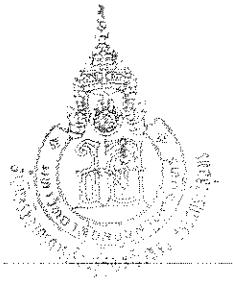

Effect of Dietary Self-Management Support Program on Dietary Behaviors in Patients with Type 2 Diabetes Mellitus in Yogyakarta, Indonesia

Yanuar Primanda

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of
Master of Nursing Science (International Program)
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ABSTRACT

This quasi-experimental study aimed to examine the effect a dietary self-management support program had on the dietary behaviors of patients with type 2 diabetes mellitus (T2DM) and dietary behaviors goal-setting achievement levels. Seventy subjects meeting the inclusion criteria were selected from the medical OPD of Jogja Hospital, Yogyakarta, Indonesia and divided equally into two groups using matching technique and tossing coin. The control group subjects received only standard care, while the experimental group subjects also received a month-long, dietary self-management support program which followed the Self-Management Method based on Kanfer and Gaelick-Buys's work (1991). Major program components included a reflection, individual education, counseling sessions, dietary behaviors goal setting and action planning, and follow-ups. A reliable ($\alpha = .73$), self-reporting questionnaire developed by the researcher was used. Goal achievement levels were evaluated weekly, at the 2nd week, 3rd week, and 1 month stages, and were based on the ratio between plans successfully implemented and plans made.

The results showed that subjects in the experimental group significantly improved their dietary behaviors after participating in the dietary self-management support program ($t = -11.40$, $df = 34$, $p < .01$). There was a statistically significant difference of dietary behaviors between subjects in the experimental and control group ($t = -6.55$, $df = 47.52$, $p < .01$) after the program. More than half of subjects in the experimental group completely achieved their goals at the week two (57.1%) and one month (68.6%) stages of the program. At the end of the program, 31.4% subjects completely achieved their three sets of weekly goals.

This study provided empirical evidence on the effectiveness that a dietary self-management support program has on the dietary behaviors of patients with T2DM. It is thus recommended that such programs be implemented in nursing practice.

Keywords: dietary behaviors, self-management, type 2 diabetes mellitus, Yogyakarta

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Yanuar Primanda

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CHAPTER 1

INTRODUCTION

This chapter presents the background and significance of the problem, objectives, research questions, conceptual framework, hypotheses, definition of terms, and significance of the study.

Background and Significance of the Problem

Diabetes mellitus (DM) is a worldwide health problem. In Indonesia, the number of DM was about 8.4 million in 2000 and projected to increase up to 21.3 million in 2030 (Wild, Roglic, Green, Sicree, & King, 2004). In 2005, DM was the seventh most lethal disease in Indonesian hospital setting (Ministry of Health of Republic of Indonesia [MOHRI], 2007). In Jogja Hospital, one of the secondary hospitals in Yogyakarta Indonesia, DM was the first of the top ten diseases seen in outpatient departments (OPDs). The number of DM in this hospital was 8,138 patients in 2007 and 9,816 patients in 2008, with approximately 90% of them in 2008 diagnosed with type 2 diabetes mellitus (T2DM) (Jogja Hospital, 2008).

Patients with T2DM have a high risk to develop complications, including hypoglycemia, hyperglycemia, ketoacidosis, retinopathy with potential blindness, nephropathy that may lead to renal failure, neuropathy with risk of foot ulcers and amputation, and features of autonomic dysfunctions including sexual dysfunction (American Diabetes Association [ADA], 2009a). The most common identified risk factors are suboptimal health-related behaviors, including high calorie

and fat intake (Clark, 2008). Therefore, in most cases of T2DM, lifestyle modification, including dietary behaviors, is the first choice for diabetes management (Williams & Pickup, 2004). Based on ADA recommendations (2008, 2009c), management of dietary behaviors is important to control blood glucose level including hemoglobin A1c (Pastors, Warshaw, Daly, Franz, & Kulkarni, 2003; Swinburn, Metcalf, & Ley, 2001); improve health status; and prevent complications (Wing et al., 2001). Therefore, effective self-management of dietary behaviors is imperative.

Although effective self-management of dietary behaviors benefits patients, in fact, most patients with diabetes have difficulty with self-management of their dietary behaviors (Lin, Anderson, Hagerty, & Lee, 2008; Nelson, Reiber, & Boyko, 2002). In Yogyakarta, Indonesia, a study of 88 patients with T2DM found that more than 60% of the patients did not follow their dietary behaviors recommendations (Sinorita, Saadah, & Jazakillah, 2008). Both patients and healthcare professionals recognize dietary behaviors as the most difficult aspect of T2DM management (Grodner, Long, & Walkingshaw, 2007), except the patients realize the needs to manage their dietary behaviors (Garcia et al., 2007). Thus, it is understood that the central role in management of dietary behaviors is the diabetic patients themselves. Consequently, self-management plays a pivotal role in dietary behavioral management since patients have to be responsible for their day-to-day care (Lorig & Holman, 2003).

In recent years, self-management method has become an important means in controlling T2DM. This self-management method emphasizes patients' participation and active engagement in their daily treatment care (Embrey, 2006; Hughes, 2004; Kanfer & Gaelick-Buys, 1991). This method becomes necessary in

patients with T2DM since the traditional method which placed the patients in a passive role is no longer sufficient to capture the complexity of the treatments and the nature of the disease which require not only healthcare experts, but also patient's active role in the treatment (Bodenheimer, Lorig, Holman, & Grumbach, 2002; Delamater, 2006). Encouraging self-management method recognized the patient as the expert about their own lives rather than just passively accepting the treatment recommended by the healthcare providers. The patients know what works for them (Anderson & Funnel, 2005). This method has proven to be an important element of care for all people with diabetes mellitus and is highly recommended to optimize patient outcomes' (ADA, 2009b; Lorig et al., 1999). Thereby, several standard regimens for T2DM recommend incorporating some aspects of dietary behaviors with self-management method to improve patients' dietary behaviors (ADA, 2009c; Indonesian Endocrinologist Society [PERKENI], 2006).

Numerous studies have been conducted to examine effective self-management support program derived from the concept of self-management method. Various teaching strategies have been used to encourage self-management of dietary behaviors. They were ranging from a lower expected level of patient participation such as attending a lecture session to be given information, to higher active patient's participation through participating in setting dietary behaviors goals (Barlow, Wright, Sheasby, Turner, & Hainsworth, 2002; Clark, 2008; Ellis et al., 2004). A review and meta-analysis study of 104 existing studies focused on dietary behaviors found that goal setting and action planning seemed to be effective in improving dietary behaviors (Ammerman, Lindquist, Lohr, & Hersey, 2002). The goal achievement contributes to

the enhancement of self-confidence in reaching the expected behaviors (Bodenheimer, Davis, & Holman, 2007).

Although some studies have had some success with improving dietary behaviors by using self-management method in patients with T2DM in Western countries, those studies have had some important limitations, such as convenient, non-random sample selection (Albarran, Ballesteros, Morales, & Ortega, 2006; Bastiaens et al., 2009; Tang et al., 2005; Wallace et al., 2009), attrition rate more than 20% (Polonsky et al., 2003), and low generalizability (Clark, Hampson, Avery, & Simpson, 2004; Song & Kim, 2009). A meta-analysis study from Norris, Engelgau, and Narayan (2001) also found that the generalizability of existing studies was often limited, and threats to internal validity including selection bias, performance bias, and the attrition issue were common.

In addition, several follow-up strategies in dietary self-management support programs including in person visits, phone calls, and an internet-based approach to improve dietary behaviors have been examined in Western populations. Such strategies, used either solely or in combination, generally showed positive outcomes on dietary behaviors (Clark et al., 2004; Wallace et al., 2009), although some had only partial success (Albarran et al., 2006; Glasgow et al., 2006).

The most commonly studied outcomes in previous studies were dietary behaviors changes (decreased fat intake, increased fruit and vegetable intake, decreased carbohydrate intake, or achieved goal) and clinical outcomes (body mass index or lipid profile). When a goal-setting strategy is used, the evaluation of goal achievement is necessary to determine whether the patient has achieved his/her goal or not. If a patient achieved his/her goal(s), this gives them confidence that they can

be successful, which creates a positive feed forward loop and makes further accomplishments easier and contribute to the overall patients' dietary behaviors and self-management in general (Kanfer & Gaelick-Buys, 1991).

A quasi-experimental study to improve dietary behaviors among patients with T2DM in one secondary hospital in Riau, Indonesia was conducted by Nazir (2009). She employed an educational program based on the Health Belief Model. Patients only received a one time didactic health education and practice session in group without further follow-up. A month after the program, the intervention group had improved their dietary behaviors. However, this study used only 40 patients (20 patients/group). This sample size was determined based on the justification that for a quasi-experimental study, at least 20 patients in each group were needed and no prior study was used to calculate the effect size to determine the sample size. Moreover, the study was conducted in a single hospital setting, thereby it has limited generalizability. No further studies were found in the available literature which investigated the effects of a dietary self-management support program on dietary behaviors in patients with T2DM in Indonesia.

In Indonesia, the guidelines for the management of patients with T2DM were established by the PERKENI, and these guidelines emphasize education, dietary behaviors, and exercise (PERKENI, 2006). However, the guidelines are not inclusive; for example, they discuss the need to decrease calorie intake without further explanation about recommended calorie needs of the patients. Moreover, these guidelines were developed based on similar guidelines from Western cultures which have different food items and food ingredients, and there are other cultural issues related to dietary behaviors that are not properly considered in the Indonesian

guidelines. Kanbara et al. (2007) stated that the influence of socio-cultural and religious background was often hardly considered in the management of diabetes. The fact that dietary behaviors are also influenced by cultural background (Sowattanangoon, Kotchabhaikdi, & Petrie, 2009) pointed out the need of a study in particular patients with T2DM, including those in Yogyakarta.

Additionally, although evidence from existing studies showed positive outcomes from dietary self-management support programs in clinical settings including OPDs and those interventions are feasible, the implementation of such programs in Indonesia has been limited. Moreover, considering that Indonesia consists of numerous distinct ethnic, linguistic, and religious groups across numerous islands, the results from previous studies cannot be easily generalized. For example, the Nazir's study was conducted in Riau, Indonesia, in which the majority of the population are of the Minagnese ethnic group who prefer spicy foods stewed with coconut milk (Nazir, 2009); while in Yogyakarta, the Javanese ethnic group is the biggest population and their foods, while also containing coconut milk, are mostly very sweet rather than spicy (Vaisutis, 2007). Therefore, it is important to test the effectiveness of dietary self-management support program on dietary behaviors in patients with T2DM in Yogyakarta, Indonesia to fill this gap.

Objectives of the Study

The objectives of the study were to:

1. Compare the dietary behaviors of patients with T2DM before and after receiving the dietary self-management support program

2. Compare the dietary behaviors of patients with T2DM who received the dietary self-management support program and those who received only the standard care but not the dietary self-management support program, after completing the dietary self-management support program
3. Identify the goal achievement levels in patients with T2DM receiving the dietary self-management support program

Research Questions of the Study

The research questions of the study were stated as follows:

1. Were dietary behaviors of the patients with T2DM after receiving the dietary self-management support program better than before receiving the dietary self-management support program?
2. Were the dietary behaviors of the patients with T2DM who received the dietary self-management support program better than those who received standard care after completing the dietary self-management support program?
3. What were the goal achievement levels of the patients with T2DM receiving the dietary self-management support program?

Conceptual Framework of the Study

Two concepts were used and integrated to construct and develop the conceptual framework of the dietary self-management support program employed in this study. The first concept was the Self-Management Method (Kanfer & Gaelick-Buys's, 1991). While, the second concept was dietary behaviors for patients with T2DM based on ADA (2009c), Savoca and Miller (2001), and Tjokroprawiro (2006).

Self-management refers to an individual's ability to manage the symptoms, treatments, physical and psychosocial consequences, and required life style modifications that result from that condition or illness. Kanfer and Gaelick-Buys (1991) stated that a self-management process will be started when an individual needs to learn new behaviors, formulate a decision making strategy, modify current behaviors as a result of failure or achievement of earlier goals, or find new strategies of problem solving as a result of interruption or ineffective habitual response sequences to earlier attempted solutions. The overall self-management process consists of three processes: self-monitoring, self-evaluation, and self-reinforcement.

In the self-monitoring process, an individual intentionally monitors and observes his/her existing behaviors. Next, in the self-evaluation process, an individual compares his/her existing behaviors with what he/she ought to do (desired behaviors) and identifies whether he/she is meeting or not meeting the desired behaviors. Then, in the self-reinforcement process, an individual reacts cognitively and emotionally to the results of the self-evaluation process. As results of the self-reinforcement process, an individual decides to act, modify, maintain, or change his/her existing behaviors.

The decision have been made in the self-reinforcement process can be manifested as a therapeutic contract. A therapeutic contract is a written statement between the individual and his/her healthcare providers that outline specific actions that the individual agrees to execute to fulfill the agreement. Practically, this therapeutic contract is applied as goal setting and action planning strategy. Based on Kanfer and Gaelick-Buys (1991), the goal setting and action planning strategy have several important points in general, including clear and detailed descriptions of the required behaviors with some contractual goals specific to time and frequency, it can

be evaluated within a short time so responses can occur quickly, and it is easy to measure and evaluate. In addition, Kanfer and Gaelick-Buys also emphasized the importance of the individual's self-confidence in his/her ability to execute the required program or desired behaviors. Such a program should be designed to increase the probability of success by insuring that desired behaviors do not exceed the individual's capacity to boost his/her self-confidence through the success of past experiences.

In this study the contents of desired dietary behaviors for patients with T2DM were adopted from ADA (2009c), Savoca and Miller (2001), and Tjokroprawiro (2006). In general, the desired dietary behaviors consisted of four dimensions including recognizing the amount of calorie needs, selecting a healthy diet, arranging a meal plan, and managing dietary behaviors challenges.

The proposed dietary self-management support program in this study was conducted over a 1-month period and consisted of several sessions. Firstly, the individual reflection sessions gave the patient a practice in intentionally identifying, observing, and monitoring his/her existing dietary behaviors (the self-monitoring process). Open ended questions were used by which the researcher facilitated the patient's reflections on this session. Secondly, the individual education and counseling session provided adequate information related to the patient's desired dietary behaviors. This session was tailored based on the patient's prior knowledge regarding diabetic dietary behaviors, which were measured prior to the beginning of the actual program. The knowledge from education and counseling session was particularly important to help the patient to justify his/her current dietary behaviors whether he/she was meeting or not meeting the expected behaviors through

comparing his/her current dietary behaviors with the desired behaviors (the self-evaluation process). Thirdly, by using the discussion technique, the patient was able to identify the dietary behaviors that he/she needed to change, modify, or that could be continued and further improve his/her overall dietary behaviors. Fourthly, the patient developed goal(s) and action plan(s) based on the results of the self-evaluation process with assistance from the researcher (the self-reinforcement process). The researcher measured the patient's self-confidence to achieve the various goals using a 10-point self-confidence scale based on Bodenheimer et al. (2007).

Lastly, the follow-up sessions (both through telephone and face-to-face follow-ups) permitted the progress of self-management process (self-monitoring, self-evaluation, and self-reinforcement) in motion. At these sessions, the researcher assisted the patient to evaluate and justify his/her goal achievement levels by identifying what action plans he/she had already done compared with the action plans as listed in his/her goal setting and action planning form. Also, any barriers to completing the plans and possible ways to solve the identified problems to allow goal achievement of the desired dietary behaviors were explored. After these discussions, the patient could decide to continue, modify, or develop a new goal(s) and new action plan(s) as a recognition of the failure or success to achieve the previous goals. Additionally, the researcher provided reinforcement for the patients' efforts to achieve their goal(s). Hence, during the follow-up sessions, the self-management processes were recycled. Figure 1 shows the integrated self-management process used to guide the construction of the dietary self- management support program to improve dietary behaviors among patients with T2DM in this study.

Dietary Self-Management Support Program		
Components [a]	Interventions	
	The Researcher's Activities	The Patient's Activities
Self-management process a. Self-monitoring* b. Self-evaluation** c. Self-reinforcement*** (Notes: *,**, *** are matched with the contents of the next column)	**Week 1 of Intervention (T0)**	
	1. Reflections on patient's current dietary behaviors* a. Using open ended questions b. Clarifying current dietary behaviors based on the "prior knowledge regarding diabetic dietary behaviors" questionnaire c. Listing the patient's current dietary behaviors	1. Actively reflecting and intentionally monitoring their own dietary behaviors*
	2. Individual education and counseling session** a. Providing one-to-one information related to dietary behaviors in patients with T2DM: general information and individualized information based on the patient's prior knowledge regarding recognizing the amount of calorie needs, selecting a healthy diet, arranging a meal plan, and managing dietary behaviors challenges b. Discussion and counseling about any misunderstanding and unclear topics c. Providing the dietary self-management booklet which contained all the topics covered in the discussions	2. Following the educational sessions actively (paying attention, asking or answering questions, clarifying unclear information, participating actively in the discussions)**
	3. Identification of the problems of dietary behaviors: discussing and comparing between the patient's current dietary behaviors with the desired dietary behaviors as discussed in the individual education sessions**	3. Discussing and comparing their own current dietary behaviors with the desired dietary behaviors and trying to explain or justify any discrepancies**
	4. Individual goal setting and action planning: generating individual, specific, negotiable, realistic, measurable, and achievable goal(s) and action plan(s) focused on modifying dietary behaviors based on the results of identification of dietary behaviors problems which can be evaluated within 1 week***	4. Developing specific, negotiable, realistic, measurable, and achievable goal(s) and action plan(s)***
	Week 2 (T1) to 1 Month (T3) of Intervention	
	5. Follow-ups: telephone (week 2-3) and face-to-face follow-ups (1 month)*,**, ***	5. Receiving the 2nd week, 3rd week, and 1-month follow-up sessions*,**, ***
	6. Evaluating the patients' goal achievement level*,**, *** a. Assisting the patient to identify and reflect on his/her dietary behaviors during the previous week* b. Helping the patient to compare performed behaviors with planned goal(s) & action plan(s) using the goal setting and action planning record/form** c. Assisting the patient to evaluate his/her goal achievement level** d. Discussing the barriers to achieving the patient's goal(s) and possible problem solving strategies** e. Providing reinforcement for any successful efforts towards achieve the patient's goal(s)*** f. Assisting the patients to continue or modify the goals and action plan***	6. Evaluating the achievement level of patient's goal(s)*,**, *** a. Identifying and reflecting on his/her dietary behaviors in the previous week* b. Comparing performed behaviors with planned goal(s) & action plan(s) by using his/her record/form** c. Evaluating his/her goal achievement level** d. Discussing the barriers and possible solutions** e. Receiving reinforcements of any effort to achieve the goal(s)*** f. Continuing or modifying of the goal(s) and action plan***

Dietary Behaviors

1. Recognizing the amount of calorie needs
2. Selecting a healthy diet
3. Arranging a meal plan
4. Managing dietary behaviors challenges

Goal Achievement Levels

Note: a –Each component continues over the full one-month program

Figure 1

Conceptual Framework of the Effect of Dietary Self-Management Support Program on Dietary Behaviors in Patients with Type 2 Diabetes Mellitus

Hypothesis

The specific hypotheses were stated as follows:

1. The dietary behaviors of the patients with T2DM after receiving the dietary self-management support program are better than before receiving the dietary self-management support program.
2. The dietary behaviors of the patients with T2DM receiving the dietary self-management support program are better than those receiving standard care.

Definition of Terms

The dietary self-management support program is a one-month program developed by the researcher to improve patients' dietary behaviors. The program is based on the Self-Management Method of Kanfer and Gaelick-Buys (1991). This program entails a series of individual reflections regarding his/her current dietary behaviors, providing individual education and counseling sessions regarding the desired dietary behaviors, including providing the patient with a self-management dietary behaviors booklet, assisting the patient to evaluate and identify current dietary behaviors problems, facilitating individual goal setting and action planning activities, evaluating the patient's self-confidence level, providing reinforcement, and conducting weekly follow-ups and brief counseling sessions through telephone and face-to-face follow-ups at the outpatient department of the target hospital.

The standard care program in this study refers to the usual care/service/support provided by healthcare providers at the same target hospital for every diabetic patient who attends this unit. Generally, the services include a monthly

regular check-up, medication, blood glucose monitoring, treatment of actual health problems, and unstructured occasional health education provided by the physician and/or nurse during the regular visit which covers several topics including dietary behaviors, foot care, insulin injections, medication, exercise, stress management, and blood glucose control. The specific content for dietary behaviors is mostly concerned with recommended healthy diet.

Dietary behaviors refer to the frequency of T2DM patients' activities in order to perform desired dietary behaviors over the previous month. Dietary behaviors consist of four dimensions: recognizing the amount of calorie needs, selecting a healthy diet, arranging a meal plan, and managing dietary behaviors challenges. In the actual study, the patients' dietary behaviors were measured by the Indonesian version of the Self-management Dietary Behaviors Questionnaire (SMDBQ) developed by the researcher which was adopted based on dietary behaviors recommendations for patients with T2DM from ADA (2009c), Savoca and Miller (2001), and Tjokroprawiro (2006). The patients' dietary behaviors were measured at baseline and one month of the intervention. With this instrument, a higher score indicates better dietary behaviors.

Goal achievement refers to the proportion of completed, partially completed, and not completed sections of the action plan(s). The evaluations were performed during the weekly follow-ups by asking the patients to indicate whether or not they accomplished their weekly goal(s). The goal achievement levels were categorized into completely achieved (all desired parts of the action plan(s) successfully accomplished), partially achieved (some parts of the action plan(s)

successfully executed), and no behavioral change at all (no part of the action plan was successfully performed).

Significance of the Study

The results of this study provide empirical evidence of the positive effect of the dietary self-management support program on dietary behaviors in patients with T2DM. The program was useful not only to help the patients to achieve better dietary behaviors, but also to improve the patients' ability to self-manage their dietary behaviors through goal setting, thereby helping the patients achieve better clinical outcomes such as controlled glycemia and prevent diabetic complications. The dietary self-management support program as described in this present study could be used as a clinical guideline to guide nurses and other healthcare professionals to help their patients to improve patients' dietary behaviors.

This study was presented at the following international conferences: (1) The Java International Nursing Conference 2010 in Semarang, Indonesia, October 2-3 2010, and (2) The 2nd International Conference on Prevention & Management of Chronic Conditions & The 11th World Congress of Self-care Deficit Nursing Theory in Bangkok, Thailand, March 23-25, 2011. Furthermore, this present study was published in Nurse Media Journal of Nursing with the following titles: (1) Review: Self-management support program on dietary behaviors in patients with type 2 diabetes mellitus (Primanda & Kritpracha, 2011), and (2) Dietary behaviors among patients with type 2 diabetes mellitus in Yogyakarta, Indonesia (Primanda, Kritpracha, & Thaniwattananon, 2011).

CHAPTER 2

LITERATURE REVIEW

This chapter presents a review of relevant literature. The review covers the following topics:

1. Overview of type 2 diabetes mellitus
    a. Pathophysiology of type 2 diabetes mellitus
    b. Risk factors of type 2 diabetes mellitus
    c. Clinical manifestations of type 2 diabetes mellitus
    d. Complications of type 2 diabetes mellitus
2. Management of type 2 diabetes mellitus
    a. Pharmacological management
    b. Lifestyle modification management
3. Concept of self-management
    a. Self-management process
    b. Goal setting and action planning strategy
    c. Goal achievement
4. Self-management of dietary behaviors in patients with type 2 diabetes mellitus
    a. Recognizing the amount of calorie needs
    b. Selecting a healthy diet
    c. Arranging a meal plan
    d. Managing dietary behaviors challenges
5. Dietary behaviors in Indonesian patients with type 2 diabetes mellitus

6. Factors Contributing to Self-Management of Dietary Behaviors in Patients with Type 2 Diabetes Mellitus
   a. Personal factors
   b. External factors
7. Dietary self-management support program in patients with type 2 diabetes mellitus
8. Summary

Overview of Type 2 Diabetes Mellitus

Pathophysiology of type 2 diabetes mellitus

Based on the American Diabetes Association (ADA, 2009a), diabetes mellitus is defined as a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The diagnosis of diabetes mellitus is based on several criteria depending on a patient's blood glucose. Fasting blood glucose (FBG) test, oral glucose tolerance test (OGTT), and random or casual plasma glucose test can be used to diagnose diabetes (Alberti & Zimmet, 1998). Using the FBG result, the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus (ADA, 2009a) categorize the diagnostic test into: normal fasting glucose (FBG < 100 mg/dl); impaired fasting glucose (IFG) (FBG = 100 – 125 mg/dl); and diabetes (FBG ≥ 126 mg/dl). The corresponding categories use the OGTT, the diagnostic test are classified into: normal glucose tolerance test (2-hour post load glucose [2-h PG] < 140 mg/dl); impaired glucose tolerance (IGT) (2-h PG = 140 – 199 mg/dl); and diabetes (2-h PG ≥ 200 mg/dl) (ADA). Another test to

diagnose diabetes mellitus is random or casual plasma glucose where its result is ≥ 200 mg/dl with the symptoms of hyperglycemia (ADA).

Type 2 diabetes mellitus (T2DM) is the most prevalent diabetes which accounts for approximately 90–95 % of those with diabetes (ADA, 2009a). Even though the specific causes of this type of diabetes are not known, T2DM is more often found in obese people (Schteingart, 2003). In patients with T2DM, two characteristics of metabolic defects which develop: insulin resistance and β-cell dysfunction. The first characteristic is insulin resistance which is defined as resistance to the effect of insulin on glucagon uptake, metabolism, or storage (Maitra, 2007). Insulin resistance is found in most individuals with T2DM and universal in most obese people. The second characteristic of a metabolic defect in patients with T2DM is β-cell dysfunction which reflects the inability of these cells to adopt themselves to the long-term demands of peripheral insulin resistance and increased insulin secretion. Therefore, the basis of the abnormalities in carbohydrate, fat, and protein metabolism appearing in patients with diabetes is due to a deficient action of insulin on target organs.

