Dietary Behaviors among Patients with Type 2 Diabetes Mellitus in Yogyakarta, Indonesia

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Purpose: To describe dietary behaviors and examine relationships between selected factors and dietary behaviors among type 2 diabetes mellitus (T2DM) patients in Yogyakarta, Indonesia.

Method: Seventy T2DM patients from a hospital in Yogyakarta who met the inclusion criteria were recruited. Patient's dietary behaviors were measured by the Dietary Behaviors Questionnaire developed for this study with adequate reliability. The questionnaire comprised of four dimensions: recognizing the amount of calorie needs, selecting healthy diet, arranging a meal plan, and managing dietary behaviors challenges. Higher scores indicate better dietary behaviors.

Result: More than half of the patients were women (54.3%) with an average age of 56.8 years and diabetes duration of 9.7 years. The results revealed a moderate level of the total score of dietary behaviors. Considering each dimension, the results showed a moderate level of recognizing the amount of calorie needs, selecting healthy diet, and managing dietary behaviors challenges. The patients reported a high level of arranging meal plans. Pearson's correlation was used to examine the relationships between selected factors and dietary behaviors. There was a positive significant relationship between the knowledge regarding diabetic diet and the total dietary behaviors scores (r = .36, p< .01). There were positive significant relationships between the knowledge regarding diabetic diet and the dimensions of recognizing the amount of calorie needs (r = .27, p< .05), selecting healthy diet (r = .35, p< .01), and managing dietary behaviors challenges (r = .28, p< .05). In contrast, the findings indicated no significant relationship between knowledge regarding diabetic diet and arranging a meal plan dimension. Furthermore, there was no significant relationship between the diabetes duration and dietary behaviors.

Conclusion: Dietary behaviors among T2DM patients in Yogyakarta were at a moderate level. Knowledge regarding diabetic diet is essential. Further study regarding intervention in increasing patients' knowledge is needed to achieve better dietary behaviors.

Keywords: Dietary behaviors, type 2 diabetes mellitus, knowledge, Yogyakarta, Indonesia

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Background

Diabetes mellitus (DM) is a worldwide health problem. In Indonesia, the prevalence of DM was about 8.4 million in 2000 and is projected to increase up to 21.3 million in 2030 (Wild, Roglic, Green, Sicree, & King, 2004). In Jogja Hospital, a secondary hospital in Yogyakarta Indonesia, DM is the first in the top ten diseases in the outpatient departments (OPD). The prevalence of DM in this hospital was 8,138 patients in 2007 and increased to 9,816 patients in 2008 with most of them (88.98%) being diagnosed with type 2 diabetes mellitus (T2DM) (Jogja Hospital, 2008).

In most cases of T2DM, lifestyle modification, including dietary behaviors, become the first choice of diabetes management (Williams & Pickup, 2004). Following dietary behaviors recommendations are important to control blood glucose levels (Pastors, Warshaw, Daly, Franz, & Kulkarni, 2003; Swinburn, Metcalf, & Ley, 2001), improve health status, and prevent complications (Wing et al., 2001). However, several studies in Western countries revealed that diabetic patients often did not follow the dietary behaviors recommendations (Lin, Anderson, Hagerty, & Lee, 2008; Nagelkerk, Reick, & Meengs, 2005; Nelson, Reiber, & Boyko, 2002).

Several factors contributing to patients' dietary behaviors were identified from the previous studies. Knowledge was believed to be the significant factor that influences dietary behaviors (Backman, Haddad, Lee, Johnston, & Hodgkin, 2002). Savoca and Miller (2001) stated that knowledge of a recommended diet for diabetic patients influence patients' food selection and dietary behaviors. Nevertheless, the relationship between knowledge and dietary behaviors was inconclusive (Chan & Molassiotis, 1999; Persell et al., 2004) thereby, limiting the generalizability of the previous study result.

