Family Support as a Moderator to the Relationship between Knowledge and Diabetes Mellitus Dietary Compliance

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Keywords: Family, Knowledge, Moderator, Diabetes Mellitus.

Abstract: Diabetes Mellitus (DM) patients need to have sufficient knowledge about the disease to regulate the diet. However, many people with DM still break the diet rules although the doctors have explained the disease. This study aims to analyze whether family support acts as moderator variable in the relationship between knowledge and DM dietary compliance in a district of Garut. Garut district is located in West Java Province and has a high number of DM patients and embraces a strong Sundanese culture with strong family's bond. This research used quantitative method with data collected from 32 people with DM in Garut regency. Multiple Regression Analysis (MRA) used to analyze data. The results of this study indicate that both knowledge of disease and family support were able to tend diabetic dietary compliance partially, but family support increased the tendency significantly ($p < 0.05$). Thus, family support moderated the relationship between knowledge of disease and DM dietary compliance. The culture of family's bond namely *silih asah, asih, asuh* wrapped in the community needs to be more widely socialized to increase dietary compliance people with DM.

1 INTRODUCTION

Diabetes Mellitus (DM) is a chronic metabolic disease in digesting carbohydrates. This disease is caused by the body's inability to produce the hormone insulin as needed or the ineffective use of insulin. It is characterized by high blood sugar levels or hyperglycemia (Association, 2014). DM is caused by damage to synthesis in pancreatic beta cells or insulin secretion, or tissue inability to use insulin.

The disease is divided into several types: type 1, type 2 DM, DM gestational and other types of DM (Association, 2014). Type 2 DM is most commonly afflicted by the world population (Brethauer et al., 2013). Type 2 DM is a DM caused by disruption of insulin secretion and insulin resistance. Insulin is a hormone released by the pancreas gland, serves to metabolize blood glucose into cells, energizes and is responsible for maintaining blood glucose levels to normal (Rosengren et al., 2012). The pancreas is the largest endocrine gland in the human abdominal cavity.

Diabetes is a degenerative disease whose prevalence continues to increase. WHO predicts that diabetes will be the top 7 diseases that will cause death in 2030. Every 10 seconds, DM causes the death of one person. International Diabetes Federation (IDF) estimates that there will be an increase of 7 million people per year (Borhani et al., 2015; Jiang et al., 2012).

DM includes diseases classified as "lifelong disease" because the disease is experienced by patients throughout their ages. The risk of complications that can cause death can be reduced if people with DM improve lifestyle, especially diet. Chronic hyperglycemia DM causes long-term damage in the form of dysfunction and failure of various organs of the body, especially the eyes, kidneys, nerves, heart, and blood vessels (Cubbon et al., 2013). Recent studies have even suggested high blood sugar levels increase the risk of cancer in patients with DM (Cohen and LeRoith, 2012). Therefore, blood glucose guarding becomes the main control to maintain long-term body.

Compliance in health sciences is defined as the extent to which the patient's behavior takes medication, runs lifestyle changes, undergoes medical tests or maintains an appointment with the physician according to the healthcare provider's recommendations (Khan et al., 2012). Thus the compliance to the DM diet is how DM patients follow meal schedules, portions, suggestions, and

avoid foods and beverages that are prohibited according to the pathogenesis of DM.

In contrast to patients with type I diabetes DM who has been diagnosed since childhood, people with type II diabetes do not immediately get insulin injections. Therefore, behavioral adherence to maintain the diet becomes the main thing for people with diabetes mellitus type II to be able to control blood sugar levels to be stable and prevent complications. As a result, to this, in the DM nursing service standard, knowledge sharing is given to improve the independence of DM patients in maintaining the stability of blood glucose through diet. Nevertheless, despite gaining knowledge, many DM patients who are in the middle-aged adults often ignore adherence to the DM diet (Hernández-Ronquillo et al., 2003; Khan et al., 2012).

Data show 1 in 5 middle adult suffer DM. Effective management of adult DM patients is more emphasized in the prevention of diabetes complications, early treatment, vascular disease control, functional assessment of disability due to injury to limbs, eye disease, and stroke. The middle-aged adults are characterized by physical and mental changes. In that age range there is usually a decrease in physical strength followed by memory loss, decreased sensitivity to pain, and increased emotional sensitivity. In addition, when reaching old age psychic problems such as cognitive dysfunction, dependence on others, self-distrust, and depression may happen (Sinclair et al., 2012).