Risk factors of type 2 diabetes mellitus

Various clinical risk factors of T2DM are associated with increasing age, obesity, physical inactivity, genetics and a family history of diabetes, and racial and geographical factors. The prevalence of T2DM increases with age. Recently, T2DM is starting to present in children and in adolescents because of obesity and a positive family history of diabetes (Ehtisham, Barrett, & Shaw, 2000; Goran, Ball, & Cruz, 2003). The peak age of onset in a developing country is now 40-45 years, 10-20

years younger than was traditionally the case in the western world (Williams & Pickup, 2004). Being overweight (BMI $\geq$ 25 kg/m^2 for people in western countries, and BMI $\geq$ 23 kg/m^2 for Asian people) increases the risk factors of T2DM (ADA, 2009c). Furthermore, Williams and Pickup also revealed that a BMI > 35 kg/m^2 increases the risk of T2DM developing over a 10-year period by 80-fold, as compared with those with BMI < 22 kg/m^2. However, people who are not obese by the traditional weight criteria may have an increased percentage of body fat distributed predominantly in the abdominal region (central or truncal obesity) that also carries a high risk of developing T2DM (McTernan et al., 2002; Ohnishi et al., 2006; Williams & Pickup). In addition, poor diet management, habitual physical inactivity, a history of gestational diabetes mellitus or the delivery of a baby weighing more than nine pounds, polycystic ovary syndrome, a history of vascular disease such as hypertension (blood pressure $\geq$ 140/90 mmHg in adults), HDL cholesterol $\leq$ 35 mg/dl, and/or triglyceride $\geq$ 250 mg/dl are risk factors for T2DM (ADA).

Clinical manifestations of type 2 diabetes mellitus

The clinical manifestations of T2DM are related to the metabolic consequences of insulin deficiency (Schteingart, 2003). Patients with insulin deficiency are unable to maintain normal fasting plasma glucose levels or glucose tolerance after ingesting carbohydrates. If the hyperglycemia is severe and exceeds the renal threshold for this substance reabsoprtion, glycosuria will emerge. The glycosuria leads to osmotic dieresis which causes increased urine output (polyuria) causing a loss of water and electrolytes in the body. On the other hand, an increased level of glucose in the blood is because of the inability of insulin to transport glucose

to the cells resulting in hyperosmolarity. The combination between renal water loss and the hyperosmolarity tends to deplete intracellular water, triggering the osmoreceptors of the thirst centers of the brain. Thus, the intents to thirst increase (polydipsia). With the deficiencies of insulin, the scales swing from insulin promoted anabolism to catabolism of proteins and fats. Proteolysis follows, and the gluconeogenic amino acids are removed by the liver and used as building blocks for glucose. The catabolism of proteins and fats tend to induce a negative energy balance, which in turn leads to an increase in appetite (polyphagia), thus completing the classic triad of diabetes: polyuria, polydipsia, and polyphagia. Despite the increase in appetite, catabolic effects prevail, resulting in weight loss and muscle weakness. Furthermore, impairment of growth and susceptibility to certain infections may also develop (ADA, 2009a).

Complications of type 2 diabetes mellitus

Patients with T2DM have a high risk of developing both short term and long term complications. The short term complications include hypoglycemia and hyperglycemia with ketoacidosis or the non ketotic hyperosmolar syndrome which leads to stupor, coma, and death if not treated adequately (ADA, 2008; Alberti & Zimmet, 1998). It also includes infections such as cutaneous furunculosis and carbuncles, vulvovaginitis, cellulitis, urinary tract infection, and ear infection which lead to metabolic abnormalities and diabetic coma (ADA). The long-term complications include vascular diseases (both microvascular and macrovascular), neuropathic conditions (sensorimotor neuropathy and autonomic neuropathy), and a mix between vascular and neuropathic diseases (ADA; Stratton et al., 2000).

Microvascular diseases include retinopathy and nephropathy; whereas macrovascular diseases include accelerated coronary atherosclerosis, accelerated cerebrovascular atherosclerosis, and accelerated peripheral vascular disease. Furthermore, patients with T2DM have a high risk of developing other complications related to chronic diseases (Nathan, 2003).

Management of Type 2 Diabetes Mellitus

There are two major management goals for patients with T2DM: to achieve near-normal metabolic control and to prevent microvascular and macrovascular complications (ADA, 1998). However, since diabetes management is complex and requires many issues beyond glycemic control, it needs an appropriate management including pharmacological and lifestyle modification management.

Pharmacological management

Pharmacological management uses oral hypoglycemic agents and insulin is provided to the patients when lifestyle modification management cannot control their glycemic level and their conditions get worse (Williams & Pickup, 2004). Certain medication used in an individual patient with T2DM is determined by clinical judgment about the likely balance between β-cell impairment and insulin resistance in their particular condition.

Sulphonylureas. Sulphonylureas are sulfonamide derivatives. The major action of sulphonylureas is to improve glycemic control through three mechanisms: (1) release insulin from β-cells pancreas, (2) reduction of serum glucagon levels, and (3) an extrapancreatic effect to potentiate the action of insulin on

its target tissues (Karam, 1998). Sulphonylureas are indicated as an adjunct to diet and exercise to lower blood glucose in T2DM (Karch, 2003). Furthermore, since sulphonylureas require functional β-cells, therefore this medication is useful in the early stages of T2DM (Rang, Dale, Ritter, & Flower, 2007). The most common adverse effect of these drugs is hypoglycemia which can be severe and prolonged.

Biguanides. Biguanides are recommended as the first-line therapy for T2DM. It offers more advantages over insulin or sulphonylureas in treating hyperglycemia because it is an insulin sparing agent and does not increase weight or provoke hypoglycemia (UK Prospective Diabetes Study [UKPDS], 1998). The common drug of this class is metformin. Acute side effects of Metformin include diarrhea, abdominal discomfort, nausea, metallic taste, and anorexia. These adverse effects can be minimized by increasing the dosage of the drugs slowly and taking it with meals (Davis, 2006). Metformin lowers the hemoglobin A1c value by about 2%, and can reduce plasma triglycerides by 15% to 20% (Davis).

Alpha-glucosedase inhibitors (aldose reductase inhibitors). Acarbose (Precose®) and miglitol (Glyset®) are competitive inhibitors of the intestinal α-glucosedases and reduce post-meal glucose excursion by delaying the digestion and absorption of starch and disaccharides which results in an insulin sparing action. α-Glucosedase inhibitors do not stimulate insulin release and therefore do not result in hypoglycemia (Davis, 2006). Monotherapy with these drugs is associated with a modest drop (0.5-1%) in glycohemoglobin levels and a 20-25% mg/dl fall in fasting glucose levels (Nolte, 2009). Flatulence is the principal adverse effect which can be seen in 20-30% patients (Karam, 1998). α-Glucosedase inhibitors are used in T2DM

whose diabetes is inadequately controlled by diet with or without other agents (Rang et al., 2007).

Thiazolidinediones. Thiazolidinediones (Tzds) are a new diabetic drug class. In a patients with diabetes, a major site of Tzds action is the adipose tissue where the drug promotes glucose uptake and utilization and modulates the synthesis of lipid hormones or cytokines and other proteins involved in energy regulation. Furthermore, these drugs reduce hepatic glucose output, enhancing the effectiveness of endogenous insulin and reducing the amount of exogenous insulin needed to maintain the blood glucose level by approximately 30% (Rang et al., 2007). Although these medications are highly efficacious, the adverse effects of weight gain, congestive heart failure, an increased bone fracture risk in women, and possible worsening of cardiovascular risk (for rosiglitazone), potentially limit the drugs' popularity and future use (Nolte, 2009).

Insulin therapy. For patients with T2DM, insulin therapy may be required if they are unable to control their blood glucose levels with oral medications, healthy dietary behaviors, exercise, or weight loss programs and experiencing physical stress such as surgery, infections, and prolonged use of corticosteroids. Patients with T2DM also may require insulin after several years with the disease because the body may stop producing sufficient insulin. Insulin can be used as monotherapy or in combination with oral agents. Based on the American Association of Clinical Endocrinologist (AACE)'s recommendation, insulin therapy is considered in patients with HbA1c levels greater than 8% with symptomatic hyperglycemia and in patients with elevated fasting blood glucose levels or exaggerated postprandial glucose excursions regardless of HbA1c levels (AACE, 2007).

Lifestyle modification management

For patients with T2DM, lifestyle modification management can be the first choice for their diabetes management. This management includes nutrition or dietary management, weight control management, exercise, psychosocial considerations, and self-monitoring.

Dietary management. Dietary management is the main part in the overall management of diabetes. In a patient with T2DM, dietary management is absolutely recommended in order to manage existing diabetes and to prevent or at least slow the rate of the development of diabetes complications (ADA, 2008). The general goals of dietary management based on ADA consist of four goals: (1) achieve and maintain: a blood glucose level in the normal range as close to normal as is safely possible, lipid and lipoprotein profile that reduces the risk for vascular disease, and blood pressure levels in the normal range or as close to normal as is safely possible, (2) to prevent, or at least slow, the rate of development of the chronic complications of diabetes by modifying nutrient intake and lifestyle, (3) to address individual nutrition needs, taking into account personal and cultural preferences and the willingness to change, and (4) to maintain the pleasure of eating by only limiting food choices when indicated by scientific evidence.

Weight control management. Since T2DM is associated with obesity, it is imperative to control body weight. Patients with T2DM with obesity should decrease their body weight. It is important to set a weight loss goal that is both achievable and maintainable. Even a moderate weight loss of 5% of body weight can produce significant health benefits such as improved insulin action, decreased fasting blood glucose concentration and a reduced need for diabetes medication (Klein et al.,

2004) and this loss of 5% may be a reasonable initial goal for most patients. Several strategies have been developed to promote weight loss in patients with T2DM including behavioral therapies, exercise, diet, anorectic drugs, surgery, or a combination of these strategies. Dietary strategies alone are most effective for promoting short-term weigh loss in T2DM (Brown, Upchurch, Anding, Winter, & Ramirez, 1996). However, for better outcomes of long-term weight reduction, dietary strategies combined with behavioral therapy that is aimed at developing skills required to successfully change problematic eating and activity patterns is recommended (Klein et al.).

Exercise. Exercise is important for patients with T2DM. It can decrease the hemoglobin A1c approximately 0.6% (Boule, Haddad, Kenny, Wells, & Sigal, 2001). Exercise also produces beneficial effects on the cardiovascular system and maintains an ideal body weight (Wallace & Matthews, 2002). Exercise should be tailored to the individual patients, according to their physical condition and life style. In addition, when healthcare professionals encourage patients with diabetes to perform exercise, the safety mode of exercise including frequency, duration, intensity, and appropriateness of exercise should be a concern. Based on recommendations of ADA (2009c), patients with T2DM should perform at least 150 min/week of moderate-intensity aerobic physical activity (50-70% of maximum heart rate). Furthermore, they recommend that in the absence of contraindications, people with T2DM should perform resistance training three times per week.

Stress management. T2DM is one of chronic diseases that places patients in a long life illness condition. They have to make adjustments for living with diabetes mellitus that can lead to stressful conditions. Stress raises glucose levels

through symphatetic nervous activation, resulting in metabolism dysregulation and increased blood glucose levels. Thereby, stress management has a significant effect on improving glycemic control in patients with T2DM (Surwit et al., 2002). Stress can be managed through the use of behavioral stress management programs (Henry, Wilson, Bruce, Crisholm, & Rawling, 1997; Mendez & Belendez, 1997) or through the administration of anxiolytic medications (Surwit et al.).

Self-monitoring. Self-monitoring becomes an essential component in patients with T2DM. To effectively manage their disease, patients with T2DM need to effectively monitor and respond to a much broader set of signs and symptoms than blood glucose only (Song & Lipman, 2008). Patients need to monitor the possibility of acute complications such as hyperglycemia and hypoglycemia and find the appropriate treatment to prevent the development of acute complications as well. Furthermore, patients need to self-monitor the possibility of long-term complications including retinal problems, diabetic neuropathy, and foot ulcers.

From those several lifestyles modification management, dietary management is considered to be an essential management in patients with T2DM (ADA, 2009b; Wing et al., 2001). Dietary management has a significant impact on blood glucose levels. It can decrease the levels of hemoglobin A1c 1-2% in patients with T2DM depending on the duration and severity of diabetes (Pastors et al., 2003), compared with physical activity that only decrease hemoglobin A1c 0.6% (Boule et al., 2001). It is also proved to be effective in control weight and improve glucose tolerance which is imperative in prevention of diabetes complications (Swinburn et al., 2001). Thus, dietary management in patients with T2DM can decrease the development of complications along with glycemic control (ADA, 2008).

Another consideration related to dietary management is associated with its complexity. Dietary management is recognized to be the most difficult to manage by both healthcare professionals and patients (Grodner et al., 2007). Even though the importance of dietary management is well known by patients, several studies reported that patients were often overwhelmed to manage their dietary behaviors; therefore, they could not self-manage their dietary behaviors appropriately (Nagelkerk, Reick, & Meengs, 2005; Nelson et al., 2002; Meeto, 2004). For those reasons, it is necessary to consider dietary management in patients with T2DM.

Concept of Self-Management

Self-management refers to the individual's ability to manage the symptoms, treatment, physical and psychological consequences, and life style changes inherent in living with a chronic condition resulting in the ability to monitor one's condition and to affect the cognitive, behavioral, and emotional responses necessary to maintain a satisfactory quality of life; thereby establishing the dynamic and continuous process of regulation of the self (Barlow et al., 2002). Self-management is especially important for those with chronic conditions including T2DM; where the patient is the one who has to be responsible for his or her day-to-day care over the length of the illness, mostly for their life time, and the fact that an individual has an ability to control and effectively manage his or her health (Lorig & Holman, 2003). When individuals self-manage, they control and are responsible for the management of chronic conditions or healthy behaviors by purposefully engaging in performing recommended behaviors (Ryan & Sawin, 2009). The term of self-management is often used interchangeably with self-care which encompasses the patient's active role

in determining healthy behaviors related to their disease. Indeed, self-care and self-management is linked to each other; if one exists, the other should do so (Embrey, 2006).

The concept of self-care by Orem describes how illness, life cycle changes and environment could affect a person's ability to self-care, resulting in self-deficit. In addition, the aims of nursing care are to reduce self-care demands, for example, the need to carry out personal care such as hygiene, to increase the patient's (carer's) ability to care for him or herself, and to give care directly if the patient is not able to do so (Hughes, 2004). In contrast to self-management that requires collaboration with professionals (Embrey, 2006), self-care often does not involve the collaboration between professionals and patients (Ryan & Sawin, 2009). Self-care focuses on the illness rather than the achievement of a wider perspective on health (Hughes).

Self-management can be seen as a process, program or method, and outcome (Ryan & Sawin, 2009). As a process, self-management entails the use of self-management skills to manage conditions or risk factors. Self-management as a program or intervention, also called a self-management support program, designed by healthcare professionals with the intention to prepare patients to assume the responsibility to manage their chronic illnesses or engage in health promotion activities. As an outcome, self-management means the engagement in the self-management process such as the maintaining dietary behaviors, smoking cessation or self-monitoring blood glucose.

Kanfer and Gaelick-Buys (1991) view self-management method as a nursing method or intervention in managing chronic illness which is emphasized as an

essential aspect in care of people with long term conditions. Kanfer and Gaelick-Buys explained that intervention using a self-management method emphasizes the importance of the patients' responsibility which encourages rehabilitative experiences in which the patient accepts increasing responsibilities for his or her own behaviors, for dealing with the environment, and for planning the future instead of offering a protective treatment environment. The focus of self-management is the patient's engagement in the behavioral change process. Indeed, the role of healthcare professionals is providing the most favorable condition for change. The aims of a self-management method consist of three outcomes: (1) to help patients acquire more effective interpersonal, cognitive, and emotional behaviors; (2) to alter the patients' perceptions and evaluative attitudes of problematic situations; and (3) to either change a stress-inducing or hostile environment or learn to cope with it by accepting that it is inevitable (Kanfer & Gaelick-Buys).

A self-management method is important when the behavioral change becomes the target of intervention. Based on Kanfer and Gaelick-Buys (1991), behaviors are viewed as the product of three sources of control: the immediate environment, the person's biological system, and the cues originating from the person's repertoire of cognitive and self-directive variables. These three sources of control interact and influence people's behaviors. Behaviors are shaped ultimately by the mutual effect at a particular point in time. Among those three sources, the influences of a single source can never be eliminated, rather its relative importance shifts across time and a changing environment. For example in dietary behaviors, it is sometimes mostly under the control of the biological system. At other times, environmental factors such as the smell of fresh bread, of the sight other people eating

are more important. Training in self-management can decrease the effects of temporary fluctuations in biological and environmental variables on a person's behaviors. Hence, people can control their behaviors even though the control might be failure if the strength of the variables from the environment or on the person's biological system is substantially increased.

Self-management process

A self-management method involves three processes including self-monitoring, self-evaluation, and self-reinforcement (Kanfer & Gaelick-Buys, 1991). Self-monitoring occupies deliberately attending to one's own behaviors. This process requires an individual's full awareness and intentional reflection on current behaviors. The next is the self-evaluation process in which a patient compares the information obtained from self-monitoring and the patient's standards for the given behaviors. It engages the comparison between what one is doing and what one is ought to be doing. The effective self-management behaviors will be interfered with when the self-evaluation is based on inappropriate or insufficient self-monitoring or on a vague and unrealistic standard. It is because the comparison does not yield an effective guide for corrective behaviors. The last process is self-reinforcement. Here, the patient reacts cognitively and emotionally to the result of the self-evaluation. This process may result on both feedback effects and feedforward effects. Feedback effects influence the strength of the current reaction to preceding behaviors in which an individual persists to continue the existed behaviors. In contrast, feedforward effects influence the individual's future expectations and behaviors by learning, developing, modifying, or changing the preceding behaviors. The feedforward effects happen when the

patient meets the standard of desired behaviors and continues to create new discrepancy behaviors and sets the self-management process in motion again. Furthermore, meeting the standard can lead to a reevaluation of performance in related areas.

In addition, Kanfer and Gaelick-Buys (1991) also emphasized the importance of the patient's perceived control of the process in the self-management support program as manifested by the patient's self-confidence in his/her ability to execute the required program or expected behaviors. They suggested that such a program should be designed to increase the probability of success by insuring that task demands do not exceed the patient's capacity to boost patient's self-confidence through the success of past experiences, the most effective source of self-confidence. Several studies showed that a high level of self-efficacy leads to effective self-management and better health outcomes including self-care behaviors (diet, exercise, self-monitoring blood glucose, and foot care), health related quality of life, psychosocial wellbeing and the utilization of health services (Kavookjian et al., 2005; Lanting, Joung, Vogel, Bootsma, Lambert, & Mackenbach, 2008; Savoca & Miller, 2001; Whittemore, Melkus, & Grey, 2005; Wu, 2008).

Goal setting and action planning strategy

In using a self-management method, several specific intervention programs are suggested including a therapeutic contract. A therapeutic contract is a written statement between the patient and his/her healthcare providers that outline specific actions that the patient agrees to execute to fulfill the agreement (Kanfer & Gaelick-Buys, 1991). Kanfer and Gaelick-Buys suggested that the contract should be

explained in a clear and detailed way, arrived at by negotiation, accepted fully by the patients, and made so as to avoid a contract that may be difficult or impossible for the patient to achieve. Therapeutic contracts can reduce patient's fears that they will never overcome their problems by requiring only small behaviors changes at the first (Kanfer & Gaelick-Buys). In the practice setting, a therapeutic contract has a similar meaning with goal setting and action planning. Therefore, in this study, the term of therapeutic contract is replaced with goal setting and action planning.

In detail, Kanfer and Gaelick-Buys's (1991) identify seven elements in the goal setting and action planning: (1) a clear and detailed description about the required behaviors, (2) a clear set criterion of time or frequency related to goal achievement, (3) the contract specifies positive consequences when the goal can be achieved, (4) provisions be made for some aversive consequences as a result of not achieving the goal within a specified time or with specific frequency, (5) a positive appreciation and motivation indicates the additional positive reinforcements obtainable if the individual achieves or exceeds the goal, (6) the goal setting and action planning specifies the means by which the behaviors are observed, measured, and recorded which enables the individual to be informed about the goal achievements, and (7) arrangement of the timing for delivery of reinforcement eventuality to follow the response as quick as possible.

Specifically, Bodenheimer et al. (2007) developed well known goal setting and action planning strategy. As recommended by Kanfer and Gaelick-Buys (1991), this strategy emphasized the successes of completion of goal setting and action planning to boost the sense of self-mastery which contributes to the patient's confidence to achieve the goal. Goal setting assists patients to work toward healthier

behaviors and involves patients agreeing on a general self-management goal. Action plans are concrete and specific activities that patients agree to do to help achieve their goal.

The goal setting and action planning strategy based on Bodenheimer et al., (2007) was used in several research studies and showed better outcomes on patients' behaviors including dietary behaviors, exercise or activity, medication, insulin use, stress reduction, and smoking cessation (DeWalt et al., 2009; MacGregor et al., 2006; MacGregor, Wong, Sharifi, Handley, & Bodenheimer, 2005; Wallace et al., 2009). In addition, those studies found that the feasibility of the goal setting and action planning to be implemented in busy primary care with limited clinician personnel is high. Thereby, it may be benefit to employ this existing intervention to improve the dietary behaviors of patients with T2DM in Indonesia.

Goal Achievement

Once the patient sets a goal and action plan, evaluation of the goal achievement becomes necessary. As Kanfer and Gaelick-Buys (1991) stated, the goal achievement plays a pivotal role in the process of self-management since it contributes to the motion of the self-management process. Generally, the purposes of the goal achievement evaluation are to provide reinforcement, identify barriers and explore problem solving, identify helpful resources or skill building activities, and adjusting goals if necessary (Shilts, Horowitz, & Townsend, 2004).

During evaluation of goal achievement, the process of self-management will be recycled (Kanfer & Gaelick-Buys, 1991). Individuals who achieve the goal often initiate additional behavioral changes (DeWalt et al., 2009).

The goal achievement is also believed to be one source of individuals' self-confidence which is useful to enhance the self-management process (Kanfer & Gaelick-Buys). Whilst, lack of success on the goal achievement can be translated into lessons learned instead of failure which enables an individual to develop problem solving related to barriers to success in carrying out the action plan (Bodenheimer et al., 2007). By this evaluation process, the individuals' behavioral changes may be detected even though the individuals do not completely achieve their goal (DeWalt) or even though the behavioral changes are only small but still amount to real change (Bastiaens et al., 2009).

Self-management of Dietary Behaviors in Patients with Type 2 Diabetes Mellitus

Self-management of dietary behaviors plays a pivotal role in T2DM management. Based on Tjokroprawiro (2006), it focuses on three dimensions including recognizing the amount of calorie needs, selecting a healthy diet, and arranging a meal plan. Indeed, it entails the management of dietary behaviors challenges including avoiding favorite foods, weight management, dining out, and portion control (Savoca & Miller, 2001). Thereby, self-management of dietary behaviors in patients with T2DM consists of four dimensions including: recognizing the amount of calorie needs, selecting a healthy diet, arranging a meal plan, and managing dietary behaviors challenges.

Recognizing the amount of calorie needs

The amount of calorie needs can be recognized based on total calories needed for an individual. Total calorie needs are calculated based on the Body Mass Index (BMI). BMI is calculated using body weight divided by the square of body height (kg/m^2). Classifications of nutritional status based on BMI from the Indonesian Association of Study Related to Obesity (HISOBI, as cited in Tjokroprawiro, 2006) are as follows: underweight (BMI < 18.5), normal (BMI 18.5 – 22.9), overweight (BMI ≥ 23), at risk (BMI 23 – 24.9), and obesity (BMI ≥25). In patients with sedentary activity, the daily calorie needs based on the BMI are 40-60 cal/kg (underweight), 30 cal/kg (normal), and 20 cal/kg (overweight).

Generally, the physician should identify the requirement of the total calories needed for the patient. For instance, if the diet order is prescribed for 2000 kcal, it can be calculated as follows (protein 10%, carbohydrate 60%, and fat 30%):

Protein: 2000 x 10% = 200 kcal (4 kcal/gram = 50 gram protein)

Carbohydrate: 2000 x 60% = 1200 kcal (4kcal/gram = 300 gram carbohydrate)

Fat: 2000 x 30% = 600 kcal (9kcal/gram = 66.67 gram fat)

In Yogyakarta, Indonesia, a study from Ngwenya and Ray (2007) found that the amount of calorie consumption per day was increasing both in rural (1,746.89 kcal in 1996 to 2,485.77 kcal in 2002) and in urban areas (1,438.47 kcal in 1996 to 2,599.32 kcal in 2002). This increasing calorie intake contributed to the high prevalence of obesity among adults and further contributed to the high prevalence of chronic diseases including T2DM. For patients with T2DM, this excessive calorie consumption will impact on further development of complications.

Selecting a healthy diet

Patients with T2DM are now encouraged to eat a healthy well-balanced diet that provides all the essential macro- and micronutrients in appropriate amounts (Choudhary, 2004). The general dietary guidelines from the American Diabetes Association and the American Heart Association (ADA, 2008; Klein et al., 2004) stated that patients with T2DM are recommended to: (1) consume a variety of fruits, vegetables, grains, low-fat or nonfat dairy products, fish, legumes, poultry, and lean meats, (2) limit foods high in saturated fat, trans-fatty acids, and cholesterol; substitute unsaturated fat from vegetables, fish, legumes, and nuts, (3) emphasize a diet rich in fruits, vegetables, and low-fat dairy products, (4) limit salt and (5) limit alcohol intake.

