1. Association between Income and Blood Sugar Level in Type 2 DM Patients

From the result of this study, it showed that most of the respondents have low income (52%). According to Basic Health Research (2015), the enhancement of DM incident was due lifestyle changes, in people who have high income, there would be a lifestyle changes, especially in terms of food consumption, where the food consumed contained a lot of saturated fat and sugar. This could lead to obesity which would cause changes in disease patterns, one of them was the increased incidence of diabetes mellitus (Suiraoka, 2012).

It can be assumed that food intake was not the only factor that played a role in controlling blood sugar levels. Another factor that affected blood sugar levels was drug and exercise therapy (Sudoyo, 2014). The result of this study was different from the study by Isfaizah (2017), which stated that there was a relationship between family income and the control of blood sugar levels. This can be different because in that study, the control of blood sugar levels was based on HbA1c levels, whereas in this study, blood sugar levels was based on fasting blood sugar levels.

2. Association between Education and Blood Sugar Level in Type 2 DM Patients

From the result of this study, it showed that most of the respondents have low level of education (88%). Education would affect the learning process, so that the higher the education, the more people would receive the information and it would increase the knowledge. By having good knowledge, it would form the belief, therefore, people would behave according to those beliefs (Istiari, 2012). The lower the level of education, the lower the awareness in health, which would lead to poor health status (Brown et al, 2004).

Based on the data analysis by using logistic regression test, the score of p= 0.676, this showed that there was no meaningful relationship between education and blood sugar level among type 2 diabetes mellitus patients. The result of this study was in accordance with a study done by Astari (2016) which stated that there was no relationship between level of education and the level of fasting blood sugar, with the score of p= 0.509.

It can be assumed that education was not the only factor which affect the mindset that can affect the behavior changes, especially health behavior in diabetes mellitus patients. Other factors that could affect the mindset were experiences, the surrounding environment, and also social cultural factors in diabetes mellitus patients (Wawan and Dewi, 2010).

3. Association between Work Activity and Blood Sugar Level in Type 2 DM Patients

From the result of this study, it showed that respondents who have work with easy activities were 52 people (52%). Low physical activity in a day should be avoided, because one of the diabetes mellitus management was an enhancement in physical activity or exercise. Physical activity would affect insulin receptor sensitivity, because during physical activity, the capillary mesh would open so that it produced more insulin, and insulin receptors became more active (Yunir and Soebardi, 2012).

Based on data analysis by using logistic regression test, the score of p= 0.540, showed that there was no meaningful relationship between work activity and blood sugar levels among patients withtype 2diabetes mellitus. The result of this study was in line with a study done by Abidah (2014) which stated that there was no meaningful relationship between physical activity and fasting blood sugar levels, and with p score= 0.771.

It can be assumed that daily physical activity was not included in physical activity, one of the kinds of physical activity was exercise. Although daily activities were not included in physical activity, diabetes mellitus patients were still recommended to be active every day and avoid sedentary behavior (Yunir and Soebardi, 2014).

The result of this study on socio-economic factors was in accordance with a study conducted by Edriani (2012), which stated that there was no relationship between social economic factor and blood sugar level. In a study done by Edriani (2012), social economic factors were education (p= 0.068) employment (p= 0.158) and marital status (p= 0.581), while in this study, the social economic factors include income, education, and activity at work. A study done by Edriani (2012) analyzed the employment factor based on employed and unemployed, while in this study, it analyzed the employment based on the activities at work.

4. Association between Knowledge about DM and Blood Sugar Level in Type 2 DM Patients

Knowledge was a very important factor to form certain beliefs, so that someone would behave according to those beliefs (Istiari, 2012). If someone has good knowledge about health, then she/he would try to minimize or avoid the occurrence of disease. Behavior which was based on knowledge would be more lasting than behavior which was not based on knowledge (Wawan and Dewi, 2010).

Based on the data analysis, patients' knowledge showed the results that most respondents (66%) have good knowledge. Based on the data analysis by using logistic regression test, the score of OR= 0.87; p= 0.001, this showed that type 2 diabetes mellitus patients who have lack of knowledge were 0.8 time more likely to have high level of blood sugar compared to type 2 diabetes mellitus patients who have good knowledge, and there was a meaningful relationship between the knowledge of type 2 diabetes mellitus patients and blood sugar level. Good respondent's knowledge about diabetes mellitus disease could be obtain through experiences or information obtained from mass media such as newspapers, magazines, and television. Informa-

tion can also be obtained from health personnels.

The result of this study was in line with a study done by Nanang (2016) which stated that there was a relationship between knowledge and controlled blood sugar levels (p= 0,017). However, the result of this study was not in accordance with a study conducted by Liswati (2014) which stated that there was no relationship between the knowledge of diabetes mellitus management and the control of blood sugar levels (p= 0.797). The results of this study were different because in the study conducted by Liswati, one of the inclusion criteria was that the diabetes mellitus patients had received nutritional counseling/ education at least 1 time during diabetes mellitus diagnosis.

a. Family Support

According to Setiadi (2010), family support which consisted of instrumental, information, appreciation, and emotional supports was a factor that could support the improvement of health status. Niven (2012) stated that family support, especially in the form of emotional support from other family members was an important factor in determining the compliance of the program. Families could help in reducing the ignorance and disobedience to the diet, and families could become a supporting group to achieve the adherence to the diet (Setiadi, 2010).

The recent study showed that type 2 diabetes mellitus patients with strong family support were 0.9 times less likely to had high blood sugar level than type 2 diabetes mellitus patients with weak family support (OR= 0.99; p= 0.042). The result of this study was in line with a study done by Pebriantini (2014) which stated that there was a relationship between family support and fasting blood sugar levels in type 2 diabetes mellitus patients.

As stated by Friedman et al. (2016) family support was the most important source of assistance in helping family members to change their lifestyle. According to Perkeni (2015), an increase in the incidence of diabetes mellitus was related to lifestyle, therefore, family support was needed to overcome this problem.

Based on the descriptions above, it can be concluded that diabetes mellitus patients who have good family support would also have good behavior in terms of maintaining the compliance on the diet. This was supported by a statement of McMurray (2013) which stated that family support was a factor that could affect a person's behavior and lifestyle so that it could have an impact on health status and quality of life.

The role of the family was expected to provide support and motivation for diabetes mellitus patients in optimizing their lives, such as adhering to a diet, doing physical exercise, routinely taking drugs, and controlling blood sugar levels.

Fasting blood sugar levels in type 2 diabetes mellitus patients were mostly good, which were 76 patients. Blood sugar levels in diabetes mellitus patients were controlled by regulating the food, exercising, and taking recommended drugs. With normal blood sugar levels, the diabetes mellitus patients could have normal lives (Suharyanto, 2009).

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