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Effects of Family Function on Blood Sugar Control in Patients with Type 2 Diabetes Mellitus

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ABSTRACT

Background: A long term treatment can happen for patients with diabetes mellitus (DM), which can negatively affect their lives and their families. Family support is an important factor to help them adapt to their DM and maintain their self-management. Doctors must assess family function of the patients with DM during their treatment. **Objective:** This study aimed to observe the effects of family function on blood sugar control in type 2 DM patients who were included in PROLANIS (chronic disease management program) at Puskesmas Banguntapan 2 Bantul, D.I. Yogyakarta, Indonesia. **Methods:** This quantitative analytical study was conducted with a cross-sectional design in November-December 2019 by using the Family APGAR instrument and fasting blood sugar tests from the DM patients' venous blood. Its sampling technique was the total sampling of the PROLANIS participants who suffered from DM and met inclusion criteria of this study. All obtained data of this study were analyzed by Spearman Product Moment analysis to determine the effects of family function on their fasting blood sugar levels. **Results:** This study found that there was a significant effect of family function on blood sugar control in the patients with type 2 DM ($p=0.008$). This finding indicated that the family function was an important aspect in controlling their blood sugar. **Conclusion:** The family function was an influential factor to optimize the treatment of patients with type 2 DM. The assessment on the family function should be a part of their routine examination in primary healthcare units.

Keywords: Type 2 Diabetes Mellitus, Family Function, Self-management, Blood Sugar Control

INTRODUCTION

Diabetes mellitus (DM) is a chronic disease that has captured the world's attention. The World Health Organization (WHO) reported that the prevalence of DM reached over 352 million patients in the world at the ages of 20-64 years old in 2019, and this may increase to 552 million patients in 2030. The number of patients with DM in Indonesia is ranked the 7th highest in the world¹. A study of the Basic Health Research of Indonesia reported that the prevalence of DM at the ages of >15 years reached 6.9% in 2013 and increased to 10.9% in 2018².

Diabetes mellitus is the most challenging problem the health system, and can reduce the quality of life and increase mortality rates due to various complications accompanying it. The patient with DM requires long-term treatment which can involve a high cost. This cost burden should become a consideration for policy makers to create a sustainable care system³. The Indonesian Healthcare and Social Security Agency (BPJS Kesehatan) organizes PROLANIS (the

chronic disease management program) to provide health services for patients with chronic diseases including DM to achieve an optimal quality of life with effective and efficient costs. The PROLANIS program is implemented in an integrative way by involving participants, health facilities and BPJS Kesehatan⁴.

Self-management is the most important element to maintain blood sugar control of patients with DM. Patients with DM must be empowered to have self-management to control their blood sugar, to prevent complications and to have an optimal quality of life. The American Association of Diabetes Education mentioned that there were four factors that could influence the success of the DM self-management. Those were patients' characters, patients' family, doctors and health systems, and patients' community. The patients' family characteristics are a main social context of DM management that has not been widely explored. Interventions involving family members are designed for the DM treatment because the family members

have significant roles in patients' self-management to achieve blood sugar control in primary care units⁵.

The Family APGAR was firstly introduced by Gabriel Smilstein in 1978 to assess an individual's level of satisfaction with social support received from his/her family. The assessment of the social support includes adaptation, partnership, growth, affection and togetherness. The Family APGAR assessment focuses on interactive emotional, communicative and social relationships between the patients and their families. It can trace or identify unstable or fragile families⁶. The Family APGAR is to evaluate perceptions of family function by exploring individual satisfaction with their family relationships. It is the easiest and shortest assessment to use in medical practices, and only has five short and simple questions and clear answer choices that are easy to understand. Thus, the Family APGAR is an option for assessing the family function in a family healthcare unit or in a primary healthcare unit^{7,8}.

The Family APGAR can be used to identify the risks of family dysfunction during treatment of chronic diseases including the DM. The family function can be defined as the extent to which a family performs as a unit for managing self-regulation, adapting to changes and resolving conflicts. A functional family is a family that affords to meet the needs of all family members and to manage stress and various problems that emerge. A family is considered to be dysfunctional if the family has bad behavior, is disorganized and has high levels of conflict. A family tension can arise when caring for a family member with a chronic disease. In this situation, all family members are expected to spend their time with the sick family member, to provide support of resources and to maintain the psychosocial well-being of him/her. The resource support can be in the form of time, roles, finances and other external assistance. The support should be fulfilled in a good way that does not interfere with the sick family member or hinders the growth and development of other members of the family who are not sick⁹.

This study aimed to observe effects of the family function according to the Family APGAR on blood sugar control in patients with DM.