Carbohydrate. In patients with T2DM, carbohydrates play fundamental roles in glycemic control. Common dietary carbohydrates include sugar, starch, and fiber. Carbohydrates are recognized to cause a postprandial rise in blood glucose more than protein or fat (Dudek, 2007). The most consideration related to carbohydrate consumption is the total amount of carbohydrate that the person with diabetes chooses to have for a meal or snacks. This is the basis of carbohydrate counting, whereby food portions contributing 15 g of carbohydrate (regardless of the source) are considered to be one carbohydrate serving (Franz, 2004). In Indonesia, the recommended amount of carbohydrate for patients with diabetes is 68% of their total calories (Tjokroprawiro, 2006). Keeping the number of carbohydrate servings the same time at each meal from day to day is often a goal of a diabetes meal plan (Powers, 2003).

Another consideration related to carbohydrate consumption is the glycemic index, sugar and sweeteners, and fibers. The glycemic index is a system to categorize carbohydrate foods based on how high they raise the blood glucose level after they are eaten (Powers, 2003). Foods which contain low glycemic indexes include oats, barley, bulgur, beans, lentils, legumes, pasta, apples, oranges, milk, and yoghurt. There is limited evidence to support the long-term usefulness of low glycemic index diet compared with high glycemic index diet in patients with T1DM and T2DM (Franz, 2004). Related to sugar and sweeteners, traditional assumptions that sugar causes diabetics' blood glucose levels to rise too high and too quickly no longer hold true (Dudek, 2007). However, it is still good advice to suggest to patients with diabetes to be careful in their consumption of foods containing large amounts of sucrose (Franz). Furthermore, the usage of sugar alcohols and nonnutritive sweeteners are safe when consumed within the acceptable daily intake (ADI) levels, for example aspartame below 50 mg/kg daily, established by the food drugs administration (FDA) (ADA, 2008). As for general information, patients with T2DM are encouraged to consume a variety of fiber-containing foods as much as 25 g/day for women and 38 g/day for men.

Carbohydrate distribution throughout the day is important and needs to be managed. Tjokroprawiro (2006) suggests the distribution of carbohydrates into six meals every three hours which consists of three big meals (25% of carbohydrate) and three snacks (10% of carbohydrate). This distribution method allows the body to be ready to make more insulin for the next rise in blood glucose.

In Indonesia, rice is the most important staple food and carbohydrate source for Indonesians. In some of the islands in eastern Indonesia, corn, sago,

cassava, and sweet potatoes are also considered as staple food. However, today those alternatives carbohydrate sources are regarded as "poor man's food" and rice is the preferable one (Eliot, Capaldi, & Bickersteth, 2001). Indonesians eat rice a lot. In fact, some Indonesians feel they don't eat a meal unless it is rice. There is a saying, even if Indonesians have eaten a loaf of bread, they are still hungry (Rahardjo, 2002). This statement may contribute to the study findings of Atmarita (2005) who revealed that Indonesian people consumed excessive cereals (carbohydrate), especially in rural areas.

Most foods in Indonesia are sweet, including Yogyakartan foods. Commonly, sugar palm or sweet soy is added to foods (Koane & Bruijn, 1996). Even the traditional foods that can be found every where in Yogyakarta namely "*gudheg*" (jackfruit curry) is also sweet. Almost all of the drinks and beverages contain sugar, except people order the drink without sugar (Vaisutis, 2007). In addition, consuming one or more sweet foods daily is common among Indonesian people (Usfar et al., 2010).

Protein. In patients with T2DM, ingested protein can increase the insulin response without increasing the plasma glucose concentration. High-protein diets are not recommended as a method for weight loss at this time since the long-term effects of a protein intake > 20% of calories on a diabetes management plan and its complications are unknown (ADA, 2008). The dietary intake of protein for individuals with diabetes is similar to that of the general public and usually does not exceed 20% of energy intake (ADA; Franz, 2004).

In Indonesia, the most common protein source is soybeans. Tofu (*tahu*) and fermented compressed soybeans (*tempe*) are two most popular protein contained

foods (Forshee, 2006). Most Indonesians prefer fish, poultry, and eggs to red meat. Indonesian Muslims do not eat pork. Protein consumption including eggs and milk, meat, and fish is increasing among Indonesian (Atmarita, 2005).

Fat and Oil. The primary goal with respect to dietary fat in patients with diabetes is to limit saturated fatty acids, trans-fatty acids, and cholesterol intakes to reduce cerebro vascular disease (CVD) risks. In all people with diabetes, less than 7% of their energy intake could be derived from saturated fats, a minimized intake of trans fat, and their dietary cholesterol intake should be less than 200 mg daily (ADA, 2008). In Indonesia, oils and coconut milk is widely used in foods. Coconut milk is an essential cooking ingredient in Indonesian foods. In fact, coconut milk contains high calories and saturated fats (Coila, 2010). A 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.

Vitamins and minerals. Based on ADA's recommendation (2008), the routine supplementations with antioxidants such as vitamin E, vitamin C, and carotene is not advised. Furthermore, supplements provide no proven benefit in managing T2DM unless underlying nutrient deficiencies exist. Furthermore, chromium supplementation also cannot be recommended since the evidence does not clearly demonstrate its effects. However, folic acid to prevent birth defects and calcium to prevent osteoporosis are found to be beneficial (Dudek, 2007).

Alcohol. For patients with T2DM, alcohol consumption should be limited to a moderate amount; one drink or less per day for women and two drinks or less per day for men (1 drink = 12 oz beer, 5 oz of wine, or 1½ oz of distilled spirits

[15 g alcohol]). To reduce the risk of nocturnal hypoglycemia in individuals using insulin or insulin secretagogeues, alcohol should be consumed with food. Moderate amounts of alcohol consumption has no acute effect on glucose and insulin concentrations when ingested alone; however, carbohydrate co-ingested with alcohol as in a mixed drink may raise the blood glucose (ADA, 2008). Alcohol consumption should be avoided during pregnancy and lactation and by people who have a history of alcohol abuse (Dudek, 2007). In Indonesia, since the majority of people are Muslim, alcohol consumption is uncommon. However, in some regions where there is a significant non-Muslim population, alcohol is consumed freely (Vaisutis, 2007).

Sodium or salt. The concern to limit the sodium intake in patients with T2DM is because many of them have high blood pressure or hypertension. Thus, the goal of blood pressure levels for patients with diabetes is based on the ADA recommendation which is less than 130/80 mmHg (ADA, 2009c). To achieve this goal, a diet in low sodium becomes the first line intervention. In normotensive and hypertensive individuals, a reduced salt intake to 6 g/day (2,300 mg sodium) with a diet high in fruits, vegetables, and low-fat dairy products lowers blood pressure. For patients with T2DM and symptomatic heart failure, a dietary sodium intake of < 2,000 mg/day may reduce symptoms (ADA, 2008).

Arranging a meal plan

Several methods can be used to determine meal planning in patients with T2DM including an exchange system plan, plate methods, a diabetic food pyramid, and carbohydrate counting plans.

Exchange system plans. The American Diabetic Association and the American Dietetic Association developed the Exchange List for Meal Planning as a framework for choosing a healthy diet that is relatively consistent in total calories and the amount of carbohydrate, protein, and fat eaten daily. In the exchange system, food is categorized into three major groups: carbohydrates, meat and meat substitutes, and fats. Within each major category are subgroups that form the exchange list. Each food in a particular group is given a serving size, so each serving has a similar amount of carbohydrate, protein, and fat (Powers, 2003). In Indonesia, the Ministry of Health Republic of Indonesia released an exchange list for the Indonesian population. In this exchange list, food is categorized into six groups including carbohydrate, protein from an animal source, protein from a plant source, vegetables, fruits, milks, and oils.

The advantages of exchange system plans are as follows: enable patients to simplify meal planning, eliminate the need for daily calculations, provide flexibility and variety, ensure a relatively consistent intake, and emphasize important nutrition principles such as limiting and modifying fats and controlling sodium intake. However, the exchange list may not be appropriate for all ages, ethnic, and cultural groups. This approach is best suited to people who want or need structured meal-planning guidance and are able to understand complex details. Some patients progress from using an exchange list to carbohydrate counting (Dudek, 2007).

Plate method. This method is a visual method for teaching food amounts. This method is one of easiest methods to determine a meal plan and monitor portion sizes (Powers, 2003). Patients can take out one dinner plate and divide it in half. Fill one half with vegetables. The other half is divided into two sections: one for starchy foods and the other for protein foods.

Diabetic food pyramid method. A diabetic food pyramid is an alternative method for patients who cannot master the details of the exchange list or carbohydrate counting. This method is less than ideal but the consistency in the amount of servings from various food groups may be achieved, even if the quality of food choices is not considered, for example sodium and fat (Dudek, 2007). Therefore, to compensate for intricate details that may be lost in the translation, such as "lean" meat and "nonfat" milk, it may be practical to recommend fewer fat servings than the exchange calculation, approximately one serving per meal. Using this method; patients have to select the number of servings that they want to eat each day from the six food group table. Then patients divide those servings throughout the day into their meals and snacks.

Carbohydrate counting plans. The basic principle of this method is the concept "that a carbohydrate is a carbohydrate is a carbohydrate" and that carbohydrates are what affect the postprandial glucose levels (Dudek, 2007). This method focuses mainly on carbohydrates by counting the amount of carbohydrates consumed at each meal and snack, and emphasizes the consistent quantity of total carbohydrates without restricting the type. It is a very useful method when patients begin to take diabetes medication and is most useful in patients who use flexible insulin management or an insulin pump (Powers, 2003). The advantages of this method is its flexibility that allows patients with diabetes to feel more in control and offers the potential for improved glucose control. However, patients need to regularly record their blood glucose levels before and after eating and they need to measure their foods. In addition, the goals of weight control and healthy eating may be

forgotten since this method is only concerned with carbohydrates, without concern fo protein and fat.

In Indonesian culture, a mealtime is typically a casual and solitary affair. Foods are prepared in the early morning for any one who wants to eat at any time. No specific time is set for a meal. Usually people eat two to three times per day depending on their preference.

Managing dietary behaviors challenges

Another dimension that should be of concern in the self-management of dietary behaviors is managing dietary behaviors challenges. Dietary behaviors challenges are determined as some situations and behaviors that hinder the establishment and maintenance of self-management of a diet including avoiding favorite foods, portion control, weight management, and dining out (Savoca & Miller, 2001; Yannakoulia, 2006). Several studies revealed that patients tend to consume favorite foods rather than healthy foods (Nagelkerk et al., 2005; Nelson et al., 2002; Meeto, 2004). High-fat food, red meat, candy, dessert, and regular soft drinks are favorite foods, whereas fruits and vegetables which are considered as healthy foods are not favorable foods, thereby patients are often reluctant to consume fruits and vegetables.

The second challenge is portion control. The ability to manage portion size at every meal is challenged when patients want to self-manage their dietary behaviors. Several conditions such as in stressful conditions, hunger, and deprived situations challenge patients to keep control of their portion size (Savoca & Miller,

2001). Patients often use foods to comfort themselves, thus they realize that even though the portion size is more that they require, they continue to eat the food.

Weight management is another challenge related to self-management of dietary behaviors in patients with T2DM. For them, weight loss is one of their goals. Patients who succeed in losing their weight have a major life achievement; whereby for patients who fail to lose weight after trying to manage their diet, dietary management becomes a source of frustration (Savoca & Miller, 2001).

The fourth challenge is dining out. Several events, such as travel, holidays, family events, and social events challenge patients' efforts to follow their meal plan. Those occasions involve a change in patients' routines and the need to avoid tempting food (Savoca & Miller, 2001). Dining out challenges are often difficult because in those occurrences menu choices can often lack of variety and large portions of food are offered.

In Indonesia, patients with T2DM have to be able to face those challenges in order to self-manage their dietary behaviors. Culturally, Indonesia can celebrate everything with food (Klaudine, 2010). Several religious activities also are celebrated with a huge number and different kinds of food (Forshee, 2006). Moreover, when Indonesian families invite guests to a meal, they prepare more food than can possibly be eaten. Unfortunately, the foods served for those special occasion would contain not only a sweet element, but are also high in cholesterol and fat as can be found in "*sate*" (skewered meats with a spicy peanut sauce), "*rendang*" (beef coconut curry), "*gule*" (fatty meat coconut curry), and other sweet foods as appetizers or desserts. This condition challenges patients with T2DM to follow their dietary recommendations.

Dinning out in Indonesia is a common activity for Indonesian people (Forshee, 2006). In Yogyakarta especially, it is very easy to find a place for dining out, ranging from a street vendor seller who sells quite cheap foods to exclusive restaurants which serve expensive and exclusive foods. Variation in menus can be found depending on individual preference such as "*gado-gado*" (vegetable salad with peanut sauce), "*soto*" (chicken soup with coconut milk), fried rice, noodle, and "*pecel*" (another type of vegetable salad).

In regards to achieving and maintaining optimum levels of health status and quality of live as long as possible with the prevention of both short term and long term complications of diabetes, dietary behaviors management should be adapted to an individual's lifestyle, culture, and socioeconomic status. Personalized targets should be negotiated, clearly defined and communicated, and cultural consideration should be addressed. The goal setting and action planning is recognized as one effective strategy to personalize a patient's needs (Ammerman et al., 2002). This strategy allows patients to negotiate their specific goals, particularly related to their dietary behaviors, based on their individual lifestyle (Bodenheimer et al., 2007).

In addition, the regular review and on-going dietary education should be performed, because T2DM is one of chronic diseases in which the individuals have to deal with the disease for life-long periods (McGough, 2003). Several strategies can be used to maintain regular reviews such as by telephone, by email, and through internet based interactive programs, either individually or in group education (Bodenheimer et al., 2007). Telephone follow-up can be an alternative approach to conventional clinical follow-up and it can be carried out without apparent detriment to the patient (Sardell, Sharpe, Ashley, Guerrero, & Brada, 2000).

Moreover, dietetic intervention requires an appropriate level of knowledge, experience, and skill if dietary habits and eating behaviors are to be adjusted effectively (Purnell, as cited in McGough, 2003). Therefore, the healthcare providers play a role as the support person for patients to improve self-management of their dietary behaviors through improving patient's knowledge, experience, and skills. Healthcare providers provide adequate information, support, and motivation for patients; thereby enabling patients to self-manage their diets based on adequate knowledge and skill.

When providing a support program in dietary management, healthcare providers should be concerned with several aspects including the flexibility of their teaching methods and the trusted relationship between them and their patients. The support program should be innovative and specific to the requirements of the individual, rather than being rigid, prescriptive, and restricted to a particular system of teaching, as may be the case when knowledge, experience, and skills in dietary behaviors therapy are limited (McGough, 2003). The general approach is to become aware of and help assess the patients' needs to improve their self-management ability (Grodner et al., 2007). Furthermore, it is important to build trusted relationships between healthcare providers and patients through open discussion about motivations and concerns related to dietary management (Grodner et al.).

Dietary Behaviors in Indonesian Patients with Type 2 Diabetes Mellitus

Indonesia is the largest archipelagic nation in the world with more than 17.000 islands throughout the country (Federal Research Division, 2004). Indonesian cuisine reflects regional, ethnic (Chinese, Middle Eastern, Indian, and Western)

influences, and daily food quality, quantity, and diversity vary greatly by socioeconomic class, season, and ecological conditions. Rice is a staple element in regional cooking and the center of general Indonesian cuisine. The definition of a full meal is cooked rice (*nasi*) with side dishes (*lauk-pauk*) (Cunningham, 2010). Side dishes of meat, fish, eggs, vegetables, and a variety of condiments and sauces using chili peppers and other spices accompany the rice. It is believed that if a person did not eat rice, he or she did not take a meal (Rahardjo, 2002).

A survey study about the nutrient intake pattern of a Minangkabau ethnic group, one of biggest ethnic groups in Indonesia, showed that they had a poor quality of dietary fat pattern and a high risk towards cardiovascular risk factors, especially concerning dyslipidemia (Djuwita et al., 2003). These dietary behaviors were believed to be one factor that causes further complication in T2DM (ADA, 2008). Over-nutrition and increased preserved food consumption especially in urban areas and excessive consumption of cereal (carbohydrate) leds to an increased number of chronic diseases including diabetes, although in some areas under-nutrition problems still exist (Atmarita, 2005).

Specifically, dietary behaviors among people in Yogyakarta are unique and quite different from other people in Indonesia. Its uniqueness and differences includes the life style, types of foods, and the local cultures. Concerning life style, nowadays, eating out is a common life style pattern in Yogyakarta (Forshee, 2006). Yogyakarta is a gastronome's delight with countless restaurants to street vendors from which to choose from (Barrie, 2007). Several menus are available, ranging from high calorie and fat foods such as *"sate"* (either roasted chicken or beef with peanut sauce), *"tongseng"* (beef curry with soy sauce), *"oseng-oseng mercon"* (buffalo's

skin stewed with ingredients and spices) to high fiber and vegetable foods such as *"lotek"* (vegetable salad), *"gado-gado"* (vegetable salad with egg and rice cake), and *pecel* (peanut sauce with cooked spinach and bean sprouts).

Concerning the types of food, mostly the foods in Yogyakarta are sweet, unlike foods in East Java which are more spicy and salty (Vaisutis, 2007). Vaisutis further explained that drinks and beverages in Yogyakarta are also sweet. Davidson and Jaine (2006) stated that people in Yogyakarta eat fruit as dessert and like it to be as sweet as possible. Generally, vegetables are cooked and stewed in coconut milk (*santan*). The common foods which can be found easily in Yogyakarta include *gudheg* (sweet stew of jackfruit) and *sayur lodeh* (vegetables cooked in coconut milk), *bakpia* (meal made of green beans and flavors), and *yangko* (meal made of flavors and sugar). These types of food in Yogyakarta can not be found easily in other parts of Indonesia.

As other people in Indonesia, people in Yogyakarta also celebrate any occasions with food. The difference with other places in Indonesia is the local culture such as the culture in a wedding ceremony. People in Yogyakarta spend at least three days to one week preparing for a wedding day. Neighbors come and are involved actively in this occasion. During the preparation time, neighbors have to stay in the bride's house and eat food that the host has served for them. The food may not be suitable for patients with T2DM. However, the patients have to eat the food anyway since refusing food from the host is considered as culturally impolite among people in Yogyakarta.

Several studies have been conducted to investigate the dietary behaviors of patients with T2DM in Yogyakarta. A study from Sinorita et al. (2008)

found that among patients with T2DM in a tertiary hospital in Yogyakarta, from 47 subjects who had good blood glucose control, almost a half of the patients (44.69%) failed to follow a meal plan as recommended by a nutritionist which included three meals and two or three times of additional food/snacks with recommended quantity, time, and type of food. Sinorita et al. explained that rather than following the meal plan, the patients preferred to control their dietary behaviors by reducing their dietary consumption after having a large meal (after overly consuming food at a party). This phenomenon indicated that the patients with T2DM tend to over eat rather than self-manage their dietary behaviors during a party or other special occasion that serves a lot of food.

In Jogja Hospital, a secondary hospital in Yogyakarta, Indonesia, the prevalence of patients with diabetes is gradually increasing each year. A study from Eryanti, Sinorita, and Ismail (2008) found that more than half of the patients with diabetes in this hospital who joined the diabetes club (Indonesian Diabetes Mellitus Association [Persadia]) and those who did not join the club did not follow dietary recommendations and had energy intakes more than the recommended energy intake (57.7% and 65.4% respectively). Another study found that 55.6% patients with diabetes in this hospital who joined Persadia had a high fat consumption (Wulandari, Purba, & Supriyati, 2008). Furthermore, Wulandari et al. (2008) found that nearly half of the patients (44.4% patients) had a low protein intake and one third (33.3%) had a high carbohydrate consumption. The researchers revealed that most of the patients (66. 7% patients) had uncontrolled blood glucose. The researcher argued that several factors including biological, physiological, psychological, and cultural factors might

influence these findings. These two studies showed that patients with diabetes in Jogja Hospital were unable to self-manage their dietary behaviors as recommended.

Factors Contributing to Self-Management of Dietary Behaviors in Patients with Type 2 Diabetes Mellitus

Several factors contribute to the self-management of dietary behaviors in patients with T2DM. Generally, it could be classified into two categories: personal or internal factors and external factors.

Personal factors

Age. It is considered as one factor contributing to the self-management of dietary behaviors since older ages are associated with an increase of barriers to self-management of dietary behaviors (Wen, Parchman, & Shepherd, 2004). In addition, through the ageing process, adults change their dietary behaviors. The health status and physical ability of the elderly, such as a decline in salivary flow and masticatory impairment due to poor dentition (loss of teeth, inadequate dental and gingival care), and loss of appetite, result in decreased nutritional intake (Payette & Shatenstein, 2008).

Gender. Gender is one factor influencing the self-management of dietary behaviors in patients with T2DM. Management of dietary behaviors is a priority for most of the women in the study of Whittemore et al. (2005). Most of the women in that study reported following their recommended dietary behaviors more than 70% of the time even though 96% of 53 total patients were obese. It showed that even the women considered that they had followed the dietary behaviors

recommendations; they still had difficulty to self-manage their dietary behaviors. Furthermore, women had difficultly to self-manage their dietary behaviors because they had to prepare food for their family and often had to cook two kinds of meals to self-manage their dietary behaviors (Savoca & Miller, 2001). This condition made them feel too overwhelmed to self-manage their dietary behaviors, thus they decided to eat the same food as their family which contained high fat and calories (Ponzo et al, 2006). Conversely, a different situation happened for the male patients. Most of the male patients in several studies reported that they were able to follow the dietary behaviors recommendations because their wife always prepared the food as recommended from the healthcare providers (Ponzo et al.; Savoca & Miller; Wong, Gucciardi, Li, & Grace, 2005).

Socioeconomic status. The disease itself caused financial expenses for patients with T2DM, since they had to deal with several laboratory checks, medications, and treatments to deal with the complications which resulted in food selection for their diet (Albarran, et al., 2006). Patients with low economic status tended to choose cheaper and high calorie foods to compensate for their condition, thereby impeding their ability to self-manage their dietary behaviors. A study from Sukmarini (2007) found that the social economical status had a significant positive association with dietary behaviors in patients with T2DM in Indonesia.

Knowledge. Knowledge is an important factor to control dietary behaviors. Adequate knowledge is one of the sources of self-efficacy to self-manage dietary behaviors (Xu, Toobert, Savage, Pan, & Whitmer, 2008). Both patients in Western and Eastern countries emphasized the needs of adequate knowledge and information about their dietary behaviors plans (Clark & Hampson, 2001; Nagelkerk

et al., 2005; Sanpaung, 2000 as cited in Wattana, Srisuphan, Pothiban, & Upruch, 2007; Savoca & Miller, 2001). The most important knowledge that they needed was related to selecting a healthy diet and meal planning. Knowledge of the patients in reducing dietary fat, limiting carbohydrates, controlling the portion and regulating meal times regularly would foster the strategies ability of the patients to self-manage their dietary behaviors (Savoca & Miller).

Cultural background. Cultural background influenced the dietary behaviors of the patients. Sowattanangoon et al. (2009) found the patients often had difficulty in reducing carbohydrate and sweet fruit consumption because, culturally, the foods they consumed contained high carbohydrate and sugars. A study from Lanting et al. (2008) found that Dutch people had difficult to self-manage their dietary behaviors because they had to eat different food from their family and it was considered impolite to eat food that is different to the rest of the family is; whereas Turkish and Moroccan patients experienced that it was impolite to refuse food when offered. Another study found that Black and Hispanic groups were less likely to self-manage their dietary behaviors compared with (White & Oster et al., 2006). Thus, cultural background can be a significant factor in self-management of dietary behaviors in patients with diabetes.

Self-efficacy. Self-efficacy is a person's judgment about his or her ability to organize and execute the course of action which requires designated types of performances (Bandura, 1997). Self-efficacy influences the successfulness of self-management including dietary behaviors. A study from Kavookjian et al. (2005) and Whittemore et al. (2005) found that patients with high self-efficacy were more likely to self-manage their dietary behaviors as recommended. Furthermore, the individuals'

confidence in their ability to maintain their healthy dietary behaviors influenced their food selection and meal planning (Savoca & Miller, 2001). For example, if patients had had a good self-efficacy, they brought their own lunch box rather than search lunch with coworkers who were enjoying fast-food or high fat lunch. In the present study, the term of self-efficacy is used interchangeably with self-confidence.

Psychological status. Many research studies found that psychological status including depression, helpless, and frustration have a strong influence on self-management. Patients with persistent depressive symptoms have difficulty to self-manage their diabetes (Bayliss, Ellis, & Steiner, 2007; Ponzo et al., 2006; Whittemore et al., 2005). Negative experiences contributed to poor self-management behaviors performances including dietary behaviors (Nagelkerk et al., 2005).

Time management. Time management is a common problem for patients with T2DM. They have to know when they eat and take medicine. If they do not follow their meal plan, they will delay taking their medicine and this will affect their blood glucose. Job, family and social activities become barriers to consistency in meal planning. Patients with T2DM have to prepare their food to be available on time when it is needed. The ability to integrate the management dietary behaviors into busy routines is a critical component of successfulness in diabetes care and self-management of a diet (O'Connor, Crabtree, & Yanoshik, as cited in Savoca & Miller, 2001).

External factors

Social support. Social factors, especially family relationships play an important role in diabetes management (Delamater, 2006). Social support has a major

impact in self-management of dietary behaviors for patients with T2DM especially in selecting healthy food and meal planning dimensions. The key source of social support is spouse support. The patients whose spouse supported their healthy diet rather than favorite diet had better food selection and meal planning (Nagelkerk et al., 2005; Savoca & Miller, 2001). Another study revealed that social support fosters the improvement of self-management behaviors including dietary behaviors through improving self-efficacy and the patient's belief about the effectiveness of dietary management (Xu et al., 2008).