In Indonesia, several studies were conducted to measure dietary behaviors among non diabetic patients. The study from Djuwita, Purwantyastuti, and Kamso (2003) found that the Minangkabau ethic group, one of the biggest ethnic groups in Indonesia, preferred to consume high fat foods which lead to dyslipidemia and risk for cardiovascular diseases. Another study from Atmarita (2005) found that Indonesian people in rural areas consumed excessive cereals (carbohydrate) while people in urban areas consumed excessively processed foods. Those dietary behaviors should be avoided by T2DM patients. However, considering that Indonesia consists of numerous distinct ethnic, linguistic, and religious

groups across numerous islands, the results from the previous studies could not be generalized easily.

The guidelines on the management of T2DM in Indonesia were established by the Indonesian Endocrinologist Society (PERKENI) and emphasize education, dietary behaviors, and exercise. However, these guidelines were developed based on Western culture. The influence of socio-cultural and religious backgrounds was hardly considered in the management of diabetes (Kanbara et al., 2007). Therefore, dietary behaviors and its contributing factors among T2DM patients in Yogyakarta, Indonesia need to be investigated to fill those gaps.

Objectives

The objectives of this study were: (1) to describe dietary behaviors among T2DM patients in Yogyakarta, Indonesia, and (2) to examine relationships between selected factors and dietary behaviors among T2DM patients in Yogyakarta, Indonesia.

Methods

Setting

This study was conducted at the medical OPD of Jogja Hospital. This hospital is a secondary hospital in Yogyakarta, Indonesia. In this hospital, T2DM patients in ambulatory care attend a regular check-up at the medical OPD once a month.

Sample

Seventy T2DM patients who met the inclusion criteria were recruited. The inclusion criteria included an age of more than 18 years old, current fasting blood glucose (FBG) ≥ 126 mg/dl, and the ability to communicate in Indonesian language both verbally and written. The patients who consented to participate in the study were recruited.

Data Collection Instruments

Demographic Data Questionnaire (DDQ). The DDQ was used to collect patient's demographic data. This questionnaire was completed by using a check on the forced choices and/or fill in the blanks in the format. Several sources of data including medical records, direct interviews, and direct measurement were used to complete this questionnaire. Data about patient's age, gender, marital status, religion, educational level, experience of receiving dietary educational programs, occupation, total monthly income,

health insurance, comorbid disease, and the duration of having diabetes were collected from a direct interview with the patients. Current medication and current fasting blood glucose (FBG) results were collected from patient's medical records. FBG was classified into three categories based on ADA and (2009) and McAdam-Marx, Bouchard, Aagren, Conner, and Brixner's work (2011) as follows: controlled glycemia (FBG ≤ 153 mg/dl), intermediate glycemia (FBG 154 -211 mg/dl), and poorly controlled glycemia (≥ 212 mg/dl). The patient's body weight and height needed to determine the patients' body mass index (BMI) were measured directly by weight and height measurement tools which were regularly calibrated by the hospital technician to ensure validation. The patient's BMI was classified based on WHO expert consultation (2004) as follows: underweight (BMI <18.5), normal weight (BMI = 18.5 - 22.9), overweight (BMI = 23 - 24.9, and obesity (BMI ≥25).

Knowledge of Diabetic Diet Questionnaire (KDDQ). The KDDQ was used to measure the patients' current knowledge about dietary behaviors in patients with T2DM. It was a 13-yes/no set of questions. The results showed that the reliability of knowledge on diabetic dietary behaviors by using the KR-20 formula was .58. Patients' knowledge was categorized into three categories: low (score 0 - 4.32), moderate (score 4.33 − 8.65), and high (score 8.66 − 13).

