

Original Research

Correlation Between Diabetes Self-Management and Nutritional Status of Type 2 Diabetes Mellitus Patients in Hospital

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Article Info

Article History:

Received May 14, 2022

Revised May 15, 2022

Accepted May 23, 2022

Keywords:

Diabetes Self-Management

Diet

Nutritional status

ABSTRACT

Diabetes Mellitus patients must maintain constant glucose control to avoid complications. Diet is one type of diabetes management that can be accomplished through self-management (DSM). DSM activity greatly influences patients since the patient can independently manage and apply dietary guidelines in daily life. This study aims to analyze the correlation between DSM and nutritional status in patients with diabetes mellitus. This study was conducted in three types A hospitals in Jakarta using a cross-sectional design with 260 patients with type 2 diabetes mellitus. The measurement of DSM activity was measured using the Diabetes Self-Management Questionnaire (DMSQ), measuring food intake through a questionnaire of 1x24 hours food recall and nutritional status assessed by body mass index (BMI). This study shows that 53.1 % of respondents have adequate food intake, 52.7% of respondents have an inadequate level of diabetes self-management, and 56.6% of respondents have abnormal nutritional status. There is a significant correlation between DSM and nutritional status ($p = 0.002$, $OR = 2,217$). Respondents with an inadequate DSM are at risk of 2,217 times experiencing abnormal nutritional status compared to respondents with an adequate DSM. It is necessary to strengthen education through diabetes self-management in dietary problems repeatedly to patients through meetings held in groups when patients come to the outpatient unit. Hence, patients can fulfill their self-care properly.

Introduction

Diabetes mellitus (DM) is a complex chronic disease that requires continuous care and is one of the world's biggest health problems. There are 463 million diabetic patients globally, and it is anticipated that by 2045, that number will have increased by 51% to 700 million (Cho *et al.*, 2017). Diabetes Self-Management (DSM) is a critical element in the treatment of diabetes patients, which can facilitate the patient's knowledge, skills, and abilities to prevent further complications so that the quality of life of diabetic patients increases.

Management of Diabetes Mellitus through DSM can be successful depending on the motivation of care and self-awareness in controlling symptoms and avoiding diabetes complications (Wu *et al.*, 2018). A systematic review study of 3,421 research articles proves that diabetes self-management effectively supports the success of diabetes management (Heinrich *et al.*, 2010). A study conducted in a systematic review and meta-analysis of 184 articles showed that self-management significantly improved diabetes outcomes (Panagioti *et al.*, 2014). One of the pillars of DM management that is important to follow in the long term is diet. A study of 185 patients with type 2 diabetes also showed an association between patients following the recommended diet and a decrease in HbA1c levels, and they experienced fewer chronic complications of diabetes (Ouyang *et al.*, 2015)

Diabetes self-management allows for dietary control. The study results on 60 respondents showed that there was an effect of DSM on the dietary behavior of DM patients with $p = 0.01$ (Atika *et al.*, 2016). The diet application is often an obstacle in diabetes services because patients feel bored having to comply with the recommended diet program for the rest of their lives (Setyorini, 2017). Most of the patients mentioned difficulties in implementing the recommended dietary recommendations in their daily life, a study of 356 types 2 DM patients showed that 41.3% of diabetic patients had nutritional disorders (Ponzo *et al.*, 2017).

Patients are often unsure of the type of food they can eat, which leads to inappropriate dietary restrictions resulting in nutritional disturbances. Unimplemented dietary changes can have harmful consequences, one of which is nutritional problems or malnutrition. Malnutrition often occurs in adult and elderly diabetic patients. Therefore, screening is needed for diabetic patients to assess the incidence of malnutrition (Wang & Hu, 2018). The description above shows that self-management, especially related to diet, is essential to be studied more broadly to support nurses get an overview of the correlation between diabetes and nutritional status in diabetic patients.

Method

The study used a cross-sectional design with a consecutive sampling of 260 patients with type 2 diabetes mellitus who visited the endocrine outpatient unit at three type A hospitals in Jakarta. Research data were collected using the diabetes self-management (DSM) questionnaire belonging to Schmitt (Schmitt *et al.*, 2013). Respondents also took anthropometric measurements (weight and height) to determine the patient's nutritional status and filled out a 1x24 hours food recall form to determine the respondent's food intake. All respondents agreed to participate, and the data were evaluated descriptively. This study was conducted with the agreement of the Faculty of Nursing's Research Ethics Committee, Universitas Indonesia No.190/UN2.F12.D/KHP.02.04/2018. Furthermore, the correlation between the two variables was analyzed using the chi-square test with a 95% CI.