RESEARCH METHODS

This quantitative analytical study used a cross sectional design. This study was conducted at Puskesmas (Health Centre at Sub-District Level) Banguntapan 2 Bantul in November and December 2019. Subjects of the study were PROLANIS participants with DM. The inclusion criteria were: patients who had suffered from diabetes mellitus for more than 1 year, was able to communicate well and was willing to participate in this study. The assessment of family function was conducted by interview using the Family APGAR instrument. Fasting blood sugar tests were measured by taking the DM patients' venous blood. Then, all obtained data were analyzed by Spearman Product Moment analysis to determine the effects of family function on the patients' blood sugar levels.

This study was approved by the Research and Health Ethics Commission, Faculty of Medicine, Universitas Islam Indonesia, with a Certificate of Ethics Approval No. 36/Ka.Kom. Et/70/ KE/V/2019.

RESULTS

Data of this study were obtained from the questionnaire answers and fasting blood sugar tests that were processed according to the purpose of this study. Samples that met the inclusion criteria were 81 patients. Table 1 shows the characteristics of the samples, indicating they were between 50 -60 years (43%), female (73%), low educational backgrounds from no school until junior high school (68%), married (84%) and suffering DM less than 5 years (59%).

Table 1. Frequency distribution of the respondent characteristics.

Characteristics (n = 81)	Number
Age	
< 50 years	17 (21%)
50 – 60 years	35 (43%)
> 60 years	29 (36%)
Sex	
Male	22 (27%)
Female	59 (73%)
Educational Background	
Low	55 (68%)
High	26 (32%)
Marital Status	
Married	68 (84%)
Widow/widower/unmarried	13 (16%)
Duration of Suffering from DM	
< 5 years	48 (59%)
> 5 years	33 (41%)

Table 2 shows that most of the respondents had family function based on good Family APGAR scores (63%) and uncontrolled blood sugar levels (54%).

Table 2. Frequency distribution of variable measurement.

Variable	Number
Fasting Blood Sugar Level	
Controlled	37 (46%)
Uncontrolled	44 (54%)
Family APGAR	
Good function	51 (63%)
Less function	30 (37%)
Dysfunction	0

Table 3 explains the effects of family function according to the Family APGAR on blood sugar control of the respondents by using statistical analysis by Spearman Product Moment test with statistically significant result set as *p* value <0.05 (0.008). In a family that functioned well, most of the patients had controlled blood sugar levels (36%)

Table 3. Cross tabulation of family APGAR and blood sugar control

Family Function	Blood Sugar Control		<i>p</i> value
	Controlled	Uncontrolled	
Good function	29 (36%)	22 (27%)	0.008
Less function	8 (10 %)	22 (27%)	

DISCUSSION

The results of this study found that the Family APGAR levels had a significant effect on fasting blood sugar control in patients with type 2 DM ($p = 0.008$). This is in line with a study in a primary care clinic in Nigeria showing that patients with functional families had more controlled blood sugar levels than patients with dysfunctional families. A family is the center of care and social support for patients with DM. Good family function is highly important for treatment of patients with DM because it requires long-term care. It also requires adequate support psychosocially to improve medication adherence and blood sugar control. Active participation of DM patients' families is strongly required to achieve optimal treatment. The active participation can be done by discussing and making agreements between the patient with DM and his/her family, especially in terms of monitoring adherence to regularly taking medication and controlling blood sugar. Evaluation of the family function can be done by a doctor if the patient does not comply with taking medication and if their blood sugar is difficult to control¹⁰.

A study in a health center of Masshad, Turkey also showed that adequate family function and support had a positive impact on the recovery of patients with DM, and it also prevented complications for them. DM affects several aspects of a patient's life that require holistic changes of their lifestyle. These can be realized if there is adequate support from the environment, especially the patient's family. Dimensions of the family function include ability to solve problems together, to communicate within the family, to provide appropriate emotional responses and to control behaviors. Understanding of family function is strongly suggested to improve family centered treatment and to provide interventions in improving family function performance. The performance of family function is needed during the treatment of patients with DM to improve their quality of life¹¹.

Self-management is a monitoring process and a dynamic self-evaluation in the context of a family. A study in Brazil revealed that structures and factors of family dynamics directly and indirectly influenced the disease management. These include the ability to give love, to receive love and to communicate. It is also related to differences and similarities in perceptions on diseases among family members. This study also indicated the importance of roles of a family on a patient with DM during treatment. Treatment of patients with DM involves long-term care that influences their lives and their families. A family is a backbone in the DM patient treatment. Social support from their family will help them in adapting to their illness. In patients with DM, self-management will be improved if the family is able to change their behaviors to support them. Reinforcement between family members, involvement of family members and various social support are very important in encouraging and strengthening self-management behaviors of the patients to avoid uncontrolled diseases and the emergence of serious complications^{12,13}.