Healthcare providers support. Support from healthcare providers influences the management of dietary behaviors in patients with T2DM. How healthcare professionals expressed control affected how patients responded to them (Naemiratch & Manderson, 2006). Patients with T2DM need respect from healthcare professionals regarding the manner in which recommendations for control were covered (Albarran et al., 2006). Patients need a collaborative relationship with the healthcare providers who encourage accountability, self-management, and provide positive coaching, so they are more empowered when receiving specific and concise information about their dietary behaviors plan (Nagelkerk et al., 2005). Support from healthcare providers which also include therapeutic communications improved the perceived self-efficacy of the patients; thereby, sustaining self-management of patients on their dietary behaviors (Xu et al., 2008).

Dietary Self-management Support Program on Dietary Behaviors in Patients with Type 2 Diabetes Mellitus

There is growing body of evidence to show that, when compared to standard care, self-management support programs benefit patients with chronic diseases, particularly in terms of knowledge, performance of self-management behaviors, self-efficacy, and aspects of health status (Barlow et al., 2002). Several self-management support programs were conducted to improve a patient's self-management behaviors including dietary behaviors. CINAHL and PubMed databases were used as sources to find existing studies related to dietary self-management support programs in patients with T2DM. The keywords such as self-management, dietary behaviors, eating behaviors, and type 2 diabetes mellitus were used to search the data. The studies which were published in the English language during the last 10 years, measured dietary behaviors despite the clinical or laboratory outcomes in patients with T2DM were included. In addition, two unpublished master theses were also included to review the dietary behaviors measurement tool in Indonesia (Nazir, 2009; Sukmarini, 2007).

Thirteen published experimental studies and three meta-analysis studies were reviewed to determine the existing study about the dietary self-management support program in patients with T2DM. Three of the thirteen studies were considered as additional reports from previous studies (Clark & Hampson, 2001; DeWalt et al., 2009; Galsow & Toobert, 2000) since they reported the same intervention or program. Thereby, they were considered as a complementary report from the remaining ten intervention studies. Six of ten intervention studies (60%) were randomized controlled trials (RCT) (Clark et al., 2004; Glasgow, Boles, McKay,

Feil, & Barrera, 2003; Glasgow et al., 2006; Kim & Oh, 2003; Polonsky et al., 2003; Song & Kim, 2009) and 40% were quasi experimental studies (Albarran et al., 2006; Baestiaens et al., 2009; Tang et al., 2005; Wallace et al., 2009). From those three meta-analysis studies, one meta-analysis study focused on the modification of fat, fruit, and vegetable intake (Ammermann et al., 2002) and two meta-analysis studies described the effectiveness of diabetes self-management education intervention (Fan & Sidani, 2009; Norris et al., 2001). Two meta-analysis studies from Ammerman et al. (2002) and Norris et al. (2001) did not incorporate any study included in this review. In addition, a meta-analysis study from Fan and Sidani (2009) did not mention the entire original articles they reviewed; thereby, the present reviewed studies may also be included in Fan and Sidani's work as they were unable to be identified.

From ten intervention studies, eight studies were conducted in Western countries and only two studies were conducted in Asia (Korea) (Kim & Oh, 2003; Song & Kim, 2009). Generally, they were conducted in individual-based (50%), followed by group-based and combination-based programs (30% and 20%, respectively). Since the review was used to identify the effect of dietary self-management support programs on dietary behaviors in patients with T2DM, thus the outcomes were focused on dietary behaviors. The dietary behaviors outcomes, commonly, could be classified into clinical outcomes and behavioral change outcomes. Clinical outcomes entailed the laboratory results including lipid profile, BMI, waist circumference; whereas, the behavioral change outcomes comprised of the achievement of goal setting and action planning, macronutrients intake, fat consumption, and fruit and vegetable consumption.

Target population. From the total ten experimental studies, the target population for dietary self-management support programs for all studies included out patients with T2DM. The age of patients ranged from 21 - 93 years old, had been diagnosed with T2DM for at least four years, had HbA1c levels ranging from 4.2% to 16.8%, had BMI ranging from 12.9 to 73.4, and waist circumference ranging from 79 cm to 115 cm. None of the studies included patients who had complications that caused them to be unable to perform self-management activities, such as T2DM patients with severe physical disabilities as a result of cardiovascular disease (diabetes complication), patients with foot amputations which could limit them from walking for exercise, and patients with psychiatric problems.

Settings. The interventions to improve patients' self-management were conducted in various settings and locations. Intervention could be delivered in primary care, outpatient settings (hospital outpatient departments, diabetes centers, general practitioner clinics, and other health service centers), community setting and the patient's home. The location for intervention might be more than one location and combined several locations, such as a primary care unit and a patient's home. The most common setting was in the outpatient settings. From those 10 studies, none of the studies were conducted in inpatient departments.

Teaching strategies. The teaching strategies of interventions were classified into deductive (interventionist provide learning material through educational sessions and might be followed by discussion); practice required skills; brief counseling (individual consultation regarding the selected behavioral change in brief within a short duration); goal setting and action planning; and problem solving. Most of the studies combined several methods in their dietary self-management

support program. Only one study used counseling methods without any combination with other methods (Kim & Oh, 2003). Three studies employed a combination of brief counseling, goal setting and action planning, and problem solving methods (Glasgow et al., 2003, 2006; Wallace et al., 2009) and two studies combined deductive, goal setting and action planning, and problem solving methods (Bastiaens et al., 2009; Tang et al., 2005). Other studies combined those methods either deductive with problem solving (Albarran et al., 2006; Polonsky, 2003), deductive with skill practice (Song & Kim, 2009), or goal setting with problem solving (Clark et al., 2004). These situations captured the lack of similarity of the interventions methods which also were revealed by the previous meta-analysis study (Ammerman et al., 2002; Norris et al., 2001).

A study that only used a single method reported significant improvement of dietary behaviors across the time within 12 weeks (Kim & Oh, 2009). Studies using a combination of three methods provided various effects on clinical outcomes (BMI reduction and waist circumference) (Bastiaens et al., 2009; Glasgow et al., 2006), but they seemed to provide a positive effect on behavioral change (Bastiaens et al., 2009; Glasgow et al., 2003, 2006; Tang et al., 2005; Wallace et al., 2009). A similar effect was also reported from the intervention that used a combination of two intervention methods. The results showed that the effect on behavioral change was not different between the program that encompassed one or more than one intervention method. However, a study from Kim and Oh did not measure clinical outcomes as that measured by other studies that even though they reported various significant effects on clinical outcomes; they provided some benefits for the patients.

Fan and Sidani (2009) measured the effect size for a self-management support program based on the teaching methods. They classified teaching methods in three categories: didactic (conveying information and limited discussion or interaction between providers and patients), interactive (encouraging active patients' involvement in the learning process, a discussion session, goal setting negotiation, and problem solving), and mixed (combination between didactic and interactive). Based on their work, the interactive method provided the largest effect size compared with didactic and mixed on self-management behaviors including diet (0.54, 0.47, and 0.29 respectively); whereas the mixed method provided the largest effect size (0.69), larger than interactive and didactic (0.54 and 0.16 respectively) on clinical outcomes. Within the 10 intervention studies, it seems that the intervention which combined several intervention methods might have more benefit for patients on the clinical outcome and provide the same impact as an intervention with a single method on behavioral change. However, it should be noted that to be effectively self-managed especially in dietary behaviors, people need adequate knowledge (Savoca & Miller, 2001). The fact that many studies reported a lack of dietary knowledge in patients should be considered as a reason to include in providing an information session (didactic method) prior to the discussion, goal setting, and/or problem solving (Clark & Hampson, 2001; Nagelkerk et al., 2005; Sanpaung, 2000 as cited in Wattana et al., 2007).

In details, the most common intervention used in those studies was goal setting and action planning which was used in a combination with other intervention methods (Glasgow et al., 2003, 2006; Wallace et al., 2009). The effect of this intervention method was mostly seen on behavioral change rather than clinical

outcomes. This finding was similar with the finding from a meta-analysis study which focused on the modification in fat and fruit intake that revealed goal setting as the important component especially in modifying dietary behaviors (Ammerman et al., 2002). Specific goal setting and action planning can lead people to achieve a higher performance than no goal, general, or unspecified goal (Bodenheimer et al., 2007).

Facilitators. Either trained non-clinicians, clinicians (nurses, physicians, and dieticians), or a multidiscipline team were reported in selected studies even though most of the interventions were led by clinicians (60%), followed by a multidiscipline team (30%), trained non-clinician (10%), and one study did not clearly explain the facilitator (Albarran et al., 2006). Albarran et al. reported that the facilitator in their study received a series of training sessions to led the intervention. Yet no major discrepancy outcomes are noted from a review study which used different facilitators. It seems that most of the studies still placed the clinicians as the persons who were able and responsible to deliver such a program or intervention to patients. The systematic review from Foster, Taylor, Eldridge, Ramsay, and Griffiths (2009) did not mention its effect on dietary behaviors, but they found that a lay-led self-management support program could improve the health status (pain score, disability, fatigue, depression, psychosocial well-being, quality of life and self-rated general health), health behaviors (self-reported aerobic and cognitive symptom management), and healthcare use. In addition, especially because based on the review from 10 studies, the lay-led program was only performed in one study (Wallace et al., 2009), it may overestimate in judging that a trained-lay-led program results in better behavioral changes than a clinician-led program. Particularly, since dietary behaviors

were recognized as difficult lifestyle management in patients with T2DM (Grodner et al., 2007).

Contents of education session. The contents of the educational session varied across the studies. Most of the studies not only focused on dietary behaviors in patients with T2DM, thereby combining their educational contents with other topics related to diabetes such as physical activity, self-monitoring blood glucose, and drug therapy. With respect to dietary behaviors, the contents of education include basic information on healthy food, goal setting and action planning related to dietary behaviors, healthy dietary pattern or meal planning, and strategies to healthy eating. To date, it is difficult to determine details of the contents of education since many researchers did not report it clearly in their published articles.

Educational materials. Various support materials were used in existing studies. It could be written material such as guidelines, newsletters, or a handbook; intervention records such as a copy of goal setting and action planning; practice equipment such as a glucometer; and other material such as CD-Rom. Most of the intervention provided guidelines or handbook material such as diet guidelines, exercise guidelines, and other guidelines related to living with diabetes. However, some of them were unclear about the material that they used in their intervention study (Polonsky et al., 2003).

Duration of interventions. The duration of the intervention is measured using the length of the intervention period, from the baseline assessment until the completion of the program, not from the baseline until the completion of the post-test data. The duration of intervention could be derived into three categories: short-term (less than six months or 24 weeks), medium (six months until 12 months or 24-48

weeks), and long-term (more than 12 months or more than 48 weeks). From a total of ten studies, five studies were conducted in the short term period, four studies were conducted in the medium period, and only one study was in the long-term period.

The short-term studies that measured the clinical outcomes (BMI and HDL level) found a significant effect after follow-up at 12 weeks (Song & Kim, 2009), and was still significant at a follow-up in 12 and 18 weeks after the completion of the program (Baestiaens et al., 2009) even though a study from Glasgow et al. (2006) failed to detect a decrease in body weight, HDL, LDL, and total cholesterol within two months of the patient's program. However, all of those five studies in the short term duration reported dietary behavioral changes varying from the achievement of goal setting and action planning, daily fat reduction, and self-reported dietary behaviors. Baestiaens et al. revealed that even though the tools that they used in their study (Food frequency questionnaire) were unable to detect the real behavioral changes, patients in their study performed real dietary behavioral changes. The medium and long-term duration of a study also revealed a variety of outcomes similar with studies in the short-term duration. It indicated that for dietary behavioral change, the positive and significant effect could be seen in a short-duration and varies across time. Conversely, for clinical outcomes, the result might depend the time of follow-up rather than the duration of the program itself. It was because the body metabolism needs time to show certain effects on clinical outcome (decrease HDL, LDL, etc.), thereby could not be detected in the short period of a follow-up.

Fan and Sidani (2009) measured the effects size of intervention based on the duration of intervention. They classified intervention into three time durations: less than eight weeks, 8-24 weeks, and more than 24 weeks. With regard to the self-

management behaviors outcome, the largest effect size showed in the duration for more than 24 weeks followed by less than eight weeks and 9-24 weeks (0.38, 0.32, and 0.22 respectively). It could be seen that either in the short-term or in the long-term duration, the effects size ranged from small to medium effect size. Even though the largest effect size can be seen in the intervention with a longer duration, another meta-analysis study in patients with T2DM revealed that the positive effects of a self-management support program on self-reported dietary habits was demonstrated in studies with a short-term duration (< six months) (Norris et al., 2001).

Follow-up strategies. Strategies for follow-up of the interventions differ among studies. Commonly, it is categorized into four follow-up strategies: computer assisted, telephone call, home visit, and in person visit to the selected place according to the setting delivery. All of the studies used in person visits as a follow up strategy; however, the follow-up strategy could be more than one strategy. A combination by using computer assisted, telephone calls, and in person visits were used by two studies of Glasgow et al. (2003, 2006). Four studies used telephone calls and in person visits (Clark et al., 2004; Polonsky et al., 2003; Song & Kim, 2009; Wallace et al., 2009). Only one study used telephone calls alone (Kim & Oh, 2003) and three studies used in-person visits alone (Albarran et al., 2006; Bastiaens et al., 2009; Tang et al., 2005).

The person visits follow-up, which entails face-to-face contact, was still favorable in the reviewed study even though some of the studies combined this follow-up strategy with telephone contact. The face-to-face follow-up during in a person visit might provide benefit for both patients and the facilitator since they could communicate easily and foster the successfulness of the program (Ellis et al., 2004).

However, the growth of communication technology, the utilization of telephone contact, computer contact, and the internet as a follow-up strategy should not be disregarded. Fan and Sidani's work (2009) supported the effectiveness of a strategy involving interactions between healthcare providers and patients. With regards to the effect of follow-up strategies on self-management behaviors, Fan and Sidani further found that telephone follow-up had the highest effect size (0.95) compared with face-to-face follow-up and web-based strategies follow-up.

Telephone follow-up can be an alternative follow-up strategy to conventional clinical follow-up and it can be carried out without apparent detriment to the patient (Sardell et al., 2000), and is convenient, simple, and less costly than other methods (Fan & Sidani, 2009). Clark (2008) suggested telephone contact as one of the follow-up strategies in self-management support programs in patients with T2DM besides the face-to-face approach. Its benefits are not only seen in diabetic patients, but also for asthmatic patients and other chronic disease patients that need a long time follow-up (Pinnock et al., 2003; Wasson et al., 1992).

Measurement tools. To measure dietary behaviors changes, several tools were identified from those studies including the Summary of Diabetes Self-care Activities Questionnaire (Toobert & Glasgow, as cited in Clark et al., 2004; Polonsky et al., 2003; Tang et al., 2005), the Kristal Food Habits Questionnaire (Kristal, Shattuck, & Henry, as cited in Clark et al.), the Block Fat Screener (Block, Clifford, Naughton, Henderson, & McAdams, as cited in Clark & Hampson; Glasgow et al., 2003, 2006), food frequency questionnaire (Bastiaens et al., 2009), dietary recall (Albarran et al., 2006), the achievement of goal setting and action planning (DeWalt

et al., 2009; Wallace et al., 2009), and a self-reported questionnaire developed by the researchers (Kom & Oh, 2003; Song & Kim, 2009).

Toobert, Hampson, and Glasgow (2000) developed the summary of diabetes self-care activities (SDSCA) questionnaire which is a brief self-report questionnaire of diabetes self-management that includes 25 items assessing aspects of the diabetes regimen: general diet, specific diet, exercise, blood-glucose testing, foot care, and smoking. The average inter-item correlations within the scales were high (mean = 0.47), with the exception of specific diet; test-retest correlations were moderate (mean = 0.40). The items for diet are item 1 to 5. The scale is the number of days per week on a scale 0-7. The higher the score of SDSCA means the higher the self-care activity competence rate. Although the SDSCA questionnaire is a brief, reliable and valid self-report measure of diabetes self-management that is useful both for research and for practice (Toobert et al., 2000), several considerations are given. The first, the items for dietary behaviors is only five item questions that may not represent the complexity of the dietary behaviors in patients with T2DM. The second, some questions may be difficult to answer by the respondent such as "On how many of the last seven days did you eat five or more servings of fruits and vegetables". The serving size may not be familiar for some respondents. Thereby, this may reduce the application of the SDSCA questionnaire in the practice setting.

In Indonesia, Sukmarini (2007) developed the nutritional health promoting behaviors questionnaire (NHPB) to measure the nutritional health promoting behaviors among Indonesian T2DM patients. The NHPB comprises of three dimensions of dietary behaviors in patients with T2DM (selecting a healthy diet, arranging a meal plan, and recognizing the amount of calorie needs). Totally, the

NHPB consists of 21 items with 4-Likert-type rating scale: "1" = strongly disagree, "2" = disagree, "3" = agree, and "4" = strongly agree. The lower score indicates the lower NHPB level, whereas the higher sore means the higher level of the NHPB. Finally, she categorized the level of the NHPB as low level (average mean 1.00-2.00), moderate level (>2.00-3.00), and high level (>3.00-4.00). This measurement was face validated by three experts and the reliability was found acceptable (Cronbach's alpha coefficients .86).

Even though the NHPB is statistically reliable, several critiques arise from this instrument. The first is about the response rate. The NHPB's response rate is an agreement response (agreement and disagreement) rather than behaviors such as the frequency the respondent performed such behaviors in the questionnaire. Hereby, it was more likely to measure knowledge rather than behaviors. The next critique is related to the statements in the questionnaire which may be difficult to be understood by lay people whose knowledge in dietary behaviors is limited. For example, the statement "You understand and are able to use serving methods in your meal plan in a day as follows: 6-11 servings of grain group, 3-5 servings of vegetables, 2-4 servings of fruits....". This statement is not practical and may be difficult to interpret because the respondent may not understand the serving size. Overall, this tool seems not practical in the real setting for the patients with type 2 diabetes. The statements are mostly derived from the conceptual base without translation into the patients' daily practice.

Recent study from Nazir (2009) modified the NHPB questionnaire to the dietary behaviors questionnaire (DBQ). She modified the rating scales and several items of NHPB. The rating scales (originally ranged from "1" = strongly disagree to

"4" = strongly agree) were modified to be a 4-Likert scale which ranged from"1" = never to "4" = routinely. The DBQ consists of 3 dimensions with 28 item statements. The interpretation of the DBQ is similar to the NHPB. Several modifications of NHPB were made in the final version of the DBQ including wording modification and additional items that more reflect the Indonesian culture. Although the validity and reliability was high (CVI .98 and Cronbach's alpha coefficient .97) the same problem as the NHPB still existed, the DBQ still used serving sizes which may not be familiar for respondents and are not practical.

Hence, the best tool to measure dietary change is still on debate and needs further investigation (Bryne, Ursin, & Ziegler, 1996; Jones, 2002). Thereby, it may be of benefit to consider a suggestion from Kristal et al. (1994) to utilize the tool that is responsive to dietary behavioral change that will be useful to determine the effect of intervention without overestimating its effects. In addition, the tool should be able to capture the patients' daily practice. It also should consider local foods since some food items may be only available in certain places.

In conclusion, the review from the ten studies which tested the effectiveness of dietary self-management support programs on dietary behaviors in patients with T2DM found that although the population, setting, intervention mode and method, facilitators, content of education, materials, duration, and follow-up strategies varied across the study, the dietary self-management support programs provide benefit in improving patients' dietary behaviors. While the outcomes may be small dietary behavioral changes, it is meaningful for patients with T2DM.

The major concern as a result of the review entails the intervention methods, follow-up strategy, and measurement tools to detect the dietary behavioral

changes. Goal setting and action planning strategy is recommended as one of effective strategies in intervention that is concerned with behavioral change. Although in-person visits are the most common follow-up strategy, the healthcare providers should not ignore the possibility to using technology in the follow-up such as the utilization of the telephone, computer, and the internet base follow-up strategy. Lastly, there was no best tool to detect behavioral change in an intervention study identified. It is suggested that the tools should be able to capture the small behavioral change, be easy to be administered, and be low cost.

Summary

In summary, the literature review in this study provided fundamental knowledge for the development of dietary self-management support programs to improve dietary behaviors of patients with T2DM in Indonesia. Several important factors, either personal factors or external factors, contributed to the self-management of dietary behaviors among patients with T2DM which need to be considered. Four dimensions of dietary behaviors including recognizing the amount of calorie needs, selecting a healthy diet, arranging a meal plan, and managing dietary behaviors challenges were the factors the patients with T2DM need to work on to manage their dietary behaviors. Although dietary management is essential to prevent the development of complications, either patients or healthcare providers recognize it as difficult to manage. Thereby, adequate intervention strategies are imperative.

The findings from the literature review found that a self-management program was effective in improving dietary behaviors among patients with T2DM. However, several gaps on existing studies were identified. Firstly, some

methodological issues were found from previous studies such as an unclear sample size calculation and the studies employed only one group pre-post test design. Secondly, the detail of intervention in the previous studies was often not stated clearly, thereby making it difficult to be utilized in the practice setting. Thirdly, measurement tools used to measure dietary behaviors in the previous studies often were unable or lacked to capture the complexity of dietary behaviors among patients with T2DM. Moreover, some self-reported measurement tools used in the previous studies were difficult for patients to understand. This may contribute to either overestimating or underestimating the patients' actual dietary behaviors. Fourthly, previous studies were mostly conducted in Western countries. Considering that Indonesia had its own uniqueness especially in dietary behaviors, the results from previous studies could not be generalized easily. Therefore, it is important to conduct a study to investigate the effect of dietary self-management support programs on dietary behaviors in patients with T2DM in Indonesia, especially in Yogyakarta, to fill those gaps.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter presents the research design, variables, setting, population and sample, instrumentation, intervention descriptions, pilot study, data collection procedures, ethical considerations, and data analysis of the research study.

Research Design

This study was a quasi experimental study with two-group, pre-test and post-test design. It was conducted to test the effect of the dietary self-management support program on dietary behaviors in Indonesian patients with T2DM. The experimental group received both dietary self-management support program and standard care; whereas the control group received only standard care. The research design was as follows:

	Pre-test		Post-test
Control group	O_1	⟶	O_2
Experimental group	O_1	— X ⟶	O_2

Setting

This study was conducted at the medical OPD of Jogja Hospital, a secondary hospital in Yogyakarta, Indonesia. Its function as a secondary hospital is standardized by the Ministry of Health Republic Indonesia. In this hospital, diabetic patients in ambulatory care attend the medical OPD for regular check-ups.

The standard care for patients with T2DM in this hospital includes regular check-ups, medication, blood glucose monitoring, treatment of health problems, and occasional unstructured health education provided by the physician or nurses during the regular check-ups, based on any current health problem the patient may have. The unstructured educational program is deductive and places the patients in a passive rather than active role in terms of determining their treatments, including dietary behaviors (Head Nurse of the OPD of Jogja Hospital, personal communication, March 23, 2010). Additional health education and consultation is given to the patients based on the physician's recommendations, such as a dietary behaviors consultation with the hospital nutritionist. In general, standard care is provided monthly, however, patients with very poor controlled blood glucose and/or a serious complication can be scheduled more frequently, depending on their condition.

This general hospital was selected for the study because it is the secondary hospital providing healthcare services for all residents of Yogyakarta Municipality and several districts around Yogyakarta Province. The hospital serves all people regardless of their economic level and/or payment system, unlike private hospitals which have a more restricted clientele. In addition, the number of patients with T2DM in this hospital has been increasing gradually each year, and, at the study time as well as for several years prior, diabetes (including T2DM) was the most common disease in the OPD setting (Jogja Hospital, 2008). Thus, it was expected that the generalizability of the study based on a particular group of patients with T2DM in Yogyakarta, Indonesia was high. Moreover, since a structured program enhancing patients' dietary behaviors was not established in this hospital, the intervention in the present study was more likely to be integrated as a standard care in this hospital in the

future. The dietary self-management support program was conducted in the waiting room since a private room was not available for the educational program or research purposes.

Population and Sample

Population

The population base for the present study was all patients with T2DM attending the medical OPD of Jogja Hospital. The patients included in the study were selected based on the inclusion and exclusion criteria.

Sample and sample size

The estimation of required sample size was based on a power analysis by using the effect size (*d*), as calculated in a previous study by Fan and Sidani (2009). This team conducted a meta-analysis study to examine differences in knowledge, self-management behaviors, and metabolic control associated with various self-management intervention elements in diabetic patients. They found that the effect size for self-management behaviors ranged from 0.16 to 0.92. In order to determine the effect size for the present study, the researcher calculated the average effect size based on Fan and Sidani's work with consideration of the intervention elements which were similar to the present study, which encompassed behavioral intervention, a mixed teaching method alternating between didactic (information providing) and interactive (goal setting and action planning) teaching, face-to-face and telephone follow-up, individual sessions, focusing on one topic only (dietary behaviors), less than 5 meetings, total contact less than 10 hours, and duration of intervention less than 8 weeks. Finally, the average

effect size was 0.55. According to Cohen (1988), to achieve alpha = .05, power = .80, and $d = 0.55$, at least 35 patients were required per group. Thus, to fill two groups, 70 patients were enrolled. Finally, 35 patients in the experimental group and 34 patients in the control group completed the study. One patient in the control group was excluded due to a transportation problem.