Dietary Behaviors Questionnaire (DBQ). The DBQ, a self-reported dietary behaviors questionnaire, was developed by the researcher based on a review of dietary behaviors in patients with T2DM and several tools used to measure dietary behaviors in the Indonesian population including the Dietary Behaviors Questionnaire developed by Nazir (2009) and the Nutritional Health Promoting Behaviors Questionnaire (NHPB) developed by Sukmarini (2007). The DBQ comprised of four dimensions (33-item statements): recognizing the amount of calorie needs (4-item), selecting healthy food (16-item), arranging a meal plan (6-item), and managing dietary behaviors challenges (7-item). The rating scale of the DBQ was a 4-Likert scale ("1" = never, "2" = sometimes, "3" = often, and "4" = routinely). The total scores of DBG ranged from 33 to 132. The higher score of SMDBG indicated better dietary behaviors. Three experts content validated the instruments. The reliability test by using Cronbach's alpha coefficient of the DBQ was .73 which was considered as reliable for newly developed instruments (Polit & Beck, 2008).

The dietary behaviors were classified into three categories: low (score 33 – 65.99), moderate (score 66 – 98.99), and high (score 99 – 132).

Ethical Consideration

This study was conducted with the intention of protecting the human rights of all the patients. The researcher asked for approval from the Institutional Review Board (IRB) of the Faculty of Nursing, Prince of Songkla University, Thailand. The patients were approached with all needed information before giving written or verbal consent. They had the right to refuse to participate without any penalty. The identity of all patients was coded anonymously and the data collected from patients were destroyed after completion of the data analysis.

Data Analysis

Both descriptive statistics and inferential statistics were used in this study. Descriptive statistics were used to describe the demographic and clinical characteristics, and patients' dietary behaviors. Assumption tests of Pearson correlation coefficient were performed prior to data analysis. The findings showed that the patients' knowledge was negatively skewed (-5.34). Thus, the data transformation was done based on Munro (2001). As a result, the distribution of the variable after the data transformation was normally distributed (Skewness/SE of Skewness = .70). It allowed the researcher to use Pearson correlation coefficient to measure the mean difference of patients' knowledge on dietary behaviors between the control group and the experimental group.

Results

Demographic Characteristics

Seventy T2DM patients completed the questionnaire. The average age was 56.80 years (SD = 7.08, min-max age 38-73 years). More than half of the patients were women (54.3%). The majority of the patients were married (91.4%). More 55.7% of the patients had experience in receiving previous dietary educational programs, either formal or informal from Jogja Hospital's staff. The results showed that 92.9% of the patients had a high level of knowledge about the diabetic diet (M = 11.44, SD = 1.66, min-max score = 6 - 13). See details in Table 1.

Table 1

Demographic Characteristics of the Patients (N = 70)

Characteristics	n	%
Age (M = 56.80, SD = 7.08, min-max age 38-73 years)		
Middle age (34 – 59 years)	42	60.0
Elderly (≥ 60 years)	28	40.0
Gender		
Female	38	54.3
Male	32	45.7
Marital Status		
Married	64	91.4
Widow	6	8.6
Religion		
Muslim	60	85.7
Other	10	14.3
Monthly Income		
< 1,000,000 IDR	8	11.4
1,000,001 – 2,000,000 IDR	24	34.3
> 2,000,001 IDR	38	54.3
Education Level		
No schooling to Primary School	18	25.7
High School	18	25.7
College/University	34	48.6
Occupation		
Housewife/Retired	41	58.6
Teacher/Governmental staff/Private employer	29	41.4
Received previous educational program		
Yes	39	55.7
No	31	44.3
Knowledge about diabetic diet (M = 11.44, SD = 1.66, min-max score = 6 - 13)		
Moderate	5	7.1
High	65	92.9
Health insurance		
Yes	65	92.9
No	5	7.1

Clinical Characteristics

Considering the patients' clinical characteristics, the results showed that the average duration of having diabetes was 9.70 years (SD = 8.08, min-max duration = 0.17 − 28 years). More than 41% of the patients had poorly glycemic control (FBG ≥ 212 mg/dl) with an average FBG of 215.43 mg/dl (SD = 93.08, min-max FBG = 127-597 mg/dl). More than half of the patients were obese (51.5%, M = 25.32, SD = 4.77, min-max BMI = 16.22 − 39.52). See details in Table 2.