In a preliminary observation, we found high adherence rates in middle-age adults of DM in Garut, West Java, Indonesia. On the other hand, Garut regency is famous for its unique food that is very sweet, made from glutinous flour and sugar with high concentration, known as "*dodol*". This condition is like a contradiction, because the population of Garut Regency that produces "*dodol*" but DM patients have high diet compliance. This is what attracts researchers to analyze more deeply whether the DM knowledge relationship with diet compliance is moderated by family support.

2 METHODS

This research uses non-experimental quantitative method with cross sectional approach. Acting as an independent variable is DM knowledge and family support. The dependent variable in this research is DM dietary compliance. The subjects of this study were 32 patients with type II DM with inclusion criteria, such as middle-aged adults aged 45-64 years

(Dogra and Stathokostas, 2012), living with family in Garut, diagnosed with type 2 DM for more than six months, and having a good level of consciousness.

This study used three questionnaires which consist of 26 item DM compliance questionnaire, 26 item knowledge questionnaire, and 26 item family support questionnaire which is a modification of Hensarling Diabetes Family Support Scale (Hensarling, 2009). Family support consists of informative support for diabetic wound care, emotional support providing serenity, award support, instrumental support for exercise, assisting in the control of health care.

The scale used is the Likert scale with 4 ratings: "Strongly Agree, Agree, Disagree, and Strongly Disagree". Instruments used by researchers have passed the test of validity and reliability.

The respondents' characteristics of sex, age, and level of education are explained descriptively. Multiple linear regression test is used to analyze the influence of knowledge factor and family support to DM diet compliance.

3 RESULTS AND DISCUSSION

3.1 The Characteristics of the Respondents

The characteristics of the respondents in this study include age, gender, and education background, and duration suffering from DM. The age range of the respondents of the patients is divided into two categories, namely age 45-54 years (46%), and 55-64 years (54%). Based on gender characteristics, most of the respondents are female (60%) and male (40%).
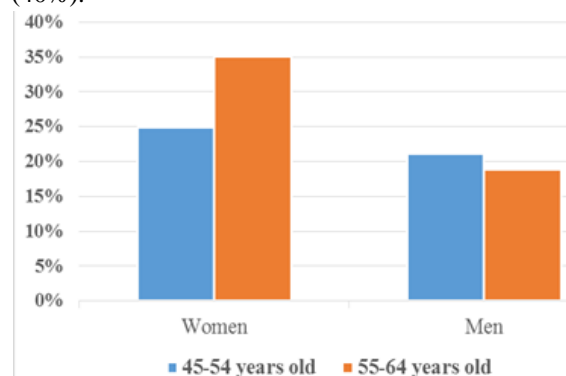

Figure 1: Age Characteristics.

From the respondent's level of education, it is found that most of the respondents have low level of education (No school, elementary) that is equal to 66.5%, middle education level (junior high school) 23% and higher education level (Diploma) by 10.5%. Most respondents (69%) who have low education level are female.

3.1.1 The Relationship among Variables

To know the influence of knowledge and family support to DM dietary compliance, the multiple regression analysis presented there is Table 1 below.

Table 1: The Results of Multiple Regression.

Model	Unstandardized Coefficients		Standar-dized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-5.746	4.321		-1.330	.194
Knowledge of DM Disease	.213	.084	.171	2.529	.017
Family support	.863	.070	.836	12.360	.000

Dependent Variable: DM Diet Compliance

Statistical analysis of research data resulted in multiple regression equation:

$$Y = -5.746 + 0.213X_1 + 0.863X_2 \qquad (1)$$

Note:

Y = DM Diet Compliance
X_1 = Level of Knowledge about DM
X_2 = Family Support

From table 1, it appears that the value of t count of knowledge is 2.53, higher than t table 2.05. This means there is a separate influence between knowledge of DM dieting compliance.

The value of t counts for family support (12.35) is greater than t table (2.05) and higher than t value for knowledge. This means that the higher the family support, the higher the DM diet compliance.

Based on statistical calculations using SPSS, the R Square Change is 0.94. This means the percentage contribution of knowledge influence together family support to DM diet compliance 94.2%, the rest is influenced by other factors. The effect of the combination of knowledge and family support can be seen in Table 2.

Table 2: The Analysis of the Influence of Knowledge and Family Support.