Results and Discussion

The demographic characteristics of the respondents consist of some aspects such as age, gender, food intake, type of anti-diabetic medication, diabetes self-management, and nutritional status.

Table 1. Characteristics of Respondents (n=260)

Characteristics	n	%
Age (years)		
<60	126	48.5
>60	134	51.5
Sex		
Female	136	52.3
Male	124	47.7
Food Intake		
Adequat	138	53.1
Inadequat	122	46.9
Anti-Diabetic Drugs		
OADs and Insulin Combination	27	10.4
OADs	152	58.5
Insulin	81	31.1

Table 2. Descriptive Statistics of Diabetes Self-Management and Nutritional Status

Item	n	%
Diabetes Self Management		
Adequate	123	47.3
Inadequate	137	52.7
Nutritional Status		
Normal	113	43.4
Abnormal	147	56.6

Table 3. Correlation Between Diabetes Self-Management and Nutritional Status

Diabetes Self Management	Nutritional Status				OR (95% CI)	p value
	Abnormal		Normal			
	n	%	n	%		
Inadequate	90	65.7	47	34.3	2.217 (1.345-3.656)	0.002*
Adequate	57	46.3	66	53.7		

Table 1 shows the characteristics of the respondents in this study, which consist of 136 female respondents and 124 male respondents. A total of 134 (51.5%) respondents are in the age group >60 years and 152 (58.5%) respondents use oral forms of anti-diabetic drugs. Based on food intake, it is seen that 138 (53.1%) respondents have adequate food intake according to calorie needs. Table 2 shows that most respondents have an inadequate level of diabetes self-management which is 52.7% (137), and 56.6% of respondents have abnormal nutritional status based on BMI (body mass index) measurements.

The analysis results of the chi square (Table 3) shows that there is a correlation between diabetes self-management and nutritional status (p value 0.002, α : 0.05). Based on the OR value, it can be concluded that respondents who have inadequate diabetes self-management have a 2,217 times risk of experiencing abnormal nutritional status compared to respondents who have adequate diabetes self-management (95% CI: 1.345; 3.656).

The results shows that 51.5% of respondents are >60 years old. Prevalence of type 2 diabetes mellitus was strongly related to age because about 50% of patients with

type 2 diabetes mellitus were >60 years old. This is supported by research in Iran which stated that age > 55 years was five times more likely to suffer from DM than the age group 25-35 years (Veghari *et al.*, 2010). This shows that the incidence of diabetes is due to the aging process. The aging process affects the compensatory ability of β pancreatic cell function and insulin resistance and is supported by a decrease in mitochondrial function that affects insulin resistance (Bilous & Donnelly, 2014).

This study shows that the number of female respondents is 52.3%. The results of this study are supported by research which states that there are 69% of diabetic respondents who are female in a study (Wattanakul, 2012). In women, there are obesity and hormonal factors in which a decrease in the estrogen hormone and an increase in the hormone androgen causes an increase in insulin resistance and increases glucose levels (Boucher *et al.*, 2014).

In this study, it is also shown that 58.5% of respondents uses oral OAD. (ADA)(American Diabetes Association, 2018) stated that administering OAD or oral anti-diabetic drugs and insulin was one of the methods used to maintain blood sugar levels in normal conditions and prevent and minimize complications due to diabetes. The results of a meta-analysis of a randomized control trial of 1,632 research articles and 18,599 samples proved that the use of oral OAD significantly lowers the risk of hypoglycemia than the use of insulin (Erpeldinger *et al.*, 2016).

The results of this study show that only 53.1% of respondents have adequate food intake. This result is obtained from the 1x24 hour food recall model which is contain types, quantities and ingredients of food in household size and the data are processed using Nutrisurvey computer software. Respondent this study follow the standards recommended by the Indonesian Society of Endocrinology (Perkumpulan Endokrinologi Indonesia (PERKENI), 2015) with maintain the amount of daily energy intake according to the minimum intake limit by reducing the consumption of high-calorie foods such as

sweet and fatty foods and adding low-calorie foods such as vegetables, fruit, mushrooms and others. Even though DM patients already know the dietary recommendations, many of them do not comply it. Hence, diet foods are considered likely to be unpleasant with the result that they only eat according to their willingness, especially when they have not shown serious symptoms. Therefore, more than 50% of patients do not follow the recommendations (Waspadji, 2018).

