

CHAPTER 2

LITERATURE REVIEW

This chapter is a review on the literature relevant to the study. Related information is presented as follows:

1. Overview of Type 2 diabetes
 - 1.1 Definition
 - 1.2 Prevalence
 - 1.3 Risk Factors
 - 1.4 Complications
2. Orem's nursing theory
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4. The supportive-developmental nursing program on patients with diabetes
5. Measurement of self-care practices

Overview of Type 2 Diabetes

Definition

Type 2 diabetes mellitus, formerly known as non-insulin dependent diabetes mellitus (NIDDM). This form is more common and accounts for 90-95% of all diabetes cases worldwide. It occurs almost entirely in adults and results from the body's inability to respond properly to the action of insulin produced by the pancreas (WHO, 2002). It may range from predominantly insulin resistance with relative insulin deficiency to a predominantly secretory defect with or without insulin resistance (Alberti & Zimmet, 1998).

Diabetes mellitus causes disturbances of protein and fat metabolism. These abnormalities are associated with micro and macrovascular and neuropathic damages (Black & Matassarini-Jacobs, 1993). Mortality is usually related to ischaemic heart disease, stroke, or chronic renal failure (Mustaffa, 1990; Spanheimer, 2001; Fatanah, 2002). Because of its high morbidity and mortality, patients with diabetes require more support to perform self-care practice for the diabetes management.

Prevalence

Type 2 diabetes is the most prevalent form of diabetes, which is due to the combination of insulin resistance (impairment in insulin-mediated glucose disposal) and defective secretion of insulin by pancreatic β -cells (Grundy et al., 1999). Diabetes has become one of the most common chronic diseases all over the world. Using American Diabetes Association (ADA) criteria, the Third National Health and Nutrition Examination Survey, 1988 -1994 (NHANES III) data indicate that diabetes (diagnosed and undiagnosed combined) affects 7.8% of adults > 20 years of age in the U.S., and rates reaching 18.8 % at > 60 years of age (Harris et al., 1998). In Latin America, the prevalence of Type 2 diabetes is highest among Pima Indians, followed by Hispanics, blacks, and whites (Ismail & Gill, 1999). In Malaysia the highest was among the Malays, with 4.7% prevalence of diabetes Type 2 (Choi & Shi, 2001). The prevalence of diabetes mellitus and impaired glucose tolerance were 10.5% and 16.5% in Kelantan, a state of north-eastern Malaysia (Mafauzy et al., 1999). The high prevalence of undiagnosed diabetes and the proportion of cases with evidence of complications at diagnoses undoubtedly create a strong imperative for screening. However 35-50% cases of diabetes are undiagnosed at any one time (Mafauzy et al., 1999).

In addition, Type 2 diabetes mellitus is a form of life-style related disease. Obesity, over-nutrition, lack of exercise, smoking, heavy drinking, and stressful lifestyle are high-risk behaviors in Type 2 diabetes mellitus (Ministry of Health Malaysia, 1998; LeRoith, Taylor & Olefsky, 2000; Marimoto & Tatsuya, 2000; Spanheimer, 2001; Kim, Sunwoo, Sung & Kim, 2002). Obesity is a strong risk factor for Type 2 diabetes mellitus with the odds ratio (OR) of 1.3 to 2.2. Further intervention trials of the effects of diet and exercise on high-risk group had given a positive effect (Marimoto & Tatsuya, 2000). The Diabetic Care Data Collection Project of Malaysia (DCDCP) had reported that 52% of Type 2 diabetic patients in Malaysia have Body Mass Index (BMI) of more than 25 kg/m², 28% smokers, 15 % alcohol consumer, and 76% with hypercholesterolemia (National action plans and strategies, 1998). Mafauzy et al. reported 38.4% of Type 2 diabetes patients in Kelantan were obese, 33.5% smokers, and 71.9% had hypercholesterolemia.

Diabetes mellitus is also a hereditary disease. Type 2 diabetes is strongly likely of genetic predisposition (Alberti and Zimmet, 1998). Population based studies, twin and family studies had shown a strong genetics component in the etiology of Type 2 diabetes mellitus and a preponderance of maternal transmission had been reported (Klein, 1996; Bo, Cavallo-Perin,

Gentile, Repetti & Pagano, 2000). Local study in Malaysia among young diabetes showed 45% of patients had family history of diabetes, where 36% were either maternal or paternal and 9% were both parents (Mohammad, 2002).

In conclusion, Type 2 diabetes among the Kelantan population were due to obesity, smoking and hypercholesterolemia, and the younger age groups were due to hereditary. Therefore, promoting changed in life-style and self-care practices is important to maintain the management of the diabetes.

Risk factors

Type 2 diabetes is reaching epidemic proportions throughout the world as more cultures adopt Western dietary habits. Currently, an estimated of 100 million people have diabetes. The risk factors for the diabetes are: (WHO, 2002).