Inclusion criteria

Seventy patients with T2DM were recruited. The inclusion criteria to select the patients in this study were as follows: (1) current FBG ≥ 126 mg/dl, (2) more than 18 years of age (recent evidence has indicated that T2DM starts to present at a younger age such as in adolescents and 18 years is the minimal age to provide verbal or written consent according to Indonesian law), (3) be able to communicate in the Indonesian language both verbally and by writing, (4) have telephone contact, (5) consent to participate in the study either verbally or with written consent, (6) have no hearing problems, and (7) have no mental health problems such as schizophrenia and other cognitive problems such as dementia, delirium, mental retardation, or Alzheimer's as recorded in the patient's medical report.

Exclusion criteria

During the study, the patients were excluded if they: (1) developed a severe complication that caused them to be unable to continue participating in the intervention or to be unable to perform self-management activities, (2) had to be hospitalized for any reason, or (3) did not complete the full study up to the post-test data collection. One patient in the control group was excluded from the study due to a

transportation reason; he changed the place for his regular check up from the study hospital to a primary care unit closer to his home.

Sampling procedure

The sample of the present study was taken from the medical OPD of Jogja Hospital. The medical records were reviewed by the nurse as the research assistant (RA) to first identify an eligible patient. The potential patient who met the inclusion criteria noted above was then approached to ascertain his/her willingness to participate in the study. The researcher explained about the study to this potential patient, including the purpose of the study, informed consent, procedures, risks, benefits, and confidentiality (Appendix A), before each patient consented verbally or by written consent to participate in the study. The patients were also informed they had the right to withdraw from the study without any penalty at any time.

The patients who were approached and who consented to participate in the study were matched based on age (± 5 years), gender (male or female), and socioeconomic status (total monthly income < or ≥ 1,000,000 IDR) and assigned to either the experimental group or the control group. The first patient of eligible subjects was assigned to one of the two groups through a coin toss, after which the next patient with the similar and matched characteristics with the first patient was located and assigned to the opposite group. The sampling procedure proceeded in this manner until 70 patients were assigned to one of the two groups (35 patients/group). The patients in the experimental group were asked not to talk to any other patients about the program, including the discussions and materials provided in the educational session. They were also asked not to show the booklet to the other

patients until the study was completed. This strategy was used in order to prevent the interaction threat between the patients in the control and experimental groups.

Instrumentation

There were two parts of instruments used in the study; (1) Part I: Dietary Self-Management Support Program, and (2) Part II: Data Collection Instruments. Each part of instruments was described as follows:

Part I: Dietary self-management support program

The dietary self-management support program (Appendix B) was developed by the researcher based on the Self-Management Method of Kanfer and Gaelick-Buys (1991) as discussed in Chapter 1. The objective of the program was to improve the patients' dietary behaviors. This program was validated by three experts (see Validity of the Instruments, p. 82). The duration of the dietary self-management program was 1 month. In order to control the quality of the intervention, maximum three patients per day were instructed in using the program. The description of the program was as follows:

Week 1 (T0). In the first week of the program, each patient received four intervention sessions: (1) reflections on the patient's current dietary behaviors, (2) individual education and counseling, (3) problem identification on dietary behaviors, and (4) an individual goal setting and action planning session.

In the reflections on the patient's current dietary behaviors session, the patient was helped to self-monitoring his/her current dietary behaviors. With the

assistance of the researcher, the patient intentionally identified their current dietary behaviors. This session took approximately 5 to 10 minutes.

Next, the patient received a 30-minute individual education and counseling session to improve patient's knowledge regarding diabetic dietary behaviors. Teaching plan to ensure the equal magnitude of the education session was developed (Appendix C). Then, individually, the patient received information which tailored based on patient's prior knowledge regarding diabetic dietary behaviors. Every patient had an opportunity to discuss any misunderstandings and/or unclear information. Also during this session, the patient's experience related to any known personal difficulties, or other barriers to self-manage his/her dietary behaviors and problem-solving, were explored.

With regard to the contents of the educational and counseling session, the patient received general information regarding dietary behaviors recommendations for patients with T2DM, including the importance of self-management of dietary behaviors and effects of unmanaged dietary behaviors. Then the researcher explained about the caloric needs calculation and instructed the patient in how to determine caloric needs based on body mass index. The researcher then explained how to select a healthy diet using the Indonesian foods exchange list. In addition, the researcher trained him/her to read the foods labels. For the arranging a meal plan topic, the researcher assisted the patient to arrange their daily meal plan, emphasizing the importance of regularity of time and portions for each meal. An example of a daily menu was provided. For managing dietary behaviors challenges, the researcher provided information and discussed strategies regarding the management of dietary behaviors problems during special occasions such as social gatherings or dining out,

in which diabetic patients often found difficulty in meeting the dietary behaviors recommendations.

In general, all of the patients received the same information; however, every patient received individualized information based on his/her personal reflections on his/her current dietary behaviors, together with the findings from the Prior Knowledge Regarding Diabetic Dietary Behaviors Questionnaire. For example, if a patient identified a problem of often skipping lunch and adding the lunch portion to the dinner meal, the researcher again emphasized the importance of arranging a meal plan and following the meal plan every day.

In order to make the educational and counseling session as useful as possible, the dietary self-management booklet (Appendix D) was provided to each patient, which included all of the information explained and discussed in the education and counseling session. The booklet used simple language and pictures to visualize the contents for easier understanding and the patient could use the booklet to guide their dietary behaviors every day.

After the individual educational and counseling session, the researcher helped the patient to self-evaluate his/her current dietary behaviors. The patient was asked to compare his/her current dietary behaviors with the desired behaviors as explained in the previous educational and counseling sessions. With the assistance of the researcher, the patient carefully considered his/her dietary behaviors and justified whether he/she met or did not meet the desired dietary behaviors that would help reduce or prevent complications of his/her T2DM. Based on the patient's justification, he/she were asked to identify the problems of dietary behaviors or unhealthy behaviors that he/she needed to change or modify. In cases where the patient's current

dietary behaviors already met the desired dietary behaviors, he/she was encouraged to maintain these healthy dietary behaviors. It took around 5 minutes.

After the patient identified the dietary behaviors that needed to be changed or modified, then the researcher assisted him/her in setting realistic, measurable, and achievable goals focused on his/her personal dietary behaviors. The researcher also assisted the patient to generate specific action plans to achieve the goals. The action planning focused on specific behavioral changes rather than the results, and which could be evaluated in a short period (at least one week). All of the patients received an example of how to set their goals and generate an action plans. After the goals were set and the action plans was identified, the researcher assessed the patient's confidence to judge how likely he/she was to perform the selected action plans in order to achieve his/her goals by using a 0-10 point self-confidence scale (Bodenheimer et al., 2007, Figure 2). If the patient's self-confidence was below 7, the researcher helped him/her to redo or modify the action plans to one in which the patient felt more confident in his/her ability to accomplish the action plans and achieve his/her goals. Then finally, the patient's goals and action plans were recorded in the Goal Setting and Action Planning form (Appendix E). The form was given to the patients to remind them about the goals that they should try to achieve in the upcoming week. Before the patient left, an appointment was made for a follow-up phone call a week after the first meeting. The time required for completion of the goal setting and action planning form was approximately 15 minutes.

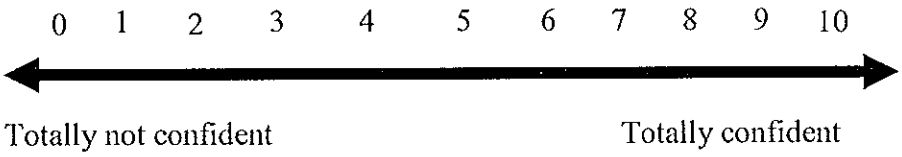

Figure 2

Self-Confidence Scale

Week 2 (T1) and week 3 (T2). During the second and third weeks of the program, each patient received a weekly follow-up through a phone call. The focus of these telephone follow-ups was to assess the goal achievement levels using a structured interview (Appendix F). The researcher asked the patient regarding the content of his/her goals and action plans in the week before the phone call. The researcher asked what activities that the patient had performed during the week to achieve his/her goals. Next, the researcher evaluated, rated, and noted the achievement of the patient's goals by comparing his/her actual behaviors during the week with the patient's individual action plans. The researcher assisted the patient in assessing whether he/she had met their own goals or not. If there were notable problems, the researcher discussed possible barriers and problem solving ideas to help achieve the goals.

After the evaluation of goals achievement was done, the continuation or modification of the goals and action plans were discussed. If the patient was unable to achieve the goals or only partially achieved the goals, the researcher assisted him/her to modify the old goals and plans, or develop new goals and action plans which the patient felt to be more achievable. If the patient had achieved their goals and followed the action plans, the researcher encouraged them to continue with their existing goals and action plans or to develop further goals and action plans. The weekly telephone follow-ups also included a brief consultation based on the patient's' personal situation as required, and the researcher worked as the support person to facilitate the patients' goals achievement. Moreover, in each follow-up, the patient's ability in self-management of dietary behaviors was reinforced.

1 month (T3). One month after the first meeting (T0), the researcher met the patient when he/she came for his/her regular monthly regular check up at the medical OPD of Yogya Hospital. The patient received face-to-face follow-up to evaluate his/her goal achievement levels after the last telephone follow-up at the previous week. The steps for the face-to-face follow-up were similar to the telephone follow-ups of weeks two and three. This final follow-up allowed the researcher to evaluate the patient's overall goal achievement levels during the program and to discuss further plans to maintain and/or improve his/her new and healthier dietary behaviors. In addition, the patient received empowerment and motivational statements to encourage him/her to continue and maintain his/her positive achievements accomplished during the program. Finally, a post-test of the patient's dietary behaviors was conducted by the research assistant.

Part II: Data collection instruments

The data collection instruments used in the study were the Demographic Data Questionnaire (DDQ), the Prior Knowledge Regarding Diabetic Dietary Behaviors Questionnaire, the Self-Management Dietary Behaviors Questionnaire (SMDBQ), and the Goal Achievement Form.

The Demographic Data Questionnaire (DDQ). It was used to collect the patient's demographic data. This questionnaire was developed by the researcher (Appendix G). The format was a combination of forced choices and fill in the blanks. Several sources of data were used to complete this questionnaire. Data about the patient's age, gender, marital status, religion, educational level, prior experience of attending a dietary educational program, responsibility of cooking or preparing food,

occupation, total monthly income, health insurance, current smoking status, duration of smoking, exercise status, duration of exercise, comorbid diseases, and duration of diabetes were collected from a direct interview with the patient or the patient directly filling in the form. Current medication and current blood glucose test data were collected from the patient's medical record. The patient's body weight and height were measured directly by the research assistant using a combined body weight-height measurement device which was regularly calibrated by the hospital technician to ensure validity.

Prior Knowledge Regarding Diabetic Dietary Behaviors Questionnaire. The patients' prior knowledge regarding appropriate dietary behaviors for patients with T2DM was assessed using a 13-item yes/no questionnaire (Appendix H). This questionnaire was used only to further guide and tailor the individualized educational session as described earlier. The possible score ranged from 0 to 13, with higher score indicating better prior knowledge.

The Self-management Dietary Behaviors Questionnaire (SMDBQ). The SMDBQ (Appendix I), a self-reported dietary behaviors questionnaire, was modified by the researcher based on a review of dietary behaviors management in patients with T2DM and several already existing tools used to measure dietary behaviors in the Indonesian population, including the Dietary Behaviors Questionnaire (Nazir, 2009) and the Nutritional Health Promoting Behaviors Questionnaire (NHPB) (Sukmarini, 2007).

The SMDBQ comprises four dimensions with a total of 33 item statements: recognizing the amount of calorie needs (4 items), selecting a healthy diet

(16 items), arranging a meal plan (6 items), and managing dietary behaviors challenges (7 items). The rating scale of the SMDBQ was a 4-point Likert scale ("1" = never, "2" = sometimes, "3" = often, and "4" = routinely). The total SMDBG score could range from 33 to 132, with a higher score indicating better dietary behaviors.

The Goal Achievement Form. The goal achievement form (Appendix J) was an ongoing record of the patient's progress in working towards his/her goals. It consisted of a record of the planned goals and action plans, the actual final degree of implementation of the action plans, the patient's self-confidence score in terms of his/her perceived ability to achieve the goals he/she set for himself/herself, the barriers and problem solving to achieve the goals, and the goals achievement levels.

The planned goals and action plans were the goals and action plans that the patient set with the researcher, whereas the implemented action plans were the actual activities performed by the patient. The researcher compared discrepancies between the two plans to evaluate the goal achievement levels. Then finally the patient's goal achievement level was determined into three levels: "1" = no behavioral changes (no effort to change the behaviors and achieve the goals at all), "2" = partially achieved the goals, the goals set were not achieved but some behaviors were changed, and "3" = completely achieved the goals.

Translation of the instruments

The self-reporting instruments were originally developed in the English language, whereas the population of the present study was Indonesian people. To ensure equivalent content between the original and translated versions of these instruments, the back translation process (Brislin, 1970) was used. Three bilingual

experts were employed in this translation process. The original English version was translated into the Indonesian language by the first bilingual expert. The second bilingual expert then back-translated the Indonesian version to English (second English version). The third expert then compared and evaluated the original English version and the back translated English version. The first and the second translators were consulted to discuss and solve any discrepancies and adjust the identified disagreements between the original version and the back-translated version. Some discrepancies were found between the two English versions, notably the translations of "best amount", "handful", and "meal plan". Revision of the Indonesian version was based on the results of these discussions.

Validity of the instruments

The English version of the prior knowledge regarding diabetic dietary behaviors and the SMDBQ were content validated by three experts: an expert from the Faculty of Nursing, Prince of Songkla University, Thailand; an expert from the Faculty of Nursing, Walailak University, Thailand; and a nutritionist from Jogja Hospital, Yogyakarta, Indonesia (Appendix K). In addition, the teaching plan, contents, and materials for the educational session were also validated by the same experts. The teaching plan, contents, and materials were revised based on the experts' comments.

Reliability of the instruments

In the present study, the reliability of the Prior Knowledge Regarding Diabetic Dietary Behaviors Questionnaire was assessed with the Kuder-Richardson

formula (KR-20) (Waltz, Strickland, & Lenz, 2005); while the internal consistency of the SMDBQ was assessed using Cronbach's alpha coefficient. To test the reliability, the researcher used the Indonesian version of the Prior Knowledge Regarding Diabetic Dietary Behaviors Questionnaire and the SMDBQ given to 20 patients who met the same inclusion criteria as the actual sample. The results showed that the reliability of the Prior Knowledge Regarding Diabetic Dietary Behaviors Questionnaire was .58, which was considered as low. This low reliability might be related to the type of the questionnaire, which only had yes and no possible answers. Dichotomous items are often less reliable than polytomous items (Haladyna, 2004). For the SMDBQ, the Cronbach's alpha coefficient was .73, which is considered as reliable for a newly developed instrument (Polit & Beck, 2008).

Pilot Study

A pilot study was conducted prior to the actual study to test the feasibility of the planned intervention (Polit & Beck, 2008). Three patients who met the study inclusion criteria received a shortened, one-week of the dietary self-management support program, with a one-time telephone follow-up and one face-to-face follow-up.

The results of the pilot study showed that in general, the dietary self-management support program was feasible to be implemented at the target setting. However, the private room that had been included in the plan to meet the patients individually was not available since the hospital had begun a new "executive class service" and was using the private room for that, thus the study had to be conducted in the waiting room. The waiting room situation was less private, noisy, and crowded,

and thus distracted the patients to some extent, and also increased the possibility of interactions threat between the patients in the experimental group and the patients in the control group. Therefore, the patients in the experimental group were asked not to talk about the program or the contents of the education sessions, or share the contents of the booklet with other patients and research assistant until the completion of the study.

Data Collection Procedures

There were two phases of data collection: 1) Preparation phase and 2) Implementation phase.

Preparation phase

For the preparation phase, the researcher followed several steps: (1) obtained research approval from the Institutional Review Board (IRB) of the Faculty of Nursing of Prince of Songkla University, Thailand, (2) obtained research approval from the director of Jogja Hospital, (3) prepared the materials for the educational sessions, (4) prepared the questionnaire packages, including an informed consent letter, (5) tested the validity and reliability of the instruments, (6) recruited the RA, (7) conducted training and evaluation for the RA to see how well the RA was collecting the data, and (8) conducted the pilot study.

In this study, the RA was responsible for both pre- and post- test data collection. The researcher had no role in the data collection. This technique is considered important to reduce the possibility of experimenter bias (McBurney & White, 2009). The RA in this study was a nurse who worked at the medical OPD of

Jogja Hospital. The training for the RA consisted of three steps. Firstly, the researcher explained the objectives, protocol, and instruments that were to be used in the study. Secondly, the researcher explained about the role and responsibilities of the RA in collecting the pre- and post-test data. Finally, the researcher went over the items of each questionnaire in detail, and the procedure to be used to complete the questionnaires. Any confusion on the RA's part about any item was clarified during this process, to ensure the RA would be able to answer any questions the patients might have.

Implementation phase

The implementation phase was started once the research proposal had been approved by the Faculty of Nursing Prince of Songkla University, Thailand and the permission from the director of Jogja Hospital was obtained. Firstly, the eligible patient identified through the pre-screening process of the RA was approached. He/she was asked about his/her interest in and willingness to participate in the study. If the patient indicated interest, the researcher then explained the purpose of the study, and the procedures, risks, benefits, rights and responsibilities, and assured the patient of confidentiality. If the patient then agreed to participate, signed informed consent or verbal consent was obtained. Then the RA assisted the patient to complete the questionnaires and measured the patient's body weight and height.

Secondly, after the patient completed all of the questionnaires and had their weight and height measured, which took approximately 10-20 minutes, the researcher assigned the patient either to the control group or the experimental group in the process explained earlier in sampling procedure section (p.73). The RA did not

participate in this step and did not know in which group the patient was assigned. The researcher asked each patient not to talk to other patients, or the RA, about any information that they received from the researcher or the contents of the education sessions (for the patient assigned in the experimental group) until the completion of the study. Next, the patient in the experimental group individually received instruction in the dietary self-management support program. From the details given earlier about time, it would appear that the researcher would spend at least one hour for each patient for the first meeting following the beginning of the program. Thereby, in order to control the quality of the program, a maximum of 3 patients per day were given the program at the first meeting (see details of the program on Instrumentation Part I: Dietary self-management support program section, p. 74).

For the patients assigned to the control group, after they completed the pre-test data similar to the patients in the experimental group, the researcher made an appointment for the next meeting when the patient was scheduled to come for their regular monthly regular check up. These patients received only the standard care given at the time in the hospital to all patients with T2DM. One week to three days before the patient's regular check up schedule, the researcher called the patient to confirm his/her attendance at his/her regular check up. Finally, one month (T3) after the first meeting, the RA assisted the patients to complete the SMDBQ questionnaire and measured the patients' body weight for the second time. Next, considering the ethical reasons, the patients received a dietary self-management booklet and a brief explanation about the contents of the booklet, depending on the patient's request. Figure 3 shows a flowchart of the data collection procedures and implementation of the dietary self-management support program among the patients with T2DM.

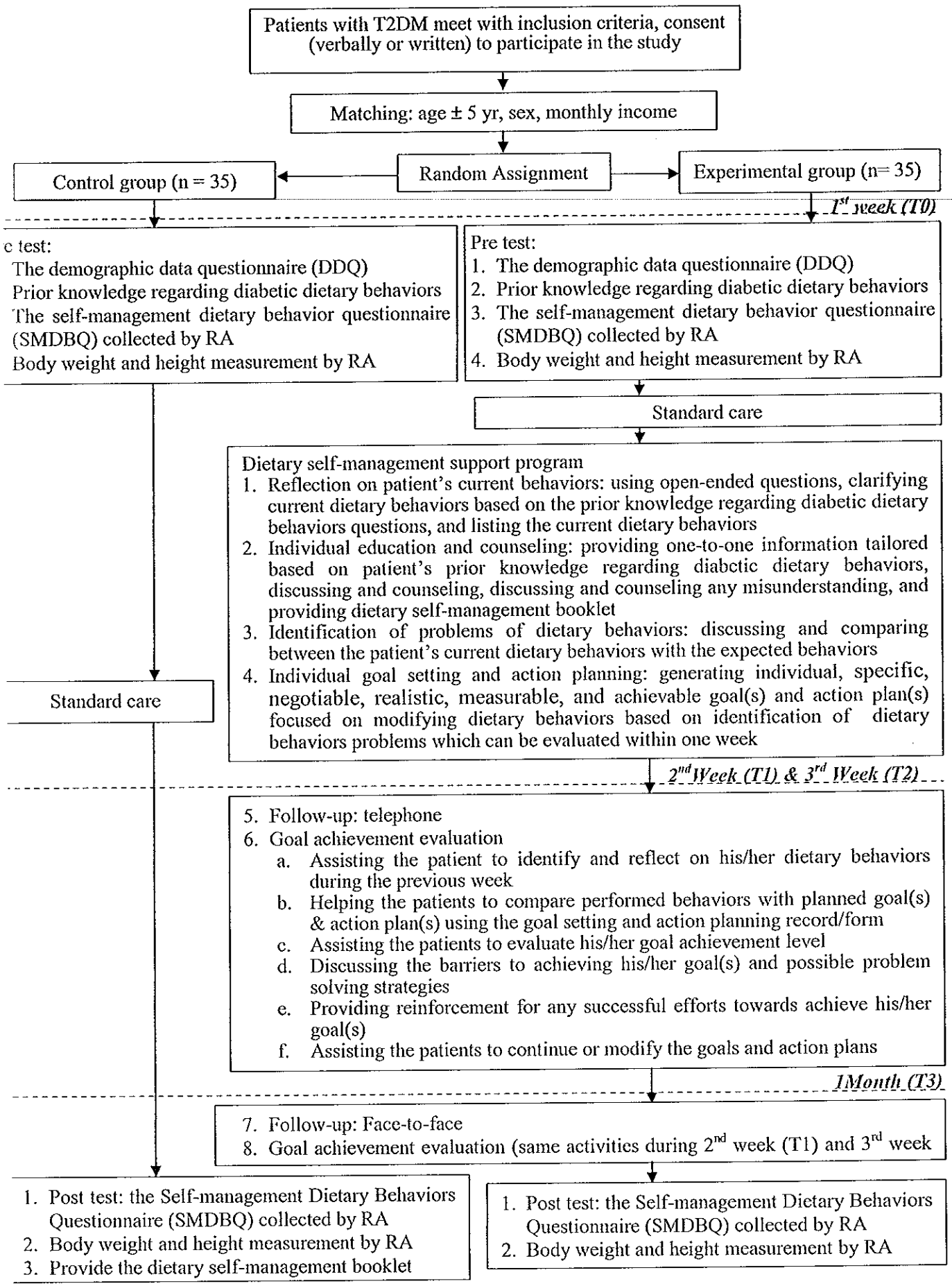

Figure 3

The Data Collection Procedures and Implementation of the Study

Ethical Considerations

This study was conducted in a way consistent with protecting the human rights of all the patients. The researcher asked for and obtained approval from the IRB of the Faculty of Nursing, Prince of Songkla University, Thailand. The patients were provided with all relevant information before being asked for written or verbal consent. They had the right to refuse to participate in, or to later withdraw from this study at any time without any penalty. The identity of the patients was coded anonymously and the data collected from the patients were destroyed after completion of data analysis. The dietary self-management support program and the dietary self-management booklet were free of charge. Furthermore, all of the patients in the control group received the dietary self-management booklet after the data collection was completed.

Data Analysis

Descriptive statistics and inferential statistics were used in this study. Descriptive statistics were used to analyze and describe the demographic data, clinical characteristics, dietary behaviors, and goal achievement by using frequency, percentage, range, mean, and standard deviation. To test the equivalence of the proportion of demographic data and clinical characteristics between the control group and the experimental group, Chi-square test and independent t-test were used. In cases where more than 20% of the expected frequency in contingency table two-by-two was too small, the Fisher's Exact test was used instead of the Chi-square test.

The assumptions for independent *t*-test analysis were tested prior to data analysis including normality and homogeneity. The normal distributions were

determined by dividing the skewness by the standard error of skewness. The results yielded a value less than ± 2.58 were considered as normally distributed; while, the homogeneities were determined by the non significance of the Levene's-Test (Munro, 2001). The results showed that taken as a group, the patients' Prior Knowledge Regarding Diabetic Dietary Behaviors was not normally distributed. On the other hand, the SMDBQ scores of both groups were normally distributed. With regard to the assumptions of homogeneity, the post-test dietary behaviors scores of both the control group and the experimental group did not meet the homogeneity assumptions. Thereby, the equal variances and not assumed score were used to determine the significance of independent t-test analysis.

Considering the results of assumptions test, the analyses of the patients' Prior Knowledge Regarding Diabetic Dietary Behaviors were done by using non-parametric tests, whereas the analyses of the patients' dietary behaviors (SMDBQ scores) were done by using parametric tests. The comparison of pre- and post-test mean scores of the dietary behaviors scores within the group were analyzed by using the dependent t-test (paired t-test), while the comparison of the mean scores of the dietary behaviors scores of the patients between the experimental group and the control group after the completion of the study were analyzed by using the independent t-test. The level of significance was set at $p < .05$.

One-way ANCOVA analysis was done to control for possible confounding variables that could have influenced the results. The patients' Prior Knowledge Regarding Diabetic Dietary Behaviors scores were used as the covariate in the analysis of pre- and post-test total dietary behaviors scores. Both the prior

knowledge scores and total pre-test dietary behaviors scores were used as covariates in the analysis of post-test total dietary behaviors scores.

CHAPTER 4

RESULTS AND DISCUSSION

Results

Seventy patients with T2DM agreed to participate in the study, and 69 of them completed it (see exclusion criteria, p. 72). Thus, the data were analyzed for 69 patients, 34 in the control group and 35 in the experimental group. The research findings are presented as follows: (1) Demographic characteristics of the patients, (2) Clinical characteristics of the patients, (3) Pre- and post-test scores for dietary behaviors within the groups, (4) Pre-test scores for dietary behaviors for the groups, (5) Post-test scores for dietary behaviors for the groups, and (6) The goal achievement levels of the experimental group.