Table 2

Clinical Characteristics of the Patients (N = 70)

Characteristics	M (SD)	n	%
Duration of diabetes mellitus	9.70 (8.08)	-	-
Fasting Blood Glucose	215.43 (93.08)	-	-
Controlled	-	22	31.4
Intermediate	-	19	27.1
Poorly controlled	-	29	41.4
Body Mass Index	25.32 (4.77)		
Underweight	-	3	4.3
Normal	-	19	27.1
Overweight	-	12	17.1
Obese	-	36	51.4
Comorbid disease			
Yes	-	38	54.3
No	-	32	45.7
Common comorbid diseases			
Hypertension	-	5	13.2
Hypercholesterolemia	-	5	13.2
Others	-	28	73.7
Receiving Oral Hypoglycemic Agents			
Yes	-	68	97.1
No	-	2	2.9
Prescribed Oral Hypoglycemic Agents			
Sulphonlyureas	-	4	5.9
Biguanides	-	8	11.8
Combination	-	56	82.4

Patients' Dietary Behaviors

The results on total dietary behaviors showed that the patients with type 2 diabetes mellitus had a moderate level of dietary behaviors (M = 89.44, SD = 13.83, min-max score = 63 − 124). Considering each dimension of dietary behaviors, results showed moderate levels of recognizing the amount of calorie needs, selecting a healthy diet, and managing

dietary behaviors challenges. The patients reported a high level in the arranging meal plan dimension (Table 3).

Table 3

Mean, Standard Deviations, and the Levels of Dietary Behaviors (N = 70)

No	Variables	Possible score	Min-Max Score	Mean	SD	Level
1.	Recognizing the amount of calorie needs	4 - 16	4 - 16	10.26	3.18	Moderate
2.	Selecting healthy diet	16 - 64	26 - 61	42.21	6.86	Moderate

No	Variables	Possible score	Min-Max Score	Mean	SD	Level
3.	Arranging a meal plan	6 - 24	9 - 24	17.87	3.52	High
4.	Managing dietary behaviors challenges	7 - 28	12 - 27	18.90	3.51	Moderate
5.	Total dietary behaviors	33-132	63 - 124	89.44	13.83	Moderate

The Relationship between Selected Factors and Dietary Behaviors

The results showed that there was a positive significant relationship between the knowledge regarding diabetic diet and total dietary behaviors scores (r = .36, p < .01). There were positive significant relationships between knowledge regarding diabetic diet and dimensions of recognizing the amount of calorie needs (r = .27, p < .05), selecting healthy diet (r = .35, p < .01), and managing dietary behaviors (r = .28, p < .05), except for the dimension of arranging a meal plan. The level of relationship was considered as low (Munro, 2001). In addition, the findings indicated no significant relationship between the duration of having diabetes and dietary behaviors.

Table 4

Correlation Coefficient between Selected Factors and Dietary Behaviors (N = 70)

No	Variables	Age	Duration of DM	Knowledge [a]
1.	Total dietary behaviors	-.02	.07	.36**
2.	Recognizing the amount of calorie needs	.11	.17	.27*
3.	Selecting healthy diet	.05	.03	.35**
4.	Arranging a meal plan	-.13	-.06	.23
5.	Managing dietary behaviors challenges	.06	.14	.28*

Note. * p < .05, ** p < .01, [a] Knowledge data after log transformation.

