



# DIETARY BEHAVIOR AMONG MUSLIM PATIENTS WITH POORLY CONTROLLED TYPE 2 DIABETES MELLITUS IN A COMMUNITY SETTING, IN INDONESIA

Rian Adi Pamungkas<sup>1</sup>, Tippamas Chinnawong<sup>2</sup>, Charuwan Kritpracha<sup>3</sup>

<sup>1</sup>Master of Nursing Science Student, Faculty of Nursing, Prince of Songkla University Thailand, Clinical instructor in Marendeng of Nursing College, West Sulawesi, Indonesia, <sup>2</sup>Lecturer of Medical Nursing Department, Prince of Songkla University Thailand, <sup>3</sup>Lecturer of Medical Nursing Department, Prince of Songkla University Thailand.

## ABSTRACT

**Background:** Dietary behavior is the cornerstone of patients with poorly controlled type 2 DM. This condition becomes a common problem in patients with type 2 DM.

**Purpose:** The objective of this study was to describe dietary behavior in Muslim patients with poorly controlled type 2 DM in a community setting, in Indonesia.

**Methods:** A quantitative descriptive study to describe the dietary behavior of 70 patients with poorly controlled type 2 DM who met the inclusion criteria. These patients were selected by using random sampling assignment from Kebunsari Public Health Center areas in Polewali Mandar Sub-District, West Sulawesi, Indonesia. Dietary behavior was measured by using the Dietary Behavior Questionnaire (DBQ). The DBQ was modified from a previous study with adequate reliability (Chronbach's alpha was .82). Descriptive statistics were used in terms of frequency, percentage, mean, and standard deviation to describe patient's characteristics and dietary behavior in this study.

**Result:** Subjects who participated in this study were middle aged with an average 53.91 years. More than half of subjects in this study were female (74.3%) who had been studied in the elementary level (60.0%). The majority of the patients had no experience of any previous educational program or counseling program related to dietary behaviors (85.7%). The result showed a moderate level of dietary behavior in patients with poorly controlled type 2 DM.

**Discussion:** Dietary behavior becomes a common issues in patients with poorly controlled type 2 DM. Several factors contributed patients performing the dietary behavior including unstructured educational program in the public health center, self-commitment, belief and perception, and local culture.

**Conclusion:** The total level of dietary behavior in patients with poorly controlled type 2 DM was moderate level. Two subscale of dietary behaviors including selecting a healthy diet and arranging a meal plan were classified as a moderate level, whereas recognizing the amount of food calories, and managing dietary behaviors challenges were a low level.

**Recommendation:** Further research is needed to establish an intervention approach related to dietary behaviors for improving the dietary behaviors of the patients with poorly controlled type 2 DM.

**Key Words:** Dietary behaviors, Poorly controlled type 2 diabetes mellitus, Indonesia

## BACKGROUND

The high percentage of diabetes mellitus (DM) has become a universal phenomenon. The World Health Organization (WHO) estimated that more than 346 million people have been diagnosed with DM (Song et al., 2012). The American Diabetes Association [ADA] (2013)

reported that 17.9 million adults have been diagnosed with DM whereas 57 million were pre-diabetic. In Indonesia, diagnosis of DM was the seventh largest number with a prevalence in 7.6 million adults (Soewondo, Ferrario, & Tahapary, 2013). The high proportion of patients remains due to poor glycemic control.

Corresponding Author:

Rian Adi Pamungkas, Master of Nursing Science Student, Faculty of Nursing, Prince of Songkla University Thailand, Clinical instructor in Marendeng of Nursing College, West Sulawesi, Indonesia, E-mail: adirian491@yahoo.com

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Poorly controlled DM is associated with serious multiple long-term complications, including constriction of blood vessels, thrombotic micro-angiopathy (nephropathy and retinopathy), neuropathy (peripheral and autonomic), peripheral angiopathy, diabetic foot, chronic kidney diseases and problems of the cardiovascular system (Polikandrioti & Dokoutsidou, 2009; Soewondo et al., 2013).