Nutritional status of some respondents (56.5%) in this study is not normal. Nutritional status is a picture of the balance between the need for macro and micro nutrients for the maintenance of life and intake from food or dietary habit. Lack of food intake can lead to influence nutritional status, cause the body susceptible to disease infection and even aggravate the condition of infectious disease, and vice versa. Although nutritional status is influenced by food intake, it is necessary to pay attention the other factors that also influencing like as attitudes and beliefs (Ali *et al.*, 2016)

Nutritional status are categorized into normal and abnormal nutritional status. Abnormal nutritional status or malnutrition causes a person to be susceptible to infectious diseases²⁰. In this study, it was seen that 50.8% have nutritional status more than normal with BMI > 25.0 kg/m². This result is the same as the study Zhou *et al.*, (2016) which stated that DM patients with BMI >25.0 was more common than DM patients who had BMI <18.5 kg /m² or BMI 18.5-25.0 kg/m².

5.8% of respondents have nutritional status less than normal with BMI <18.5 kg/m² or called undernutrition. These conditions are usually small in number, unrecognized and untreated. Undernutrition conditions can occur due to disturbances in food intake or increased metabolism followed by an increase in basal energy requirements or disturbances in the process of assimilation of nutrients with the result that there is a disturbance in the balance between nutrient intake and energy requirements, and it is followed by a decrease in organ mass. This condition can change the response of the pancreas, adipocytokines and

cytokines, thereby affecting the severity of the disease in diabetic patients (Sami *et al.*, 2017).

The results of this study showed that most (52.7%) respondents from the total sample had inadequate diabetes self-management. Diabetes self-management is a complex activity in controlling diabetes mellitus and requires continuous care and good self-management to prevent acute complications and reduce long-term complications. Diabetes mellitus requires lifelong care, but 50-80% of patients with diabetes do not have enough skills and knowledge for self-care. Therefore, an effective diabetes self-management is needed because it can improve the patient's physiology such as weight, blood pressure, and lipid profile (Goldenberg & Punthakee, 2013). The number of respondents who show inadequate diabetes self-management shows that respondents are still not optimally able to take care of themselves, especially diet problems, which causes abnormal nutritional status.

The results of statistical tests showed that there was a significant correlation between diabetes self-management and nutritional status in diabetic patients with p value 0.002, α 0.05. From 147 respondents who had abnormal nutritional status, 65.7% of respondents experienced inadequate diabetes self-management. Respondents with inadequate diabetes self-management are at risk of 2,217 times experiencing abnormal nutritional status compared to those with adequate diabetes self-management. In line with this study, the research result who conducted a study of 76 DMT2 patients divided into intervention and control groups and followed for 3 months showed that diabetes self-management had a significant correlation with changes in nutritional status (Yuan *et al.*, 2014).

Patient self-management plays an important role in diabetes management which includes diet control, physical exercise, medication management, blood glucose control and health checks. Behavioral changes can control the condition of the disease with result that they can survive longer, and the quality of life is getting better and negative

impacts are avoided, one of which is nutritional disorders (Tahmasebi *et al.*, 2015).

The application of diabetes self-management in the patient's life is needed because only the patient knows best about himself and the situation. If the patient is actively carrying out the program that is designed and runs it according to what has been planned and does not only follow the recommendations of health workers, the diabetes outcome, one of which is nutritional status, will be achieved.

In this study, respondents generally indicated that they knew about diabetes management because when filling out the questionnaire, respondents seemed to understand several terms in diabetes management related to diet and knew important points in diabetes management. However, crowded examination conditions in outpatient units make communication between patients and health workers limited. Even though the respondents already know about their diabetes self-care management, the diabetes management strengthening that is lack of optimal by related health workers cause the respondents experience inadequacy in undergoing diabetes self-management.

Communication between patients and health workers greatly affects type 2 DM patients in self-management (Tahmasebi *et al.*, 2015). It takes the role of medical personnel, especially nurses to strengthen communication and education related to self-management in diet problems repeatedly to patients through meetings held in groups when patients come to the outpatient unit so that patients can manage their illness well.

Conclusion

Based on the study results, it can be concluded that there is a correlation between diabetes self-management and nutritional status. Respondents who have inadequate diabetes self-management are at risk of 2,217 times experiencing abnormal dietary quality compared to those who have adequate diabetes self-management.

The results of this study can be used as a basis for further research related to diabetes self-management and the nutritional status of

diabetic patients. Problems that can be developed in different research are determining what media can be used to strengthen self-management, especially for diet in diabetic patients.

Acknowledgement

The authors are grateful to LPDP (Indonesia Endowment Fund for Education) and the Faculty of Nursing, Universitas Indonesia for their support and encouragement.

Conflict of Interest

The authors declared that there were no potential conflicts of interest

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