Demographic characteristics of the patients

Table 1 shows that the average age of the patients in the control group was 57.09 years old (SD = 7.36) and that of the patients in the experimental group was 56.06 years old (SD = 6.38). Most of the patients in the control group (64.7%) had experience with previous educational programs (either structured or unstructured) related to dietary behaviors in patients with T2DM, whereas more than half of the patients (54.3%) in the experimental group had no experience with such educational programs. There were no statistical differences in the demographic characteristics of the two groups.

Table 1

Demographic Characteristics of the Control and Experimental Groups (N = 69)

Characteristics	Control Group (n = 34) M (SD) n	%	Experimental Group (n = 35) M (SD) n	%	Statistic test value	*p*
Age (Min-Max = 38 – 69)	57.09 (7.36)		56.06 (6.38)		0.62[t]	.54
Middle-Aged (34-59 yr)	19	55.9	23	65.7	0.70[a]	.40
Elderly (60-80 yr)	15	44.1	12	34.3		
Sex					0.02[a]	.89
Male	15	44.1	16	45.7		
Female	19	55.9	19	54.3		
Marital status					0.19[b]	1.00
Married	32	94.1	32	91.4		
Widowed	2	5.9	3	8.6		
Religion					2.01[b]	.19
Muslim	27	79.4	32	91.4		
Other	7	20.6	3	8.6		
Educational level					4.40[a]	.11
No schooling to junior high school	6	17.6	12	34.3		
High school	7	20.6	10	28.6		
College/University	21	61.8	13	37.1		
Experience with previous dietary educational programs					2.51[a]	.11
No	12	35.3	19	54.3		
Yes	22	64.7	16	45.7		
Total monthly income					0.00[b]	1.00
< 1,000,000 IDR (< 116 USD)	4	11.8	4	11.4		
≥ 1,000,001 IDR (≥ 116 USD)	30	88.2	31	88.6		

Note. [t] = independent *t*-test, [a] = chi-square test, [b] = Fisher's exact test.

Table 1 *(Continued)*

Characteristics	Control Group (n = 34)		Experimental Group (n = 35)		χ^2	*p*
	n	%	n	%		
Cooking responsibility					4.60[a]	.10
Cooking by oneself	18	52.9	16	45.7		
Family cooking	13	38.2	9	25.7		
Combination of cooking oneself & family cooking	3	8.8	10	28.6		
Occupation					0.40[a]	.53
Retired/Homemaker	21	61.8	19	54.3		
Teacher, governmental or non-governmental staff	13	38.2	16	45.7		
Health insurance					0.25[b]	.67
No	3	8.8	2	5.7		
Yes	31	91.2	33	94.3		
Current smoking status					0.40[b]	.73
Does not smoke	30	88.2	29	82.9		
Smokes	4	11.8	6	17.1		

Note. [a] = chi-square test, [b] = Fisher's exact test.

Clinical characteristics of the patients

Table 2 shows that the average duration that the patients had had T2DM was 10.52 years (SD = 8.45) for the patients in the control group and 8.53 years (SD = 7.47) for those in the experimental group. The average BMI of the patients was 24.82 (SD = 5.22) for the control group and 25.79 (SD = 4.38) for the experimental group. The average FBG for the control group was 225.18 mg/dl (SD = 108.49), and it was 204.74 mg/dl (SD = 76.76) for the experimental group. Concerning clinical characteristics, there were no statistical differences between the patients in the control group and those in the experimental group.

Table 2

Clinical Characteristics of the Control and Experimental Groups (N = 69)

	Control Group (n = 34)		Experimental Group (n = 35)		Statistic test	
	M (SD)		M (SD)			
Characteristics	n	%	n	%	value	*p*
Duration of having diabetes (Min - Max = 0.17 – 28)	10.52 (8.45)		8.53 (7.47)		1.04[t]	.30
BMI (Min – Max = 16.22 – 39.52)	24.82 (5.22)		25.79 (4.38)		-1.55[z]	.12
FBG (Min – Max = 127 – 597)	225.18 (108.49)		204.74 (76.76)		-.76[z]	.45
Current medication					0.00[b]	1.00
No OHA	1	2.9	1	2.9		
Receiving OHA	33	97.1	34	97.1		
Sulphonylureas	3	9.1	1	2.9		
Biguanides	1	3.0	7	20.6		
α-glucosedase inhibitors	1	3.0	1	2.9		
Combination of OHA	28	84.8	25	73.5		

Note. [t] = independent t-test, [z] = Mann-Whitney U test, [b] = Fisher's exact test, OHA = Oral Hypoglycemic Agents.

Table 2 (*Continued*)

Characteristics	Control Group (n = 34) M (SD) n	%	Experimental Group (n = 35) M (SD) n	%	Statistic test value	*p*
Comorbid diseases					3.31[a]	.07
Not having comorbid diseases	12	35.3	20	57.1		
Having comorbid diseases	22	64.7	15	42.9		
Hypertension	5	22.7	-	-		
Hypercholesterolemia	3	13.6	2	13.3		
Cardiovascular	1	4.5	3	20.0		
disease	1	4.5	3	20.0		
Gout	1	4.5	-	-		
Kidney disease	11	50.0	7	46.7		
Combination						
Insulin use					0.15[a]	.70
No	21	61.8	20	57.1		
Yes	13	38.2	15	42.9		

Note. [a] = chi-square test.

Pre- and post-test scores for dietary behaviors within the groups

Concerning total dietary behaviors, a paired t-test was used to examine the differences between the pre-test and post-test scores within both the experimental group and the control group. This was done after the implementation of the dietary self-management support program. Table 3 reveals that the total dietary behaviors score for the patients in the experimental group was statistically higher after they participated in the dietary self-management support program (t = -11.40, df = 34, p < .01) than it was before.

Table 3

Comparison of the Pre-test and Post-test Dietary Behaviors Scores for the Experimental Group (n = 35)

	Experimental Group			
Variable	M	SD	*T*	*p*
Pre-test Total Dietary Behaviors Score	92.31	12.51	-11.40	.00*
Post-test Total Dietary Behaviors Score	107.03	7.23		

Note. df = 34, *p < .01.

The results provided in Table 4 reveal that, for the patients in the experimental group, all of the dietary behaviors dimensions were significantly higher after participation in the dietary self-management support program. The dimensions include *recognizing the amount of calorie needs* (t = -6.77, df = 34, p < .01), *selecting a healthy diet* (t = -11.83, df = 34, p < .01), *arranging a meal plan* (t = -5.13, df = 34, p < .01), and *managing dietary behaviors challenges* (t = -8.15, df = 34, p < .01).

Table 4

Comparison of the Pre-test and Post-test Dietary Behaviors Scores, Based on the Dietary Behaviors Dimensions, for the Experimental Group (n = 35)

		Experimental Group					
		Pre-test		Post-test			
No	Variable	M	SD	M	SD	*t*	*p*
1.	Recognizing the amount of calorie needs	11.00	3.09	13.03	1.93	- 6.77	.00*
2.	Selecting a healthy diet	43.37	5.85	50.14	3.93	- 11.83	.00*
3.	Arranging a meal plan	18.23	3.99	20.94	1.92	- 5.13	.00*
4.	Managing dietary behaviors challenges	19.71	3.30	22.91	2.39	- 8.15	.00*

Note. $df = 34$, $*p < .01$.

Table 5 shows the results of the dietary behaviors of the patients in the control group, both before and after the implementation of the dietary self-management support program. The total dietary behaviors score of the patients in the control group showed a statistically noteworthy increase after they had received standard care ($t = -1.95$, $df = 33$, $p < .05$).

Table 5

Comparison of the Pre-test and Post-test Dietary Behaviors Scores for the Control Group (n = 34)

	Control Group			
Variable	M	SD	*T*	*p*
Pre-test Total Dietary Behaviors Score	86.76	14.83	- 1.95	.03*
Post-test Total Dietary Behaviors Score	88.56	14.83		

Note. $df = 33$, $*p < .05$.

Considering the dimensions of dietary behaviors, only the *selecting a healthy diet* dimension showed a statistically significant increase in the post-test ($t = -2.08$, $df = 33$, $p < .05$) for the patients in the control group, whereas the other dimensions did not show significant changes (Table 6).

Table 6

Comparison of the Pre-test and Post-test Dietary Behaviors, Scores Based on the Dietary Behaviors Dimensions, for the Control Group (n = 34)

		Control Group					
		Pre-test		Post-test			
No	Variable	M	SD	M	SD	*t*	*p*
1.	Recognizing the amount of calorie needs	9.53	3.18	9.74	3.09	- .82	.21
2.	Selecting a healthy diet	41.53	7.82	42.44	7.51	- 2.08	.02*
3.	Arranging a meal plan	17.65	2.92	17.71	2.73	- .21	.42
4.	Managing dietary behaviors challenges	18.06	3.61	18.68	4.00	- 1.58	.06

Note. $df = 33$, $*p < .05$.

Pre-test scores for dietary behaviors for the groups

An independent t-test was used to examine the difference in the pre-test dietary behaviors scores between the patients in the control group and the patients in the experimental group. The results revealed that the average of the total pre-test dietary behaviors score was 86.76 (SD = 14.83) for the control group and 92.31 (SD = 12.51) for the experimental group. Table 7 shows that the pre-test total dietary behaviors score of the control group was statistically lower than that of the experimental group ($t = -1.68$, $df = 67$, $p < .05$).

Table 7

Comparison of the Pre-test Dietary Behaviors Scores of the Control Group and Experimental Group (N = 69)

Variable	Control Group (n = 34)		Experimental Group (n = 35)			
	M	SD	M	SD	*t*	*p*
Total Dietary Behaviors Score	86.76	14.83	92.31	12.51	-1.68	.05*

Note. $df = 67$, $^*p < .05$.

With regard to the dimensions of dietary behaviors, the patients in the experimental group had a statistically higher total dietary behaviors score than the control group patients for two of the dimensions on the pre-test. These two dimensions were recognizing *the amount of calorie needs* ($t = -1.95$, $df = 67$, $p < .05$) and *managing dietary behaviors challenges* ($t = -1.99$, $df = 67$, $p < .05$) (Appendix L, Table L1).

An ANCOVA analysis was done to control the influence that the patients' *prior knowledge regarding diabetic dietary behaviors* had on their total dietary behaviors score on the pre-test. Table 8 shows that after adjusting for this prior knowledge, the total pre-test dietary behaviors score for the patients in the experimental group was statistically higher than the control group's score [F (1, 66) = 6.39, p = .01, η^2 = .09]. There was a small positive relationship between the score for prior knowledge regarding diabetic dietary behaviors and the score for total dietary behaviors on the pre-test, as indicated by a partial eta squared value of .19. In other words, *prior knowledge regarding diabetic dietary behaviors* explained 19% of the variance in the total pre-test score for dietary behaviors.

Table 8

Comparison of the Control and Experimental Groups' Pre-test Results Regarding the Patients' Dietary Behaviors after Controlling for their Prior Knowledge Regarding Diabetic Dietary Behaviors (N = 69)

Source	Sum of Squares	*df*	Mean of Squares	F	*p*	η^2
Between groups	988.40	1	988.40	6.39	.01	.09
Prior knowledge score	2370.82	1	2370.82	15.34	.00	.19
Error	10202.84	66	154.59			
Total	566797.00	69				

Post-test scores for dietary behaviors for the groups

Using an independent t-test measurement, it was found that the total dietary behaviors score of the patients in the experimental group was statistically higher than the score for the control group (t = -6.55, df = 47.52, $p < .01$) after the dietary self-management support program had been implemented (Table 9).

Table 9

Comparison of the Post-test Dietary Behaviors Scores between the Control Group and the Experimental Group (N = 69)

	Control Group (n = 34)		Experimental Group (n = 35)			
Variable	M	SD	M	SD	*t*	*p*
Total Dietary Behaviors Score	88.56	14.83	107.03	7.23	-6.55	.00*

Note. df = 47.52, *$p < .01$.

With regard to the different dimensions of dietary behaviors, the results in Table 10 reveal that the patients in the experimental group had a statistically higher dietary behaviors score than their control group counterparts for all of the following dietary behaviors dimensions: *recognizing the amount of calorie needs* (t = -5.29, df = 55.14, $p < .01$), *selecting a healthy diet* (t = -5.31, df = 49.52, $p < .01$), *arranging a meal plan* (t = -5.69, df = 59.22, $p < .01$), and *managing dietary behaviors challenges* (t = -5.32, df = 53.66, $p < .01$).

Table 10

Comparison of the Post-test Dietary Behaviors Scores between the Control Group and the Experimental Group, Based on the Dietary Behaviors Dimensions (N = 69)

No	Variables	Control Group (n = 34)		Experimental Group (n = 35)			
		M	SD	M	SD	*t*	*p*
1.	Recognizing the amount of calorie needs	9.74	3.09	13.03	1.93	- 5.29[a]	.00*
2.	Selecting a healthy diet	42.44	7.51	50.14	3.93	- 5.31[b]	.00*
3.	Arranging a meal plan	17.71	2.73	20.94	1.92	- 5.69[c]	.00*
4.	Managing dietary behaviors challenges	18.68	4.00	22.91	2.39	- 5.32[d]	.00*

Note. [a] = $df = 55.14$, [b] = $df = 49.52$, [c] = $df = 59.22$, [d] = $df = 53.66$, *$p < .01$.

The ANCOVA analysis was done to control the influencing effect that the *prior knowledge regarding diabetic dietary behaviors* score and the total pre-test dietary behaviors score may have had on the total post-test dietary behaviors score. Table 11 revealed that after adjusting for the *prior knowledge regarding dietary behaviors* score, the post-test total dietary behaviors score of the patients in the experimental group was statistically higher than it was for the control group [F (1, 66) = 54.25, $p < .01$, $\eta^2 = .45$].

Table 11

Comparison of the Patients' Post-test Dietary Behaviors Scores between the Control Group and the Experimental Group, after Controlling for Their Prior Knowledge Regarding Diabetic Dietary Behaviors Scores (N = 69)

Source	Sum of Squares	*df*	Mean of Squares	F	*p*	η^2
Between groups	6590.25	1	6590.25	54.25	.00	.45
Prior knowledge score	1012.98	1	1012.98	8.34	.01	.11
Error	8018.37	66	121.49			
Total	676611.00	69				

Table 12 reveals that after adjustment was made for the total pre-test dietary behaviors score, the total post-test dietary behaviors score of the patients in the experimental group was significantly higher than the control group's score [F (1, 66) = 107.33, $p < .01$, $\eta^2 = .62$].

Table 12

Comparison of the Patients' Post-test Dietary Behaviors Scores between the Control Group and the Experimental Group, after Controlling for the Total Pre-test Dietary Behaviors Scores (N = 69)

Source	Sum of Squares	*df*	Mean of Squares	F	*p*	η^2
Between groups	3406.41	1	3406.41	107.33	.00	.62
Total pre-test dietary behaviors score	6936.71	1	6936.71	218.57	.00	.77
Error	2094.64	66	31.74			
Total	676611.00					

The goal achievement levels of the patients in the experimental group

In this study, the researcher implemented goal setting and action planning strategy, as explained in Chapter 3. During the study, the researcher recorded the patients' planned goals and action plans, their goal achievement levels, their scores regarding their self-confidence in accomplishing the action plans and achieving the goals, and the barriers to achieving their planned goals. The results showed that about half of the patients (51.4%) set only one goal in week one (T0) of the program. In the subsequent week, 42.9% patients set two goals (week two [T1]) and 45.7% patients set three goals (week three [T2]) respectively (Table 13).

Table 13

Number of Goals Set by the Patients in Each Week

	Week 1 (T0)		Week 2 (T1)		Week 3 (T2)	
Number of Goals	n	%	n	%	n	%
1 goal	18	51.4	6	17.2	2	5.7
2 goals	13	37.1	15	42.9	11	31.4
3 goals	2	5.7	12	34.3	16	45.7
4 goals	2	5.7	2	5.7	6	17.1

In regards to the patients' planned goals and achievement levels, out of 35 patients, ten (28.6%) set the goal of arranging a meal plan at week one (T0) and five of them (50%) completely achieved this planned goal (Table 14). Data on other goals can be seen in the table as well.

Table 14

The Top Planned Goals Set by the Patients and Their Achievement Levels for Each Week

Week of Intervention	Goal(s)	Planned		Completely achieved	
		n	%	n	%
Week 1 (T0)	Arranging a meal plan	10	28.6	5	50.0
Week 2 (T1)	Recognizing the amount of calorie needs & Selecting a healthy diet	6	17.1	1	16.7
Week 3 (T2)	Recognizing the amount of calorie needs, Selecting a healthy diet, Arranging a meal plan, & Managing dietary behaviors challenges	6	17.1	6	100

The patients' goal-achievement levels were measured three times by means of follow-up phone calls at week two (T1) and week three (T2), and a face-to-face follow-up at the one-month stage (T3) of the program. The results revealed that more than half of the patients completely achieved their goals at the week-two stage (57.1%) and the one-month (68.6%) stage of the program. However, at the week-three stage (T2) of the program, more than half of the patients (54.3%) had only partially achieved their goal(s). The Marginal Homogeneity test was used to examine the difference in the proportion of the goal achievement levels between two points in time. The results revealed that there was a statistically significant difference between the goal achievement levels at the week-three stage (T2) and the one-month stage (T3), while there was no statistically significant difference found between the goal achievement levels at the week-two stage (T1) and the week-three stage (T2), or between the levels at the week-two stage (T1) and the one-month stage (T3) (Table 15).

Table 15

The Differences in the Goal Achievement Levels of the Patients at Week Two (T1), Week Three (T2), and One Month (T3), as Found in the Follow-ups

	Week 2 (T1)		Week 3 (T2)		1 Month (T3)*[a]	
Goal Achievement Levels	n	%	n	%	n	%
No behavioral change at all	3	8.6	1	2.9	-	-
Partially achieved	12	34.3	19	54.3	11	31.4
Completely achieved	20	57.1	15	42.9	24	68.6
Total	35	100	35	100	35	100

Note. *Marginal Homogeneity test ($p < .05$), [a] = Significant difference between week three (T2) and one month (T3).

Table 16 shows the results for the overall number of weekly patients' goals which were completely achieved throughout the program. Almost one third of the patients (31.4%) completely achieved all three sets of their weekly goal(s) during the program. More than one fifth of the patients (22.8%) did not completely achieve any of their weekly goal(s) during the program.

Table 16

Frequency and Percentage of Completely Achieved Weekly Goals during the Program

Completely Achieved Goals	n	%
3 weekly goal sets	11	31.4
2 out of 3 weekly goal sets	10	28.6
1 out of 3 weekly goal sets	6	17.1
Did not completely achieve any of the 3 sets of weekly goals	8	22.8

During the program, the patients' self-confidence regarding the achievement of their goal(s) was measured. Table 17 shows that the average self-confidence scores for the patients were as follows: 8.17 (SD = 0.82) at week one (T0), 8.09 (SD = 0.95) at week two (T1), and 8.06 (SD = 0.94) at week three (T2). Although the trend indicated a decrease in the self-confidence scores over the course of the program, repeated measures ANOVA tests showed that there were no statistically significant differences between any of the mean self-confidence scores.

Table 17

Comparison of the Mean Self-Confidence Scores at Week One (T0), Week Two (T1), and Week Three (T2) of the Program

Intervention time	Week 1 (T0) Mean (SD)	Week 2 (T1) Mean (SD)	Week 3 (T2) Mean (SD)	F	*p*
Self-confidence score	8.17 (0.82)	8.09 (0.95)	8.06 (0.94)	0.93[a]	.37

Note. [a] = Greenhouse-Geisser.

Discussion

The purpose of this study was to examine the effect of a dietary self-management support program on the dietary behaviors of patients with T2DM in Yogyakarta, Indonesia. The discussion in this chapter covers the following areas: (1) Patients' demographic characteristics and clinical characteristics, (2) Hypothesis testing of the effects of the dietary self-management support program on dietary behaviors, and (3) The goal achievement levels of the patients in the experimental group.

Patients' demographic characteristics and clinical characteristics

The average age of the patients in both groups in the present study was more than 55 years. An age of more than 45 years is considered to be one risk factor for T2DM (Maschack-Carey, 2007). More than half of the patients, in both groups, were female (55.9% in the control group and 54.3% in the experimental group). Previous studies found that both males and females have the same risk regarding T2DM; however, obese females (Wang et al., 1997) and females older than 40 with a low socioeconomic status (Tang, Chen, & Krewski, 2002) are at higher risk of contracting T2DM than females with a normal BMI and average socioeconomic status. More than 80% of the patients in both groups had a total monthly income equal to or greater than 1,000,001 IDR per month (≥ USD 116). Based on the Decree of the Governor of Yogyakarta in 2009, this monthly income was considered more than minimum for people in Yogyakarta, since the minimum income was considered to be 745,694 IDR (equal to USD 85). Low income was considered to be a barrier in the

self-management of dietary behaviors for patients with T2DM (Albarran et al., 2006; Vijan et al., 2004).

Regarding the patients' clinical characteristics, this study found that the average FBG was 225.18 mg/dl (SD = 108.49) for the control group and 204.74 mg/dl (SD = 76.76) for the experimental group. Based on ADA (2009a) and McAdam-Marx, Bouchard, Aagren, Conner, and Brixner's work (2011), this average FBG was categorized as uncontrolled glycemia (more than 154 mg/dl). These findings were consistent with those of a previous study by McAdam-Marx et al. (2011). They found that the majority of Patients with T2DM had uncontrolled glycemia.

The average BMI of the patients in the control group and the experimental group was 24.82 (SD = 5.22) and 25.79 (SD = 4.38), respectively. Considering the categorization of BMI based on the WHO expert consultation (2004), the results of this study indicated that the average BMI of the patients in the control group was at the border line of obesity, and it indicated obesity for those in the experimental group. Obesity is considered to be a primary risk factor for the development of T2DM (ADA, 2009c). The findings in this study were similar to those in a previous study conducted in the United States, which found that most patients with T2DM were obese (McAdam-Marx et al., 2011; Nelson et al., 2002).

In brief, the demographic characteristics and the clinical characteristics of the patients in the present study were quite similar to those of the subjects in several previous studies conducted on patients with T2DM in Yogyakarta (Purba, Rahayu, & Sinorita, 2010; Sinorita et al., 2008). In these studies, it was found that more than half of the subjects were females with an average age over 45 years. Their average duration of diabetes was less than ten years and most had uncontrolled

glycemia (FBG $\geq$ 200 mg/dl). Thus, it was expected that the demographic characteristics of the patients in the present study indicated an accurate representation of patients with T2DM, particularly those in Yogyakarta, Indonesia.

Hypothesis testing of the effects of the dietary self-management support program on dietary behaviors

Hypothesis 1. Hypothesis 1 states that the dietary behaviors of the patients with T2DM will improve after they participate in the dietary self-management support program. The results of the study confirmed this hypothesis and revealed that the subjects in the experimental group made significant improvements in their dietary behaviors after participating in the dietary self-management support program (Table 3).

The self-management of dietary behaviors among patients with T2DM is challenging and is considered to be one of most difficult aspects of diabetes to manage, compared to other aspects such as medication and insulin therapy (Vijan et al., 2005). The present study revealed better behaviors management outcomes after the implementation of the program. There are several reasons underpinning the positive outcomes of this study.

The first reason is the patients' active role during the program. As opposed to the old model of care, in which patients were passive subjects that had to follow all of the directions from their healthcare providers, the patients in this study were the ones who were responsible for the management of their dietary behaviors. The patient was the person who decided what dietary goals he/she wanted to achieve and what action plans he/she wanted to perform in order to achieve better dietary

behaviors, whereas the researcher acted as a support person who facilitated improvement in each patient's dietary behaviors. It is believed that this modern model of care, in which patients play an active role in the management of their treatment, is the most appropriate model for caring for patients with chronic diseases like T2DM. This is because only the patient is an expert on his/her life and thus knows what treatment management will work best for his/her personal situation (Anderson & Funnel, 2005; Bodenheimer et al., 2002; Delamater, 2006).

The second reason is the application of self-management processes, including self-monitoring, self-evaluation, and self-reinforcement, as a framework in the dietary self-management support program used in this study. With regard to the self-monitoring process, the researcher assisted the patients in intentionally observing their current dietary behaviors. The dietary behaviors they displayed, and their reasons for choosing those behaviors, were identified and discussed. Once the patients were able to monitor their current dietary behaviors, they were then assisted in deciding whether or not those behaviors met the dietary behaviors recommendations. This was done in a self-evaluation process in which they compared their actual dietary behaviors to the recommended dietary behaviors that they ought to perform. Then, the patients reinforced their determination to change, modify, or further improve their dietary behaviors. These processes are fundamental in patients' self-management efforts (Kanfer & Gaelick-Buys, 1991).

The third reason is the educational session characteristics. During the program, educational sessions were conducted individually, allowing for discussion between each patient and the researcher. The discussions were individually tailored, based on patient's knowledge, and they were facilitated with a dietary self-

management booklet. Individualized sessions enabled the patients to feel free to either gain more knowledge or share their experiences and problem-solving ideas. The sessions thus focused on each patient's personal characteristics and were tailored to each patient, in regards to each patient's prior knowledge regarding diabetic dietary behaviors. Although several studies have revealed that both individual and group sessions are effective in improving dietary behaviors among patients with T2DM (Barlow et al., 2002; Deakin et al., 2005), the need for individual sessions which facilitate good dietary behaviors outcomes was identified from a study conducted by Nagelkerk et al. (2005). It was understood that dietary behaviors are individualized behaviors which are influenced by personal, social, and cultural factors (Savoca & Miller, 2001; Sumiyoshi, Kawata, Shikata, & Makino, 2010), and cannot be generalized to describe multiple people.