Several factors contributed to poorly controlled of type 2 DM, including unhealthy eating habits, physical inactivity, non-adherence to medication, and lack of regular home glucose monitoring (Nelson, McFarland, & Reiber, 2007). These prominent factors becomes the major risks for the development of diabetes complications (Khattab, Khader, Al-Khawaldeh, & Ajlouni, 2010).

Prevention of DM complications is important to improve the quality of life of the population (Jin, et al., 2009; Langat, 2011). Dietary behaviors have the pivotal role in managing diabetes mellitus (Arsand, Tufano, Ralston, & Hjortdahl, 2008). In addition, Diabetes management could be a foundation for empowering patients to increase physical (A1C, systolic blood pressure, diastolic blood pressure, LDL and HDL cholesterol level) (Hill-Briggs et al., 2011), psychological (reduce stress), and changed behaviors (blood glucose monitoring, physical activity, and dietary regimen) (Sun, Tsoh, Saw, Chan, & Cheng, 2012) in order to live with diabetes mellitus to monitor one's condition and to deal with cognitive, behavioral and emotional responses to maintain quality of life (Wu et al., 2011).

Various studies related to dietary behaviors in Indonesia have been conducted (Nazir, 2009; Primanda, 2011). However, these studies were conducted in the general population not in a specifically Muslim population in a specific area, so results may not be generalized to other settings in Indonesia. Therefore, the researcher needs to describe the dietary behaviors among Muslim patients with poorly controlled type 2 DM in West Sulawesi, Indonesia.

## OBJECTIVES

The aims of this study are:

1. To describe the dietary behavior among patients with poorly controlled type 2 diabetes mellitus.
2. To describe the selected factors contributing to dietary behaviors among patients with poorly controlled type 2 diabetes mellitus

## METHODS

### Setting

This study was conducted in a community setting, West Sulawesi Province, Indonesia.

### Sample

Seventy patients with poorly controlled type 2 DM were recruited by random sampling assignment based on inclusion criteria. The inclusion criteria was Muslim patients with fasting blood sugar level  $\geq 200$  mg/dl or FBG  $> 130$  after 6 months taking medication, 18-70 years old, be able to communicate in Indonesian language both verbal and written, have no cognitive impairment which was tested by using mini MMSE (Folstein, Folstein, McHugh, 1975), have no visual impairment, hearing impairment, movement impairment or depression.

### Data Collection Instrument

*Demographic Data Questionnaire and Health Information (DDQHI)*. This DDQHI was completed by filling in the blank form. The demographic data was consisted of 6 items including patient's name, age, gender, occupation, education, and family income whereas the patient's health information consists of 7 items including current smoking status, duration of illness, recent fasting blood glucose level, blood pressure level, total cholesterol level, BMI status, comorbidity,

*The Dietary Behaviors Questionnaire (DBQ)*. This measurement was modified based on existing tools by Primanda (2011). It was used to measure dietary behavior which consists of 4 dimensions, including selecting a healthy diet (13 items), arranging a meal plan (7 items), recognizing the amount of calorie needs (5 items), and managing dietary behaviors challenges (5 items). Each item was measured by using a five point (0-4) likert scale in which:

0 = never, 1 = seldom, 2 = occasionally, 3 = often, and 4 = repeatedly. The total score is from

0 - 120. The scoring system is divided into three categories: poor behavior scores (score 0-40), medium behavior scores (score 41-80), and high behavior scores (score 81-120) with the highest score indicating better dietary behavior.

### Ethical considerations

This study has been approved by the IRB of the Faculty of Nursing, Prince of Songkla University, Thailand. Permission letters were also obtained from the Head of the Health Departement and the Head of the Kebunsari Public Health Center, West Sulawesi Province, Indonesia. The researcher explained the purposes of the study, procedures, risks, and benefits of the study. Furthermore, the patients had been assured that they had the right to refuse to participate in this study at any time without any negative consequences. The confidentiality and anonymity of the patients were maintained throughout the study. Patients who willingness to participate in this study were informed consent.

## Data Analysis

Descriptive statistics were used in this study to describe the subjects' demographic, health information related to characteristics, and dietary behavior in terms of frequency, percentage, mean, and standard deviation.