Family function can also be defined as a homeostatic condition in interactions among the family members that

influence their physical and emotional growth. A study in Abuja Nigeria, using the Family APGAR questionnaire, pointed out a significant effect of family function on blood sugar control. This finding explains a central role of a family in managing chronic diseases such as DM. A doctor treating chronic diseases such as DM is suggested to assess family function status and family support to be utilized as an effective resource in a patient treatment. Family-based interventions to improve the family function status can be used in managing DM patients' blood sugar control. The results of this study also indicated that doctors in a primary healthcare unit should always assess the family function status of patients with DM as a part of their treatment. The family counseling approach can be performed if a family function disorder is found. Intervention planning can be done to ensure family participation in effective patient treatment⁵.

DM will affect each family differently. There are families who actually increase bonds with each other, but there are families who become depressed. Moreover, there are families who consider patients with DM to be a burden. Family members must know how to give the best support for the patients with DM. The interaction between family members and patients with DM significantly contributes for improving lifestyle and optimizing their self-management. Their well-being is related to family emotional involvement and family conditions that do not feel burdened. Emotional support can also be obtained through open communication and ability to solve problems as a team. Involvement of family support is expected in forms of good and warm communication, healthy food, blood sugar control, regular meal schedule and other activities that support the DM management. Negative behaviors from the family members such as pressure, criticism, scolding, coercion and overprotective treatment will cause negative emotional responses for the DM patients' healthy behaviors. They can feel that they have lost a sense of autonomy so they do not like the DM management. This negative treatment also can cause sadness, anxiety and low self-esteem of them because they only feel pressured to achieve blood sugar control without paying attention to their well-being¹⁴. On the other hand, family behaviors that motivate them to have independence, a sense of autonomy and good coping mechanisms will help them to improve¹⁵.

The patients with DM expect family members such as spouses, siblings, adult children or grandchildren to be willing to support and accompany them in healthy living behaviors and their disease management. They need their family members to also consume healthy foods or diets that are suitable for them, to do physical activity with them, to remind them to take medication and to accompany them when checking in to health facilities¹⁶. Support from family members makes them have healthier lifestyles and avoid stress. Therefore, family support is very useful to improve self-management and in glycemic control of the patients with DM¹⁷.

A study in Malaysia stated that family support was a predictor of adherence of patients with DM to self-management. Strong family support can build their confidence so that

they are able to do effective self-management to control their disease. Social support from family has an impact on seeking information and coping mechanism strategies that help them to manage stress and change their daily lifestyle. Family members must also increase their knowledge and understanding of DM, so the family members can promote and support good behavior for them. The self-management can be performed properly if there is an effort of the patients with DM and their families¹⁸.

A study in Mexico showed a statistically significant and positive relationship between healthy behaviors and family function, especially related to domains of growth, affection and resolve. The growth domain includes physical development, emotion and self-realization. The affection relates to love relationships among the family members. The resolve is family's commitment to devote their time to solve various physical problems and meet the emotional needs of family members. This basic function of the Family APGAR can contribute for healthy behaviors. The study noted that most of patients with DM had unhealthy dietary behaviors, lack of physical activities, irregular drug consumption, poor emotional conditions and poor blood sugar control that will further worsen their condition. A family with good function will help a patient's self-treatment and have a positive impact on the patient compliance in treatment. Patient satisfaction with the family function will support the patient's decision to manage his/her illness in better ways. It is important for family doctors, nurses and nutritionists to identify the family function to get a better approach in managing a patient's illness¹⁹.

Family support needed by elderly patients with DM can be daily activity assistance, health service assistance, financial assistance, support or attention in solving problems. They usually have decreased ability in physical activities, so they need assistance in their daily activities such as preparing food, wearing clothes, bathing and fulfilling their other social needs. Health services can be in the form of transportation or assistance to health facilities for their health checking and blood sugar control. They are usually unproductive, so they need financial support to meet their medical and daily needs. Family attention is also needed to remind to take medication, to maintain a diet, and to accept concerns and to help in solving their problems. They will feel happy and grateful and will help their self-management for the support of the family. They usually also feel lonely, so they will be happier if they feel close to their family members²⁰.

A study in Portugal showed a significant effect between the family function status according to the Family APGAR level and chronic diseases. As many as 98.1% of elderly DM patients with severe chronic diseases have dysfunctional families. This study also stated that there was no relationship between Family APGAR score and gender, age, marital status or education level²¹.

A limitation of this current study is that it only reveals a correlational relationship between two variables. This study has not identified intermediary factors that connect the two variables.

CONCLUSIONS

Patients with DM who were members of the PROLANIS had mostly functional families. Most of the patients with controlled blood sugar had good family function. Therefore, it could be concluded that the family function could affect blood sugar control in patients with type 2 DM. The family function was an influential factor for optimal treatment of the patients with DM, so that the assessment of family function should be an important part in the consultation and treatment of patients with type 2 DM. The assessment of family function should be a part of routine examination of the patients with DM and should be included in medical records in primary health units.

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