ANOVA[b]					
Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	4881.080	2	2440.540	236.080	.000[a]
Residual	299.795	29	10.338		
Total	5180.875	31			

a. Predictors: (Constant), Family support, Knowledge of DM Disease
b. Dependent Variable: DM Diet Compliance

By using the 95% confidence level, α = 5%, it is obtained that F table = 3.328. F count > F table with 0.000 significance. This means that shared knowledge of family support has a very significant effect on DM dieting compliance.

3.2 Discussion

The results of this study indicate that the level of knowledge and family support partially influence on diet compliance significantly. The combination of knowledge and family support together accounted for 94.2% percentage of DM diet compliance, the rest of which is 5.8% determined by something else.

The knowledge of DM disease increases DM diet compliance on the respondents. The results of this study are in line with Omar's research that middle age and older age have a good knowledge of DM that impact on good compliance as well (Omar and San, 2014). There are about 66.5% of respondents having low education, but having good knowledge of DM. Based on the interviews, it was found that the approaches and methods used by health and nursing counselors in explaining the use of local languages are easily understood by the respondents and provide more comfort. Thus, although most formal education is low, they have good knowledge of DM.

The results of this study found that family support increased the influence of knowledge on diet compliance. According to Keogh et al, family support is influenced by the illness of the perception of family members (Keogh et al., 2007). Family support can improve behavior and healthy lifestyle due to the accumulation of positive effects of good interpersonal experience experienced by family members in this case DM patients.

The results of this study are also in line with research Wysocki and colleagues who argued that family support through Behavioral family systems therapy (BFST) improve blood glucose metabolism of patients with DM (Wysocki et al., 2006). This

study is also in line with the Mayberry and Osborn research that suggests family support increases personal health care behavior of patients with DM (Mayberry and Osborn, 2012).

DM family support is very important especially the provision of food according to the DM diet, award support in the form of reminding respondents to check their blood sugar levels, and support for resolving problems of respondents. This is in line with the study by Epple et al who studied the preservation of blood glucose and blood lipids in patients with DM with good family support (Epple et al., 2003). In the study, culture of eating habits in an area affect the type of family support in choosing food for patients with DM and family.

What is interesting in this research is Garut regency is a region famous for culinary attractions "*dodol*" and "wajit", both a very sweet food made from glutinous flour and sugar with high concentration. If it refers to the culture of eating habits, then environmental factors in Garut district less support the compliance of diet DM patients. But the results of this study showed that the family strives not to serve the sweet foods that become uniqueness of their area at home. This is supported by the culture of "*silih asah, asih, asuh*" (the concept of broadening knowledge and help each other) inherited from generation to generation in this area.

The results of the study in Mexico suggest that non-adherence to the DM diet is influenced by motivation (87%) and the environment (13%) (Hernández-Ronquillo et al., 2003). On the other hand Schlundt et al stated that the influence of motivation by 19% and environment 46% (Hernández-Ronquillo et al., 2003). The most influential environmental factor is the family factor. Keogh et al states from the results of his research that the element of family support that affects compliance is the illness of the perception of family members (Keogh et al., 2007). In this study, based on interviews to family members of patients with DM, they understand the dangers that will be accepted by patients with DM if they are not disciplined under the DM diet. This prompted them to refrain from presenting and not eating the sweet "*dodol*" food that became their distinctive regional icon in the house. The family put forward a high empathy tradition in DM patients through the culture of "*silih asah, asih, and asuh*". *Silih asah* means sharpening each other's mind and reminding each other. Foster care means caring for each other and guiding each other. *Silih Asih* means to love each other among family members of DM patients. One

form is high solidarity to serve only low-sugar foods in the home.

Culture is the knowledge, beliefs, customs, and habits that a group of people possess. Culture is a learned behaviour, then passed down from generation to generation. Culture is one of the factors affecting locus of control, as in western and eastern cultures. In general, western culture is more on internal control, while eastern culture is more on external control. In chronic illness, the patient is considered as a decision maker and compliance as a result of the decision process. In general, people who feel the consolation, attention and helped by a person or group usually tend to more easily adhere to medical advice, than patients who lack social support from their closest people. Thus, advice, motivation, attention, direction, food conditioning given by the family are responded well by people with DM.

4 CONCLUSIONS

The results of this study indicate that family support increases the influence of knowledge on dietary adherence. Families need to be involved in daily DM patients. Preserving culture in family that fosters each other within the family of DM patients in Garut improves DM diet compliance in the high temptation of prohibited food diet.

ACKNOWLEDGEMENTS

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