## RESULT

### Patients Characteristics

A total of seventy patients were enrolled in the study. The demographic characteristics of the Muslim patients with poorly controlled type 2 DM are presented in Table 1. More than half the subjects who participated in this study were middle aged (55.71%) and elderly (32.86). More than half of the subjects in this study were female (77.14%). In terms of education level, more than one-third of the subjects had an education level of elementary school (68.7%). The subjects had no experience with any previous educational programs or counseling programs related to dietary behaviors (84.2%).

**Table 1: Demographic Characteristics of Muslim patients with Poorly Controlled type 2 DM in West Sulawesi, Indonesia (N=70)**

Characteristics	M (SD)	N	%
<b>Age</b>			
Young Adult (20-33 years)		8	11.43
Middle Age (34-59 years)		39	55.71
Elderly (60-80 years)		23	32.86
<b>Gender</b>			
Male		16	22.86
Female			
Occupation		54	77.14
Health care related worker			
Non-Healthcare related worker		3	4.29
Educational level		67	95.71
Elementary school			
Junior high school		48	68.57
Senior high school		9	12.86
Diploma		8	11.43
Monthly income		5	7.14
< 1,000,000 IDR (< 84 USD)			
> 1,000,000 IDR (> 84 USD)		14	20
Cooking responsibility		56	80
Cooking by oneself			
Family cooking		55	78.57
Combination of cooking oneself		12	17.14
Experience of previous dietary behavior programs		3	4.29
No		59	84.28
Yes		11	15.71

With regard to the clinical characteristics of the Muslim patients with poorly controlled type 2 DM (N = 70) (table 2). The findings of this study reported that the majority of the patients did not smoke (87.14 %). The average duration of subjects being diagnosed with diabetes mellitus was more than one year (87.14%). In addition, patients were categorized as poor glycemic control ( $\geq 200$  mg/dl) (78.57 %). The average patient's BMI was close to overweight (23.64) with the average cholesterol level being 207.64 mg/dl (SD = 51.07). More than half the patients had comorbid diseases including hypertension (57.14%), hypercholesterolemia (1.43%), and a combination of hypertension and hypercholesterolemia (11.43%). It was indicated that most patients thought that check-ups were not beneficial for their health in order to prevent development of poorly controlled type 2 DM.

**Table 2: Clinical Characteristics of Muslim Patient's with Poorly Controlled type 2 DM in West Sulawesi, Indonesia (N=70)**

Characteristics	M (SD)	N	%
<b>Current smoking status</b>			
Does not smoke		61	87.14
Smokes		9	12.86
<b>Duration of illness</b>			
< one year		9	12.86
$\geq$ one year		61	87.14
<b>FBG controlled (Min-Max = 97-424)</b>	206.80(87.24)		
Fairly controlled (131-199 mg/dl)		15	21.43
Poorly controlled ( $\geq 200$ mg/dl)		55	78.57
<b>Body Mass Index (Min-Max = 16-35)</b>	23.64 (3.75)		
<b>Cholesterol Level (Min-Max = 114-415)</b>	207.64(51.07)		
<b>Comorbid diseases</b>			
No comorbid diseases		21	30.00
Hypertension		40	57.14
Hypercholesterolemia		1	1.43
Combination of Hypertension and Hypercholesterolemia		8	11.43

### Patient's Dietary Behaviors

The mean, standard deviations (SD), and the levels of dietary behavior in diabetic patients (N=70) were presented in table 3. The total score of dietary behavior was categorized as a moderate level. The subscale of patient's

dietary behaviors level which are selecting a healthy diet ( $M = 22.99$ ,  $SD = 6.671$ ) and arranging meal plan ( $M = 11.77$ ,  $SD = 4.629$ ) were categorized as a moderate level. Whereas, recognizing the amount food calories and managing dietary behaviors challenges were categorized as a low level.