The positive dietary behaviors outcomes which resulted from the implementation of the individualized program in the present study were consistent with the outcomes of several previous studies in which individualized and tailored self-management support programs were also implemented (Clark et al, 2004). Clark et al. found that patients participating in a 52-week individualized and tailored educational program used in their study showed a significant decrease in their fat consumption between the baseline measurement and the three-month follow-up measurement, and this change was maintained at the 12-month follow-up. The findings from previous studies and the present study prove the effectiveness that individualized, tailored self-management programs have on the dietary behaviors of patients with T2DM.

In addition, as mentioned in the section on educational session characteristics, one element of the educational program in this study was a dietary self-management booklet. The booklet had simple language and pictures which made it easy to understand. Although a quantitative measurement was not taken, the patients who received the booklet during the program reported that it was useful to them in regards to their daily lives. Some patients read the booklet several times to ensure that they had followed the dietary behaviors recommendations. It has been found that written guidelines effectively improve patients' knowledge (Melchior, Carter, Helsley, Ernest, & Friesner, 2010) and dietary behaviors (DeWalt et al., 2009; Wallace et al., 2009).

The fourth reason is the continuous follow-up through phone calls and face-to-face follow-up together with the consultations, which were based on each patient's needs. The patients in the experimental group participated in a telephone follow-up at week two and week three and in a face-to-face follow-up at one month. Those follow-ups were useful not only in evaluating the patients' goal-achievement levels, but also for facilitating needed consultations. These activities aided in the self-management process. Moreover, the patients' improvement regarding dietary behaviors was reinforced and any difficulties were discussed in order to solve problems. Follow-up efforts are essential in a program which involves behavioral changes. Norris et al. (2001) suggested that self-management programs should include longer-term follow-ups, as well as the use of regular reinforcement throughout the follow-up process to ensure that positive behavioral changes occur.

The telephone follow-up method used in this study was considered an innovative and feasible method to use for patients with T2DM in Yogyakarta,

Indonesia. The time needed for a telephone follow-up depended on the patients' needs. The average phone call duration was 6.76 minutes (SD = 3.18, Min-Max time = 3.45-15.31 minutes) at week two (T1) and 6.97 minutes (SD = 2.68, Min-Max time = 4-16 minutes) at week three (T2) of the program. Given the growth of communication technology, telephone follow-ups were an effective method in facilitating the process of communication between the patients and the researcher. The patients who received telephone follow-ups verbally reported their appreciation and satisfaction, stating that the follow-ups were useful not only in helping them to achieve better dietary behaviors, but also for reminding them to continue self-managing their dietary behaviors. Eakin, Lawler, Vandelanotte, and Owen (2007), and Fan and Sidani (2009), revealed that interventions using phone calls were effective in improving self-management behaviors, including dietary behaviors. Furthermore, Sardell et al. (2000) suggested that telephone follow-ups were convenient, simple, and inexpensive, and could serve as an alternative follow-up approach to the conventional clinical follow-up. The positive outcome on dietary behaviors that occurred in the present study due to the use of telephone follow-ups is a result that also occurred in several studies conducted in Western countries that also incorporated telephone follow-ups (Clark et al., 2004; Glasgow et al., 2003, 2006; Polonsky et al., 2003; Wallace et al., 2009).

The results of this study also indicated that the patients in the control group showed significant improvements in their dietary behaviors at the post-test (Table 5). A significant improvement was detected only for the *selecting a healthy diet* dimension (Table 6). This result might be due to maturation threat. This maturation could be due to the patients' self-learning and knowledge-acquisition

efforts. During the month between the collection of the pre-test data and the collection of the post-test data, the patients might have developed their self-learning ability, especially in regards to selecting a healthy diet. The patients might have realized that they had to avoid certain foods which are high in carbohydrates, calories, sugar, and fats. Thus, after a month, their ability to select a healthy diet may have improved. In addition, although other structured programs emphasizing dietary behaviors among patients with T2DM were not implemented during the study, the patients in the control group might have gained more knowledge in the course of their standard care activities as a result of receiving information from medical OPD staff members. In addition, although the patients in the experimental group were asked not to inform the control group patients about the contents of the educational program before the completion of the study, it was possible that they shared their knowledge prematurely anyway. Maturation threat is an important concern in many nursing research studies. The employment of two groups, along with the use of a pre- and post-test design, as in this study, helps to decrease this threat (Polit & Beck, 2008). It is possible that maturation threat occurs simply because patients with chronic diseases, including diabetes, are experts on their lives and know what works for them due to their day-to-day learning processes and self-monitoring (Funnel & Anderson, 2004).

Hypothesis 2. Hypothesis 2 states that the dietary behaviors of the patients with T2DM who participate in the dietary self-management support program will be better than those who only receive standard care. The findings of the study supported this hypothesis. After the implementation of the dietary self-management support program, the total score for the dietary behaviors of the patients in the experimental group was significantly higher than the total score for the control group

(Table 9). Also, all of the dimensions of dietary behaviors were significantly higher for the experimental group than the control group (Table 10).

In fact, prior the implementation of the dietary self-management support program, the dietary behaviors of the patients in the experimental group were statistically higher than those in the control group (Table 7). The dietary behaviors dimensions for which there was a significant difference between the control group and the experimental group at the time of the pre-test were *recognizing the amount of calories needs* and *managing dietary behaviors challenges* (Appendix L, Table L1). After controlling for prior knowledge regarding the diabetic dietary behaviors score, the total pre-test dietary behaviors score for the experimental group was found to be statistically higher than the score for the control group (Table 8).

Regarding the mean score for each item on the SMDBQ (Appendix L, Table L2), the highest mean difference between the control group and the intervention group at the time of the pre-test was found for the *recognizing the amount of calories needs* dimension, as can be seen in item three. Patients in the experimental group had a higher mean for the "*estimating the amount of calories in one meal by using either simple measurements, complex measurements (grams, ounces, or serving sizes), or the plate method*" item than did the patients in the control group (mean difference 0.49). For the *managing dietary behaviors challenges* dimension, the highest mean difference appeared in item 32. Compared to the patients in the control group, those in the experimental group had a higher score for "*performing exercise, such as walking, rather than eating food when you feel stressed or depressed*" item (mean difference 0.97).

The significant differences between the groups at the time of the pre-test might be due to several factors. The first factor might relate to the patients' prior knowledge regarding diabetic dietary behaviors. One-way ANCOVA analysis revealed that the score for prior knowledge of diabetic dietary behaviors was a significant covariate that influenced the patients' total dietary behaviors score. There was a low but positive relationship between the prior knowledge regarding diabetic dietary behaviors score and the total dietary behaviors score at the time of both the pre-test and the post-test. Prior knowledge regarding diabetic dietary behaviors explained 19% of the variance of the total pre-test dietary behaviors score (η^2 = .19) (Table 8) and 11% of the variance of the total post-test dietary behaviors score (η^2 = .11) (Table 11).

The significance of the relationship between knowledge and dietary behaviors for patients with T2DM in previous studies was inconsistent. Chan and Molassiotis (1999) found that there was no significant relationship between knowledge and adherence to dietary behaviors. Recently, Backman, Haddad, Lee, Johnston, and Hodgkin (2002) found that knowledge was a salient factor of dietary behaviors. In another study, although the relationship between knowledge and dietary behaviors was inconclusive, knowledge was found to be useful for helping patients to determine the dietary behaviors they ought to perform (Backman et al., 2002). Savoca and Miller (2001) stated that adequate knowledge, such as knowledge of recommended foods, influenced patients in selecting a healthy diet. Moreover, Persell et al. (2004) found that high knowledge levels were significantly associated with adherence to dietary recommendations, and that knowledgeable patients were more likely to perform self-management activities. In the present study, the patients' prior

knowledge regarding diabetic dietary behaviors was measured by the Prior Knowledge Regarding Diabetic Dietary Behaviors Questionnaire (p. 80), which was developed by the researcher. In fact, this instrument had a low reliability (KR-20 = .58). Therefore, the prior knowledge regarding the diabetic dietary behaviors score that was found in this study should be interpreted with caution.

The second factor might be due the patients' histories or usual dietary behaviors. Recognizing the amount of calorie needs required the patients to focus on how many calories they needed throughout the day. Estimating calorie needs for each meal required continuous and routine practice. The patients who practiced this habit for long time periods could eventually estimate how many calories they needed quite easily. With regard to the *managing dietary behaviors challenges* dimension, the patients in the experimental group preferred walking rather than eating when they faced stress or depression. Food is commonly used as a source of comfort during stressful or depressing situations by many patients with T2DM (Savoca & Miller, 2001).

The third factor is the duration of the diabetes disease. Table 2 showed that the average duration that patients in the control group had had diabetes was slightly higher than the corresponding figure for the experimental group. Although there was not a significant difference between the groups, this might have contributed to the findings. Previous studies which have examined the relationship between diabetes duration and the self-management behaviors of patients (including dietary behaviors) have been inconclusive. Gåfvels, Lithner, and Börjeson (1993) found that patients who had had T2DM for a shorter duration were more concerned about the management of their diabetes than were longer-duration patients. Recently, Ponzo et

al. (2006) stated that a long duration of diabetes may lead to self-management fatigue or burnout, a condition in which diabetic patients gradually become unwilling to perform self-management behaviors. Conversely, other studies found no significant relationship between the diabetes duration of patients and their dietary behaviors (Purba et al., 2010; Sinorita et al., 2008). The findings from the present study were supported by those from Skinner, John, and Hampson's study (2000). They found that among adolescents with diabetes (either type 1 or type 2 diabetes mellitus), better dietary behaviors were associated with a shorter duration of diabetes.

The forth factor might be due to the ability of patients to adhere to dietary behaviors recommendations which conflict with their cultural values. Culturally, many Indonesians (including people in Yogyakarta) think that they have not really had a meal until they eat rice, even if they have already eaten "*lontong*" or "*ketupat*," which are made from rice (Klaudine, 2010). Many traditional Indonesian customs and ceremonies incorporate foods and feasts. Additionally, when Indonesian families invite guests to a meal, they prepare more food than can possibly be eaten. Those situations challenge patients with T2DM to self-manage their dietary behaviors. Moreover, most of the foods in Yogyakarta are sweet (contain palm sugar and sweet soy sauce) and stewed with coconut milk (Koane & Bruijn, 1996). Such foods, which are high in calories and fat, are not recommended for patients with T2DM (Diabetes Australia, 2011).

In the present study, both hypotheses were supported by the results. Regarding the patients in the experimental group, their dietary behaviors were significantly better after the implementation of the dietary self-management support program. When comparing the control group and the experimental group, the dietary

behaviors of the patients in the experimental group were found to be significantly better than those of the patients in the control group (after the implementation of the dietary self-management support program). Hence, the dietary self-management support program used in this current study was believed to be effective in bringing about better dietary behaviors among the patients with T2DM.

Several previous studies which implemented self-management support programs incorporating educational sessions and continuous telephone follow-ups also contained similar findings. A study by Wallace et al. (2009) utilized brief counseling sessions, goal-setting, and telephone follow-ups over the course of three months. They found that after implementing this intervention, the patients' knowledge, self-efficacy, and self-reported behaviors (including dietary behaviors) showed statistically significant improvements. However, their study only involved one group, although it did use the pre- and post-test design. Concerning the fact that the duration of the program was quite long (three months), it is possible that the improvement in the subjects' dietary behaviors was due to their maturation, rather than the program itself.

On the contrary, the present study employed two patient groups, along with the pre- and post-test design. This design is useful for controlling maturation threat (Polit & Beck, 2008). Moreover, after controlling for the score for prior knowledge regarding diabetic dietary behaviors (Table 11) and the score for total pre-test dietary behaviors (Table 12), it was found that the total post-test score for dietary behaviors for the experimental group was significantly higher than the score for the control group. This positive outcome from the present study proved the effectiveness of the dietary self-management support program which was implemented.

Another related study was conducted by Clark et al. (2004). They also implemented educational sessions, goal-setting, and telephone follow-ups over the course of 52 weeks. They found statistically significant, positive outcomes for the categories of reducing BMI, decreasing fat consumption, and improving self-care activities (including dietary behaviors). Their study used the Summary of Diabetes Self-Care Activities Questionnaire (SDSCA). Although this instrument had acceptable reliability (Toobert et al., 2000), its items, which measured dietary behaviors, focused only on how many days a week the patients followed a healthy eating plan (involving the consumption of fruits and vegetables, and also carbohydrate spacing). It seems that the complex dimensions of the dietary behaviors of patients with T2DM were not well captured by this instrument. In addition, the other instrument they used only focused on fat consumption. Thus, the essence of dietary behaviors among patients with T2DM as suggested by ADA (2008), including carbohydrate monitoring, was not well captured in their study. On the contrary, in the present study, dietary behaviors were measured with the SMDBQ (p. 80), which covered four dimensions of dietary behaviors of patients with T2DM. Also, this instrument was found to have acceptable reliability and its content was validated by three experts. Therefore, the dietary behaviors instrument used in this study might have captured the dietary behaviors of the patients with T2DM more comprehensively.

The goal achievement levels of the patients in the experimental group

In the present study, the researcher implemented a strategy involving goal setting and action planning. The third objective of the study was to examine the goal-achievement levels among the patients in the experimental group. The results showed that by the middle of the intervention (week three [T2]), more than half (57.1%) of the patients had only partially achieved their goal(s), although at the end of the intervention (one month [T3] of the program) almost 70% of them were able to completely achieve their goals. Considering their overall goal-achievement levels, almost one third of the patients completely achieved their three sets of weekly goal(s) and more than one fifth of the patients never completely achieved any of their three sets of weekly goal(s). These findings may be due to several factors, including the components of the goal(s) which were selected by the patients, the methods used to evaluate the goal achievement levels, the patients' self-confidence in achieving the goal(s), and the barriers to achieving the goal(s).

Firstly, the components of the goal(s) set by the patients each week might have contributed to the goal achievement levels. It was believed that the goals which were set at the beginning of intervention should not exceed the patients' ability to achieve them (Kanfer & Gaelick-Buys, 1991). Hence, the researcher suggested that the patients set their goals in the order of most easily achievable to most difficult. As a result, about half of the patients (51.4%) set only a single goal for week one (T0) of the program (Table 13). The most common goal set by the patients was *arranging a meal plan* (28.6%) (Table 14). It was inferred that the patients considered *arranging a meal plan* to be the easiest and most achievable goal. Five out of ten (50%) of the

patients who set this goal were able to completely achieve it (Table 14). Overall, 57.1% of the patients completely achieved their goal(s) at goal achievement level evaluation of week two (T1) (Table 15).

On the contrary, for week two (T1), more than 40% of the patients set two goals (Table 13). Six patients (17.1%) set the goals of *recognizing the amount of calorie needs* and *selecting a healthy diet* (Table 14). At this time in the study (week two [T1]), the patients might have wanted to challenge themselves by adding or developing a new goal to be achieved during the upcoming week as a result of their success regarding their previous week's goal(s). Moreover, the patients might have wanted to set more difficult goal(s). As a result, only one patient (16.7%) from six patients who had set the two goals of *recognizing the amount of calorie needs* and *selecting a healthy diet* was able to completely achieve them (Table 14). In addition, Table 15 revealed that more than half of the patients in the experimental group only partially achieved their goals at goal achievement level evaluation of week 3 (T2). This might be because the patients had to learn new behaviors and needed to make several adjustments to achieve their goal(s); therefore, the goal(s) could not easily be completely achieved.

After a month, the patients might have become more familiar with goal-setting strategies. Therefore, they could have improved their ability to implement their action planning and achieve their goals with fewer adjustments to their existing behaviors. Thus, although 45.7% of patients set three goals for week three (T2) of the program (Table 13), the goals seemed to be easy to achieve and the percentage of patients who completely achieved their goal(s) was high (Table 14 & Table 15). The Marginal Homogeneity test revealed that there was a significant difference in goal

achievement levels between the week-three (T2) and the one-month stages (T3) of the program (Table 15). In other words, the percentage of patients who completely achieved their goal(s) was significantly higher between the week-three (T2) and one-month (T3) stages of the program than it was between the week-two (T1) and one-month stages (T3) or between the week-two (T1) and week-three stages (T2).

Secondly, the method used to evaluate the goal-achievement levels potentially contributed to those levels. In the present study, the patients were classified into the *completely achieved* their goal(s) category only if they were able to accomplish all of the action plans that they planned; conversely, the patients were classified into the *no behavioral change at all* category if they never implemented any part of their selected action plans. When the patients failed to accomplish even one action plan from among all their action plans, they were placed into the *partially achieved* the goal category. Accordingly, 34.3%, 54.3%, and 31.4% of the patients only partially achieved their goal(s) at the week-two, week-three, and one-month stages of the program, respectively (Table 15). Moreover, the patients who never completely achieved their goal(s) throughout the program, even if they might have partially achieved their weekly goal(s), were categorized in the *never completely achieved their overall weekly goal(s) during the program* category. Consequently, 22.8% of the patients were classified into this category (Table 16). However, the fact that none of the patients were placed into the *no behavioral change at all* category at the end of the program indicated that all of the patients, at least, were able to accomplish some of their action plans and improve their dietary behaviors.

Thirdly, the patients' self-confidence scores might have contributed to their goal-achievement levels. Table 17 shows that although the average self-

confidence score slightly decreased from week one (T0) to week two (T1), and from week two (T2) to week three (T3), the scores were not significantly different. Additional analysis using the Spearman-rho correlation (Appendix L, Table L3 – L5) found that there was a significant positive relationship between the self-confidence scores and the goal-achievement levels in the following instances: the self-confidence score at T0 and the goal-achievement level at T1 ($r_s = .65, p < .01$), at T1 and T2 ($r_s = .61, p < .01$), and at T2 and T3 ($r_s = .60, p < .01$). Several previous studies suggested that higher self-confidence scores were significantly associated with better goal-achievement levels (Bodenheimer et al., 2007; DeWalt et al., 2009; Handley et al., 2006; MacGregor et al., 2006; Wallace et al., 2009). A self-confidence score of 7 was considered to be the minimum level at which goal(s) would most likely be achieved (Bodenheimer et al.). Interestingly, although the self-confidence scores decreased slightly (but not significantly) between weeks two (T1) and three (T2) of the program (Table 17), the percentage of patients who completely achieved their goal(s) at the one-month stage was significantly higher than the percentages at the week-three (T2) and week-two (T1) stages of the program (Table 15). This finding could be due to the components of the goal(s) set by the patients. As can be seen in Table 14, some components of the goal(s) selected at week three (T2) had actually already been selected and implemented in the previous weeks. Thus, the patients already had experience in accomplishing the selected action plans. As a result, the percentage of patients who completely achieved their goal(s) was significant by the end of the program.

The fourth factor possibly underpinning the goal-achievement levels was the barrier factor. During the evaluation of the goal-achievement levels (by

telephone and face-to-face follow-ups), the barriers to achieving the goal(s) were identified and discussed. As a result, the researcher noted several barriers reported by the patients, including family or social events (wedding ceremonies) and low family support.

Family or social events, such as wedding ceremonies, were commonly reported as barriers to goal achievement. Culturally, wedding ceremonies in Jogjakarta are conducted over the course of one week. The neighbors and relatives of the bride come each day to the bride's house for approximately one week prior to the wedding day to help prepare the wedding ceremony and all of its components. Throughout this week, they have to prepare foods, snacks, and beverages for the guests who come to the bride's house. These activities are called "*rewang*." Therefore, there are large quantities of foods, snacks, and beverages available which are high in calories and sugar. At these times, the patients often had difficulty in implementing their action plans properly because refusing foods and snacks from the host, refusing "*rewang*," and avoiding joining in wedding ceremonies are all considered impolite among the people in Yogyakarta. For example, one patient set the goal of *selecting a healthy diet*. Her action plans involved avoiding foods containing coconut milk for at least three days per week, and consuming three cups of cooked vegetables per day for at least three days per week. Because she had to join *rewang* and eat the foods and beverages served by the host, she failed to implement her selected action plans properly and was only able to accomplish some parts of her action plans. As a consequence, she only partially achieved her goal.

Low family support was also identified as a barrier to goal achievement. A female patient reported that her husband always bought sweet

desserts for her; once she did not finish it and her husband became angry because he felt that his wife did not respect him. Another patient reported that her husband preferred to eat food made with coconut milk every day. When she set an action plan to reduce the consumption of coconut milk and fried foods, she had to prepare extra foods for herself. This burdened her since she had to cook two meals instead of one. As a result, she could not implement her action plan properly and only partially achieved her goal.

In conclusion, the dietary self-management support program in the present study significantly improved the patients' dietary behaviors. All of the patients in the experimental group reported their satisfaction with the program, including the booklet and the telephone follow-ups. All of the patients in the experimental group completed the study and only one patient in the control group had to quit due to transportation problems. The results indicate that this program not only offered benefits to the patients, but was also feasible and suitable for implementation with the target group of patients. Therefore, the implementation of this program with patients who have T2DM is recommended.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

This chapter presents the conclusions of the study based on the research findings. The strengths and limitations of the study will also be addressed. Furthermore, implications and recommendations for nursing practice, nursing education, and future studies will be offered.

Conclusion

This quasi-experimental research study was designed to examine the effects of a dietary self-management support program on the dietary behaviors of Indonesian patients with type 2 diabetes mellitus. This study was conducted at the medical OPD of Jogja Hospital, Yogyakarta, Indonesia, from October 2010 to February 2011. Seventy patients with type 2 diabetes mellitus who met the inclusion criteria were recruited for this study. A paired matching technique for age (±5 years), gender, and total monthly income was used to assign the patients into the control group and experimental group.

The patients in the experimental group received a dietary self-management support program for one month. Before the intervention was started, the patients' demographic data, degree of prior knowledge regarding diabetic dietary behaviors, current dietary behaviors, and body mass index were obtained to serve as baseline data. The patients' fasting blood glucose levels were also obtained from their medical records. The instrument used to measure the dietary behaviors in this study

consisted of the Self-Management Dietary Behaviors Questionnaire (SMDBQ). The SMDBQ were validated by 3 experts and tested for reliability using Cronbach's alpha coefficient and gained the result of .73.

The patients' demographic and clinical characteristics were described in terms of frequency, percentage, mean, and standard deviation. To test the proportion of equivalence in the patient characteristics between the control group and the experimental group, the chi-square test was used. Fisher's exact test was used as an alternative statistical test to conduct analysis of two-by-two contingency tables when the observed frequencies were too small. A paired t-test was used to measure the significance of the differences in dietary behaviors within the groups. An independent t-test was used to measure the significance of the dietary behaviors differences between the control and experimental groups. In addition, descriptive statistics were used to describe the goal achievement levels among the patients in the experimental group.

The results of the study indicated that the patients in the experimental group displayed significantly better dietary behaviors after the completion of the study, across all dietary behaviors dimensions ($p < .01$). The patients in the control group showed significant improvement only for the dimension of "selecting a healthy diet" ($p < .05$). Overall, the patients in the experimental group had significantly better dietary behaviors than those in the control group, who received only standard care ($p < .01$). Considering goal achievement levels, almost one third of the patients completely achieved three weekly overall goals throughout the study. About 28% and 17% of the patients completely achieved two weekly goals and one weekly goal, respectively. About 22% never completely achieved any overall goals during the

study. Based on the weekly follow-up, it was found that more than half of the patients had completely achieved their goal(s) by week 2 and 1 month of the intervention. By week three of the intervention, more than half of the patients had partially achieved their goal(s). The number of patients who completely achieved their goal(s) one month into the intervention was significantly higher than the corresponding figure for week three, indicating that the patients were able to completely achieve their goal(s) by the end of the study.

Strengths and Limitations

The present study had several strengths, including individualized programs, the study design, and the ability of the researcher to generalize the results to cover other patients with T2DM in Yogyakarta, Indonesia. Firstly, the patients received a self-management support program in order to improve their dietary behaviors. The program was designed to accommodate the unique dietary behaviors of each individual. Moreover, each patient received an educational session which was individualized and tailored to his or her needs, based on his/her prior knowledge regarding the diabetic dietary behaviors of patients with T2DM. Therefore, the patients not only received general information about the dietary behaviors of patients with T2DM, but also received specific information based on their personal needs.

The second strength was related to the design of the study. The patients were randomly assigned to either the control or experimental group by a matching technique in order to minimize selection threat. The data were collected by the research assistant. The researcher did not participate in the data collection process in order to prevent the possibility of expectation bias. All instruments used for the data

translation processes were employed to guarantee language equivalence and clarity between the original English language instruments and the Indonesian versions. In this study, the patients in the experimental group received a diabetes self-management support program, which consisted of individual education, written booklet, goal setting and action planning, and continuing follow-up efforts through phone calls and face-to-face interviews. Telephone follow-ups were considered to be a novel approach among the Indonesian patients since no previous study had ever used telephone follow-ups to measure program effectiveness.

Thirdly, this study was conducted in a secondary hospital in Yogyakarta. The demographic and clinical characteristics of the patients in this study were quite similar to those of the patients in several previous studies conducted in Yogyakarta. Therefore, the results of this study can be used with a high degree of confidence to make generalizations about particular patients with T2DM in Yogyakarta.

In spite of these strengths, some limitations were noted. The intervention was conducted in the waiting room; hence, patients in the control group and the experimental group might have met each other on the same day and discussed the intervention among themselves. Thus, it was possible that the ideas of the patients in the control group were biased by the patients in the experimental group.