Discussion

Generally, the results of the current study showed that the dietary behaviors of T2DM patients in Yogyakarta, Indonesia were at a moderate level. There are several factors that might contribute to this result. The first factor that might contribute to the moderate level of dietary behaviors is cultural background. The patients in this present study were patients living in Yogyakarta culture in which most of the foods contain high sugar and calories which limit the availability of food choices. Moreover, several social and family gatherings such as a wedding ceremony or a community meeting placed the patients in a challenging situation to control their dietary behaviors. Not only that, several behaviors that are important for the patients to control their dietary behaviors such as ordering a half portion of food (when buy food) and refusing offered foods (which contain high sugar, calories, and fat) and asking for other healthier foods other than that already offered were considered as impolite. Considering recognizing the amount of calorie needs, measuring food by using grams or ounces for each meal was not the common behaviors and considered as complicated measures by the patients.

Cultural background influences diabetic's dietary behaviors (Misra & Lager, 2009). This finding of the current study is consistent with the study from Sowattanangoon, Kotchabhaikdi, and Petrie (2009) among diabetics in Thailand. They found that reducing the consumption of rice was difficult for patients to do because rice had been their staple food since they were very young. Moreover, the study from Lanting, Joung, Vogel, Bootsma, Lamberts, and Mackenbach (2008) found that refusing offered food was considered as culturally impolite among Turkish and Moroccan patients and eating food different to the rest of the family was also considered as culturally impolite among Dutch patients.

The second factor that might contribute to the moderate level of dietary behaviors is total monthly income. The study found that the majority of patients (68.6%) had a monthly income of 1,000,000 - 3,000,000 IDR (equal to 114 – 342 USD). Based on a decree by the Governor of Yogyakarta 2009 this monthly income was considered more than the minimum income for people in Yogyakarta since the minimum income was 745,694 IDR (equal to USD 85). This adequate income is important to ensure that the

patients are able to afford healthy food rather than high calorie and high carbohydrate foods. A low income was considered as one barrier to manage dietary behaviors among patients with type 2 diabetes (Albarran, et al., 2006; Vijan et al., 2005).

The third factor might relate to the experience in receiving either formal or informal education on dietary behaviors. The result showed that the majority of patients had experience in receiving dietary educational programs, either formally or informally from OPD of Jogja Hospital's staff. This experience is important for the patients to gain more knowledge in order to control their dietary behaviors. Patients who were informed about their illness and its treatment were more likely to succeed in managing their illness (Ellis et al 2004).

The findings of the study revealed that there was no significant relationship between the duration of being diagnosed with T2DM and dietary behaviors, while there was positive significant relationship between knowledge regarding diabetic diet and dietary behaviors. Concerning each of the dimensions of dietary behaviors, there were positive significant relationships between knowledge regarding diabetic diet and other dimensions of dietary behaviors except for the dimension of arranging a meal plan. Knowledge was a salient factor related to dietary behaviors control (Backman et al., 2002). Moreover, patients' knowledge on a recommended diet reflected their understanding of dietary guidelines which influenced their food selection and eating patterns (Savoca & Miller, 2001).

The relationship between knowledge and dietary behaviors among T2DM patients in previous studies were inconsistence. The study from Chan and Molassiotis (1999) found that there was no relationship between knowledge and compliance on dietary behaviors. On the other hand, a study from Persell et al. (2004) found that a high knowledge score was associated with following dietary recommendations and knowledgeable patients were more likely to perform self-management activities. In this present study, the patients' knowledge on diabetic dietary behaviors was measured by knowledge instruments developed by the researcher. Indeed, this instrument had low reliability (Cronbach's alpha coefficient .58). Therefore, the knowledge score on this study should be interpreted with caution.

Conclusions

In conclusion, dietary behaviors among type 2 diabetic patients in Yogyakarta, Indonesia were at a moderate level. Cultural background, monthly income, and experience in receiving dietary education programs might contribute to this moderate level of dietary behaviors. Knowledge of a diabetic diet is essential and statistically significantly related to the patients' dietary behaviors.

Recommendations

Nurses should consider patients' knowledge about a diabetic diet when dietary behaviors are the target outcome to be improved. Further study regarding intervention and increasing patients' knowledge is needed to achieve better dietary behaviors.

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