**Table 3. Dietary Behaviors Scores among Muslim Patient's with Poorly Controlled Type 2 DM in West Sulawesi, Indonesia (N=70)**

Variables	Pos- sible Score	Min- Max Score	Mean	SD	Level
Selecting healthy diet	0-52	8-37	22.99	6.67	Moderate
Arranging meal plan	0-28	2-22	11.44	4.63	Moderate
Recognizing the amount food calories	0-20	0-13	3.71	2.99	Low
Managing dietary behaviors challenges	0-20	0-12	5.00	2.99	Low
Total dietary behavior	0-120	0-120	43.47	13.71	Moderate

## DISCUSSION

The findings of this study revealed that the level of dietary behavior was a moderate level. The improvement of dietary behavior was due to several reasons including: The first reason related to the unstructured educational program in the public health center. The patients in a community setting might get information about the dietary management when they visit a public health center for a follow-up monitoring of blood sugar. Eventually this educational program is unstructured, it can improve the patient's knowledge. Thus, the patients can decide on the best dietary management for controlling blood sugar levels. This finding was consistent with Primanda (2011) stated that the increasing of knowledge significantly improves self management of dietary behaviors.

The second reason is related to self-commitment regarding dietary compliance. Indonesian society has some habits related to food preparation for celebration. For example, in Muslim celebrations, the people in West Sulawesi province often celebrate the birthday of Prophet Muhammad, which is called Maulid and Idul Fitri/Adha, with various types of food. Each family will prepare

many foods that contain high levels of sugar and fat on the day of the celebration. During the celebration, the families and neighbors will be invited to celebrate and eat together. Therefore, some patients have difficulty managing the dietary challenges during Maulid or Idul Fitri/Idul Adha. However, These findings discovered that the patients can manage dietary behaviors because they have committed themselves to dietary compliance. This finding was consistent with the previous study which reported that individual with the high level of commitment is able to consistently perform a wide range of healthful behaviours, maintain stage of dietary change, and manage the dietary behaviour challenges (Kelly, 2011).

The third reason is related to belief and perception regarding dietary management. Health Belief Model Theory stated that the behaviors of the patients are associated with the seriousness of their diseases, perception of the benefits and barriers of behavioral change (Rosenstock, Strecher, & Becker, 1998). The patient's belief's concerning the effectiveness of meal arrangements and patient's experience can encourage them to make behavioral changes in accordance with the dietary recommendations. Thereby, dietary self-management can be achieved. The previous study found that good perception related to diseases was associated with adherence to dietary self-management (Broadbent, Donkin, & Stroh, 2011). This study also was consistent with previous study reported that dietary management was related to specific beliefs about the helpfulness of the respective diet (Harvey & Lawson, 2009).

In contrast, the findings of this study showed that patients had low levels of recognition of their calorie needs and the challenges of managing dietary behaviors. This might be due to the patients paying less attention to the amount of foods consumed when they have a meal and the enjoyment of their food when the food has high sugar or high calorie content (American Medical Association [AMA], 2003). The second reason is the relationship between the culture of the patients and dietary behaviors. In Indonesia, since rice is the main staple food, many Indonesian people think that has not really had a meal before eating rice. With regard to the customs in West Sulawesi Province, there are many customs including folk festivals, harvest party, and parties for fishermen that incorporate food and various ceremonies. During these ceremonies, people will gather and eat together. They prepare various foods that contain fat and sugar in large portions. Whereas fat food and sweet foods are not recommended for patients with type 2 DM, most patients find it difficult to manage their dietary behaviors challenges.

## CONCLUSIONS

The total scores of dietary behavior among Muslim patients with poorly controlled type 2 DM was a moder-



ate level. Two subscale of dietary behavior including selecting healthy diet and arranging meal plan also were categorized as moderate level. Whereas, recognizing the amount food calories and managing dietary behaviors challenges were a low level of dietary behaviors. With regard to these findings, several factors contributed to the dietary behavior including: unstructured educational program related management of diabetes, self-commitment, beliefs and perceptions related to dietary behaviors management, patient's awareness, and the local culture.

## Recommendations

Dietary behavior is the common problem in diabetic patients. To achieve better dietary behavior of patients with poorly controlled type 2 diabetes mellitus, several factors should be considered in order to further research was needed to establish an intervention approach related to dietary behaviors for improving the dietary behaviors of patients with poorly controlled type 2 DM.

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