Implications and recommendations

This study provides evidence of the effectiveness of a dietary self-management support program on the dietary behaviors of patients. Based on the findings of the study, it is recommended that the following implementations be made:

Nursing practice

Several recommendations for the nursing practice are proposed. Firstly, nurses should implement dietary self-management support programs and conduct routine follow-ups using either phone calls or face-to-face follow-up during patients' regular visits. Secondly, in their professional practice, nurses should act as support people who promote and facilitate the enhancement of patients' self-management behaviors. Nurses should encourage patients to take an active role in determining treatments, setting goals, and generating action plans. Thirdly, it will be helpful to provide patients with written materials, such as booklets, which serve as simple guides for patients in their daily lives. Fourthly, nurses should provide patients with adequate information, not just about dietary behaviors in patients with T2DM in general, but also covering the specifics of all dimensions of dietary behaviors. These include recognizing calorie needs, selecting a healthy diet, arranging meal plan, and managing dietary behaviors challenges; in addition, these should be tailored to patients' individual needs, based on their prior knowledge. Finally, when patients visit nurses, the nurses should routinely discuss goal-setting strategies in order to facilitate better dietary behaviors among the T2DM patients.

Nursing education

The results from this study can be used to support the growing of body of knowledge related to patients' self-management, patients' dietary behaviors, and diabetes management itself. The concept of self-management should be included in nursing courses and/or training relating to the care of patients with diabetes and chronic diseases in general. In addition, concerning the fact that goal setting and

action planning strategies are effective methods for improving dietary behaviors, these concepts should be disseminated to nurses through training courses or special lectures. Finally, the results of the study can also be used as basic knowledge for the further development of self-management support programs for patients with diabetes or other chronic conditions.

Nursing research

Further research is needed to test the feasibility and effectiveness of the program in various settings, such as in primary care, community, and multi-level hospital settings. The effects of the program over long-term periods (such as six months) after program completion also need to be investigated. Furthermore, it is recommended that the effectiveness of the program be examined for clinical outcomes, such as waist circumference, BMI, and HbA1c. Moreover, the effectiveness of the program for patients with other chronic diseases such as those with hypertension or chronic heart disease should be examined. A study design using randomized controlled trials is strongly recommended. Additionally, it is suggested that an adequate strategy to prevent bias between subjects groups be used in future studies, such as the strategy of selecting the subject in the experimental group on a different day than the selection of those in the control group.

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APPENDICES

APPENDIX A

INFORMED CONSENT

My name is Yanuar Primanda. I am a lecturer at School of Nursing, Faculty of Medicine and Health Science, Muhammadiyah University of Yogyakarta, Indonesia who is doing my Master Degree of Nursing at Faculty of Nursing, Prince of Songkla University, Thailand. I am conducting a research study entitled "Effect of Dietary Self-management Support Program on Dietary Behaviors in Patients with Type 2 Diabetes Mellitus in Yogyakarta, Indonesia" to fulfill the requirement of my study.

This study and its procedures have been approved by the Institutional Review Board (IRB) of Prince of Songkla University, Thailand and also have been granted permission by the Jogja Hospital, Yogyakarta, Indonesia. You are asked to participate in this research project. Because you are currently having fasting blood glucose ≥ 126 mg/dl and being diagnosed of type 2 diabetes mellitus by your doctor, you are invited to participate in this study. Your participation will be beneficial to improve the quality of nursing care provided for diabetic patients like you in the future.

If you decide to participate in this study voluntarily, I will initiate the following procedure:

Explanation on procedure

a. Grouping
    1. You will be assigned to either the intervention group who will receive dietary self-management support program or the control group who will receive standard nursing care from our nurses at the OPD by using coin draw technique.
    2. If you are in the experiment group, you will be given a dietary self-management support program which consists of one time of individual based educational program within approximately 50 minutes and I will make follow-up using 2 telephone calls and meeting you during your regular check up. You still receive routine care from your nurse, doctors, and other providers according to standard nursing care for diabetes patients in this hospital.
    3. If you are in the control group, you will be given routine nursing care as a standard care in Jogja Hospital similar to what you usually have received. If you want, the dietary self-management support program and the manual handbook will be provided for you after the completion of this study.
b. Evaluation and Forms
    1. You will be asked to fill up the forms about your personal information (demographic data questionnaire) one time prior to the study. This would take time around 10 minutes.

2. You also will be asked to fill the form of self-management of dietary behaviors questionnaire to measure your dietary behaviors before and after completion of the program (two times). This questionnaire will take another 15 minutes.

Risks and Comfort

There are no foreseeable risks or harm to you to join this study. There is no payment to participate in this study.

Benefits

The result of this study can be used as a protocol for nurses and other healthcare professional to provide dietary self-management support program in order to achieve better dietary behaviors, thereby improve your ability to self-manage your diet that will benefit for your overall quality of life. The data from this research will be used to write a research paper. It also will provide useful information for future research related to this area.

Confidentiality

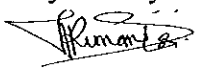
All information and your responses in this study will remain confidential. Only the researcher, the data collector, and the research advisors are eligible to access the data. Neither your name nor identifying personal information will be used in the report of the study. Further, the data on the report will be presented as a group rather than individual.

Participation and Withdrawal from Participation

Your participation in this study is voluntary. Signing the informed consent or agreeing verbally to participate and returning the form given indicate that you understand what is involved and you consent to participate in this study project. In any time of this study, you have right to withdraw from participation. No penalty will be incurred if you decide to withdraw and no any influence to your medical service or medical treatment.

If you have any question, suggestion or cannot participate in this study, you can directly contact the researcher (me) at mobile phone (+62 85729061692). Lastly, if you agree to participate in this research study, please kindly sign your name on the consent form or verbally state your agreement to participate in the study.

Thank you for your cooperation



(Yanuar Primanda)
Researcher

RESEARCH INFORMATION SHEET: DIETARY SELF-MANAGEMENT SUPPORT PROGRAM GROUP (EXPERIMENTAL GROUP)

If you are in the dietary self-management support program group, I will initiate the following procedures:

1. At the beginning of the program, you will be asked to fill the form of the demographic data questionnaire and self-management of dietary behaviors questionnaire. Together this would take time around 25 minutes. You also will be measured your body weight and body height. The research assistant will help you to complete the form.
2. You will receive individual educational session consisting of the following steps:
    a. Reflection
    b. Lecture
    c. Problem identification
    d. Setting individual goal and actions plan related to dietary behaviors
3. You will receive the self-management of dietary behaviors booklet to facilitate your learning process. This booklet is free of charge.
4. Within one month after the educational session, the researcher follows up you by both phone call and direct interview during your regular visit. The phone-call follow-up will be conducted every one week consecutively until week 3. In the fourth week, during your regular check up at the OPD of Jogja Hospital, the researcher will follow-up you for the last time. The phone call will be made base on your agreement. The length of phone call between 15-30 minutes depends on your need. You are not asked to pay the phone fee.
5. At the end of the program, you will be asked to fill the self-management of dietary behaviors questionnaire. This will take time around 15 minutes. The research assistant will help you to complete the form.
6. Beside the program, you receive routine care as your usual care.
7. You have right to withdraw from the program without any penalty.

Risk and Comfort

There are no foreseeable risks or harm to you to join this study.

QUANTITATIVE STUDY INFORMED CONSENT FORM

Study Title : Effect of Dietary Self-Management Support Program on Dietary Behaviors in Patients with Type 2 Diabetes Mellitus in Yogyakarta, Indonesia.

Investigator : Yanuar Primanda
Master Candidate, Faculty of Nursing, Prince of Songkla University, Thailand

Patient's Name :_____Age:_____

Patient's Consent

,_____, was informed of the details of the research entitled "Effect of Dietary Self-Management Support Program on Dietary Behaviors in Patients with Type 2 Diabetes Mellitus in Yogyakarta, Indonesia" and was ensured that all of information related to personal information, health history and research result will be keep confidential. If any further problem or issues arise, I can discuss them with the researcher. I have the right to withdraw from the research study at any time without any effect to my medical services and medical treatment. I am willing to participate in this research study without any threat and force. Hereby, I endorse my signature.

Given by:_____(Consenter) Date:_____

Researcher's note

I had given the detailed information of the research article entitled "Effect of Dietary Self-Management Support Program on Dietary Behaviors in Patients with Type 2 Diabetes Mellitus in Yogyakarta, Indonesia." The signature and returning the form indicate that you understand what is involved and that you consent to participate in this study voluntarily. You have been given an opportunity to ask question and were satisfied with the due answer.

Signature:_____(Researcher) Date:_____

APPENDIX B

DIETARY SELF-MANAGEMENT SUPPORT PROGRAM

1. Reflection on patient's current behaviors

   Time allocation : 5 minutes

   Method : discussion

   Steps :

   a. The researcher asks questions related to patients' current dietary behaviors

   b. .....

2. Individual education and counseling

   Time allocation : 30 minutes

   Methods : one-to-one, discussion and counseling

   Materials : Teaching plan (Appendix C)

   Dietary self-management booklet (Appendix D)

   Place : private room, medical OPD Jogja Hospital

3. Identification of problems on dietary behaviors

   Time allocation : 5 minutes

   Method : discussion

   Steps :

   a. The researcher asks the patients whether patients' current dietary behaviors followed recommended dietary behaviors for patients with T2DM

   b. .....

4. Individual goal setting and action planning

   Time allocation : 15 minutes

   Method : discussion

   Steps :

   a. Setting the goal

   b. .....

5. Follow up

Time allocation : depend on patients' need

Method : discussion

Media : telephone call (week 2 and 3) and face to face (week 4)

Steps :

a. Ask the patient whether he/she still remember his/her goal setting and action planning and compare it with goal setting and action planning form that has been made in initial/previous meeting/phone call

APPENDIX C

TEACHING PLAN FOR EDUCATION AND COUNSELING SESSION

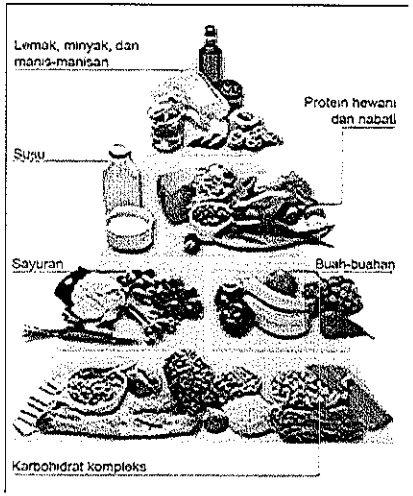
No	Topic	Objectives	Content	Method & time	Activities	
					Researcher	Patients
1.	Introduction	a. To explain to the patient about the importance of education and counseling session b.	After the reflection on your current dietary behaviors session, now I will provide relevant information about dietary behaviors in patients with type 2 diabetes mellitus (T2DM). This session will be useful for you to enhance your knowledge and help you to justify whether your current dietary behaviors are follow the dietary behaviors recommendation or not, then finally will enhance overall your self-management of dietary behaviors.	- Lecture - 1 minutes	a. Explains the importance of the education session b.	a. Pay attention
2.	General information of dietary management in diabetic type 2 patients	To increase knowledge regarding the importance of self-management of dietary behaviors	a. The importance of self-management of dietary behaviors Why patients with T2DM have to self-manage their dietary behaviors? ..... b. Effects of unmanaged dietary behaviors in patients with type 2 diabetes ..... c. Further complications in patients with type 2 diabetes may occur such as: ..... Do you have problems related to unmanaged dietary behaviors?	- Discussion - Lecture - 3 minutes	a. Explains about the importance of self-management of dietary behaviors and effects of unmanaged dietary behaviors b.	a. Pay attention b. .....
3.	Recognizing the amount of patient's calorie needs	To enhance self-management ability in	Now we will discuss and learn about calorie needs calculation based on body mass index and activity. Patients with T2DM have to able to recognize how many foods that they can consume each day to ensure adequate nutrition and to prevent complications.	- Discussion - ..... - 7 minutes	a. Explains about the calculation of BMI b.	a. Pay attention b.

No	Topic	Objectives	Content	Method & time	Activities	
					Researcher	Patients
4.	Selecting healthy diet	To enhance self-management ability in	In patients with diabetes like you, there is no specific diabetes diet. You are encouraged to follow healthy diet recommendation which also recommended for other people without diabetes. Generally, you have to follow dietary recommendation as follows:	- Discussion - ..... - 7 minutes	a. Explains about the Indonesian foods exchange list b.	a. Pay attention b. .....
5.	Arranging meal plan	To enhance self-management ability in	Do you know what is meal plan and why is it important for your health? For patients with diabetes like you, you have to arrange your meal plan to make sure your body receives the adequate energy throughout the day and to control your blood glucose level, to prevent it turns too high or too low.	- Discussion - ..... - 7 minutes	a. Explains about the meal plan arrangement b.	a. Pay attention b. .....
6.	Managing dietary challenges	To enhance self-management ability in	It is common that in patients with diabetes, they found several challenges to manage their dietary behaviors, such as during wedding ceremony in which many foods are served. Other social gathering also provides delicious foods that may contain high sugar, fat and cholesterol. What do you think about your dietary behaviors during special occasion such as social gathering, or dining out?	- Discussion - ..... - 5 minutes	a. Explains about the dietary challenges in self-management of dietary behaviors b.	a. Pay attention b. .....

APPENDIX D

DIETARY SELF-MANAGEMENT BOOKLET (INDONESIAN VERSION)

MANAGEMEN DIRI PERILAKU DIET PASIEN DIABETES



Disusun oleh:

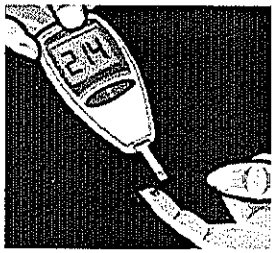
YANUAR PRIMANDA

MAHASISWA PROGRAM MASTER

PRINCE OF SONGKLA UNIVERSITY THAILAND

2010

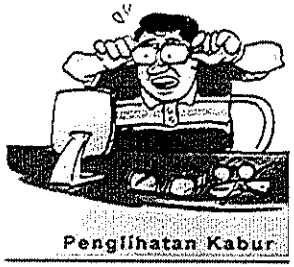
Komplikasi akibat perilaku diet tidak terkontrol:

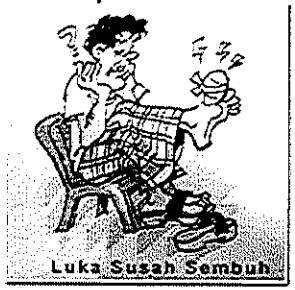


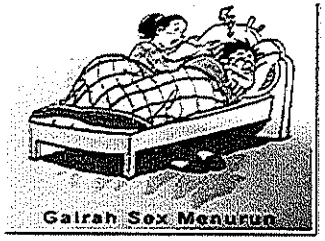
- ✓ **Hipoglikemi:** terlalu **rendah** kadar gula darah (gula darah sewaktu kurang dari 60 mg/dl)
- ✓ **Hiperglikemi:** terlalu **tinggi** kadar gula darah (gula darah sewaktu lebih dari 200 mg/dl)

Komplikasi-komplikasi pada pasien diabetes:

- ✓ **Ketoasidosis** (gula darah lebih dari 250 mg/dl)
- ✓ **Sindrom non ketotic hyperosmolar** (gula darah lebih dari 600 mg/dl), yang dapat menyebabkan **menurunnya kesadaran, koma,** dan **kematian**
- ✓ Masalah **mata** yang bisa mengakibatkan **kebutaan**
- ✓ **Kerusakan syaraf** yang bisa menyebabkan **amputasi**
- ✓ Gangguan **seksual (impotensi)**
- ✓ Gangguan **penyembuhan luka**
- ✓ **Penyakit jantung**
- ✓ **Stroke**
- ✓ **Gagal ginjal**



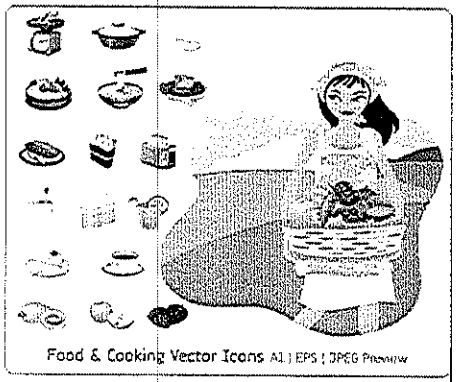


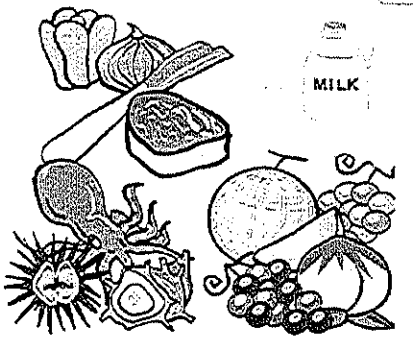


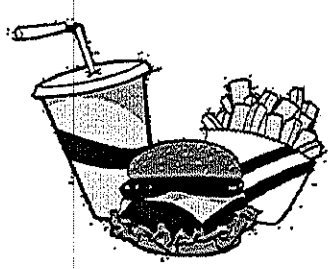
4 KOMPONEN PENTING PERILAKU DIET PADA PASIEN DIABETES:

4 komponen penting perilaku diet pasien diabetes meliputi:

a. Mengenali jumlah kebutuhan kalori (**Jumlah diet**)
b. Memilih jenis makanan-makanan yang sehat (**Jenis diet**)
c. Membuat jadwal atau perencanaan makan (**Jadwal diet**)
d. Mengatasi tantangan-tantangan dalam mengatur perilaku diet (**Tantangan diet**)







APPENDIX E

GOAL SETTING AND ACTIONS PLANNING FORM

I _____ and _____
(Patient's Name) (Researcher's Name)
Have agreed that to improve my health, I will improve my dietary habits

- **Goal:**
  1. _____
     Action Plan (What, How, How Often, & When)
     1a.....
     1b.....
     1c.....
  2. _____
     Action Plan (What, How, How Often, & When)
     2a.....
     2b.....
     2c.....
  3. _____
     Action Plan (What, How, How Often, & When)
     3a.....
     3b.....
     3c.....
  4. _____
     Action Plan (What, How, How Often, & When)
     4a.....
     4b.....
     4c.....
- **Choose your confidence score**

0 1 2 3 4 5 6 7 8 9 10

No Confidence Somewhat Confidence Totally Confidence

Possible barriers to perform the action planning:_____
_____
_____

Possible problem solving(s) :_____
_____
_____

Signature_____ Signature _____
(Patient) (Researcher)

Code:_____
Date:_____

APPENDIX F

GOAL ACHIEVEMENT STRUCTURED INTERVIEW

1 What is/are your last week goal and action planning?

2 What is/are action(s) you have implemented throughout this past week?

. .....

. .....

. .....

6 What is/are your goal and action planning for .....

APPENDIX G

DEMOGRAPHIC DATA QUESTIONNAIRE (DDQ)

Code:_____
Date:_____

Instruction: Below is the form to obtain information about your current demographic data and health information.

I. Demographic Data

1. Name :.....
2. Age :..... years
3. Gender : ☐ Male ☐ Female
4. Marital status : ☐ Single ☐ Married ☐ Widowed
5. Occupation :.....
. .....
. .....
. .....
16. Duration of diabetes : ..... year(s)

II. Health Information Data (Filled by Research Assistant)

1. Current medication :.....
.....
.....
2. FBG : .....mg/dl
3. Body weight :..... Kg
4. Body height :..... cm

APPENDIX H

PRIOR KNOWLEDGE REGARDING DIABETIC DIETARY BEHAVIORS QUESTIONNAIRE

Code:_____
Date:_____

Instruction: please fill the statements by mark (√) in the column which indicates your understanding about the statements

No	Questions	Yes	No
1	The calorie needs can be calculated based on body mass index (BMI).		
2	Check and consider the food label of prepared foods is important to manage diet.		
3	Diabetic patients are encouraged to eat variety of fruits and vegetables everyday that contains low carbohydrate and sugar such as apple, papaya, star fruits, broccoli, tomato, cucumber, lettuce, etc.		
.	……..		
.	……..		
.	……..		
13	Taking candy bar or ¾ cup of fruit juice is ……		

APPENDIX I

SELF-MANAGEMENT DIETARY BEHAVIORS QUESTIONNAIRE

(SMDBQ)

Code:_____
Date:_____

Instruction: Below are statements about your dietary behaviors to manage your diabetes during the past month. Please fill the statements by mark (√) in the column which indicates your usual dietary behaviors. There is no right or wrong answer. If you have any question, please feel free to ask the person giving you this questionnaire.

Note

- Never: Never perform it at least last whole month
- Sometimes: Once at a time, not habitual
- Often: Repeat the activity for several times, but not as a habit
- Routinely: Continuously, regularly, and always conduct the activity

No	Statements	Never	Some times	Often	Routinely
1	**Recognizing the Amount of Calorie Needs** You are concerned about the best amount of calorie in foods to be consumed each day.				
2	You consume the same portion size of food everyday.				
.	.....				
.	.....				
.	.....				
33	You bring candy bar for hypoglycemia.....				

APPENDIX J

GOAL ACHIEVEMENT FORM

Code:_____
Date:_____

Name :_____ Phone :_____

Goal achievement score:

1 = No behavioral change at all
2 = Partially achieve the goal
3 = Completely achieve the goal

Goal(s) and Action Planning	Implementation and Goal Achievement Score
Week 1, **Day/Date:**_____ **1. Goal:**_____ Action Planning **a.** _____ _____ **b.** _____ _____ **c.** _____ _____ **d.** _____ _____ **2.** …… Self-Confidence Score:_____ Possible Barriers: …… Problem solving: ……	**Day/Date:**_____ **Duration :**_____ • **Goal 1** Action Planning **a.** _____ _____ **b.** _____ _____ **c.** _____ _____ **d.** _____ _____ • Goal 2 **a.** …… Reported Barriers and Problem Solving…… Goal Achievement Score: ……
Week 2, ……	……

APPENDIX K

LIST OF EXPERTS

1. Assist. Prof. Dr. Jaruwan Manasurakarn

   Faculty of Nursing, Prince of Songkla University, Thailand

2. Assist. Prof. Dr Valla Tantayotai

   Faculty of Nursing, Walailak University, Thailand

3. Mr. Timor Haryadi, DCN

   Jogja Hospital, Yohyakarta, Indonesia

APPENDIX L

ADDITIONAL ANALYSIS

Table L 1

Comparison of the Pre-Test Dietary Behaviors Score between the Control Group and the Experimental Based on Dietary Behaviors Dimensions Group (N = 69)

Variable	Control Group (n = 34) M (SD)	Experimental Group (n = 35) M (SD)	*t*	*p*
Recognizing amount of calorie needs	9.53 (3.18)	11.00 (3.09)	- 1.95	.03*
Selecting healthy diet	41.53 (7.82)	43.37 (5.85)	- 1.11	.136
Arranging meal plan	17.65 (2.92)	18.23 (3.99)	- 0.69	.247
Managing dietary behaviors challenges	18.06 (3.61)	19.71 (3.30)	- 1.99	.03*

Note. $df = 67$, $*p < .05$.

Table L 2

Mean Score, Standard Deviation, and Mean Difference of the Recognizing the Amount of Calorie Needs and Managing Dietary Behaviors Challenges Dimensions at Pre-test (N = 69)

No	Statements	Control Group (n - 34 M	Control Group (n - 34 SD	Experimental Group (n = 35) M	Experimental Group (n = 35) SD	Mean Difference
	Recognizing the Amount of Calorie Needs					
1	Concerned amount of calorie in foods each day	2.14	1.06	2.46	1.17	0.32
2	Consumed the same portion size of food	2.34	1.06	2.77	1.09	0.43
3	Estimated the amount of calorie at one meal	2.40	1.11	2.89	1.21	0.49
4	Had the calories of food as estimated everyday	2.63	0.91	2.89	0.96	0.29

Table L 2 (*continued*)

No	Statements	Control Group (n - 34 M	SD	Experimental Group (n = 35) M	SD	Mean Difference
	Managing Dietary Behaviors Challenges					
27	Selected a restaurant that serves low-fat, low cholesterol food and variety of fruits and vegetables.	2.49	.781	2.80	.901	0.31
28	Ordered foods to include vegetables and fruits.	2.54	.817	2.77	.942	0.23
29	Finished all foods served by the restaurant.	3.23	.808	3.20	1.158	0.03
30	Ordered foods in the same portion as patients' daily meal.	2.37	.973	2.69	.963	0.32
31	Ate the same portion of food as the patients' daily meal in family events or other invitations.	2.77	.808	2.86	.944	0.09
32	Preferred exercise such as walking rather than taking food when the patients felt stress or depressed.	2.43	1.008	3.40	.812	0.97
33	Brought candy bar for hypoglycemia prevention.	2.26	1.221	2.00	1.188	0.26

Table L 3

Relationship between Self-confidence Score at Week One (T0) and Goal Achievement Levels at Week Two (T1) of the Program among the Experimental Group (n = 35)

Variables	Self-confidence score	Goal achievement levels
Self-confidence score	1	.65
Goal achievement levels	.65	1

Note. *p <.01, Spearmans's rho correlation test

Table L 4

Relationship between Self-confidence Score at Week Two (T1) and Goal Achievement Levels at Week Three (T2) of the Program among the Experimental Group (n = 35)

Variables	Self-confidence score	Goal achievement levels
Self-confidence score	1	.61
Goal achievement levels	.61	1

Note. *p <.01, Spearmans's rho correlation test

Table L 5

Relationship between Self-confidence Score at Week Three (T2) and Goal Achievement Levels at One Month (T3) of the Program among the Experimental Group (n = 35)

Variables	Self-confidence score	Goal achievement levels
Self-confidence score	1	.60
Goal achievement levels	.60	1

Note. *p <.01, Spearmans's rho correlation test

VITAE

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Primanda, Y., Kritpracha, C., & Thaniwattananon, P. (*in press*). Dietary Behaviors among Patients with Type 2 Diabetes Mellitus in Yogyakarta, Indonesia. *Nurse Media Journal of Nursing.*