1. Age: The onset of Type 2 diabetes typically occurs after the age of 40. Aging itself may increase the risk for glucose intolerance and diabetes. In one study, diabetes occurred 20% in men and women who are older than 85 years compared to only 5% in men and 3.8% in women who are younger than 60 years.

2. Obesity: The rate of obesity is very high in Type 2 diabetes. Some studies have found that regardless of family history even the modest weight gain is associated with an increased risk for diabetes. Excess body fat appears to play a strong role in insulin resistance and its distribution is also important. Fat concentrated around the abdomen and in the upper part of the body is associated with insulin resistance. On the other hand, fat that accumulates in a “pear-shape” around the hips and flank appears to have a lower association with obesity. One study suggested that waist circumferences greater than 35 inches in women and 40 inches in men signify increased risk for heart disease and diabetes.

3. Lack of exercise: It has been demonstrated that regular physical activity increases insulin sensitivity and improves glucose tolerance. Recently, prospective studies have also shown that physical activity is associated with a reduced risk of NIDDM.

4. Dietary behavior: The overweight people who consume high-energy diet may have the risk for diabetes. It would be an over-simplification to propose that any single nutrient is specifically diabetogenic. However, there is evidence from both laboratory and epidemiological studies in various populations that increased dietary intake of saturated fats and decreased intake of dietary fiber can result in decreased insulin sensitivity and abnormal glucose tolerance.

5. Severe or prolonged stress: Several states of physical stress or trauma are associated with glucose intolerance induced by hormonal effects on glucose metabolism and insulin secretion. The role of emotional and social stress as contributory factors in diabetes mellitus remains unproved.

6. Drugs and hormones: Long lists of drugs that impair glucose metabolism have been compiled. Among commonly used drugs: phenytoin, diuretics, corticosteroids, some contraceptive steroid, and adrenoceptor-blocking agents may cause glucose intolerance and in susceptible individuals.

7. Pregnancy history: Women with history of gestational diabetes mellitus or large birth weight babies exceeding 4 kgs are at risk for diabetes mellitus.

8. Smoking: Smokers are at a higher risk for both Type 2 diabetes and its complications.

9. Family History: From 25% to 33% of all patients have a family history of diabetes.

10. Ethnicity: The risk for Type 2 diabetes is higher in African and Hispanic Americans than in Caucasian-American. African-American women in general have a higher rate of insulin resistance from high-fat diets than non-African-Americans. The Pima tribe in Arizona has an incidence of Type 2 diabetes that is 19 times higher than that of the white population. However, the association between diet and diabetes remains critical in assessing these ethnic differences.

Complications

Complications of Type 2 diabetes can be divided into three main groups:

1. Micro-vascular complications

Retinopathy. Approximately 2 % of people become blind while about 10% develop severe visual handicap after 15 years of diabetes (WHO, 2002). The Diabetic Care Data Collection Project (DCDCP) in 1997 had reported 53% of diabetic patients in Malaysia had retinopathy (National Action plans and strategies, 1998). Diabetes is associated with damage of small blood vessels in retina resulting in loss of vision (WHO, 1999; LeRoith et al., 2000).

Neuropathy. It is one of common complications of diabetes and studies suggested that up to 50% of people with diabetes are affected (WHO, 1999). Major risk factors of neuropathy are level and duration of hyperglycemia. It can also lead to sensory loss and damage to the limbs. Foot care is an important means of reducing impacts of diabetic neuropathy by preventing infection, subsequent gangrene and amputation. It is also a major cause of impotence in diabetic men (WHO, 2002)

Nephropathy. Diabetes is one of the leading causes of renal failure. Its prevalence varies among populations and is related to the severity and duration of the disease (WHO, 2002). The risk of renal failure is 17 times more in diabetics as compared to non-diabetics (Mustaffa, 1990). In Malaysia, 52% of diabetic patients were found having early stage of nephropathy. It is detected by urine micro albumin test, and 10% were in advanced stage with serum creatinine more than 180 umol (National Action Plans and Strategies, 1998).

2. Macro-vascular complications

Cardiovascular complications (Coronary Artery Disease-CAD, cerebrovascular disease, peripheral vascular disease, congestive cardiac failure and cardiomyopathy) account for approximately 50% of all deaths among people with diabetes in industrialized countries. The absolute risk for major cardiac events in Type 2 diabetic patients is 20.2% compared to 18.8% in matched non-diabetic patients who had established CAD (Spanheimer, 2001). Smoking, hypertension, dyslipidemia and obesity act as independent contributors to cardiovascular disease in diabetic patients. Practical approaches in reducing the cardiovascular risk in diabetes were smoking cessation, control of blood pressure, lipids and blood glucose levels. In addition, weight loss, diet, and exercise have been shown to improve insulin resistance and reduce risk of cardiovascular events (WHO, 2002).

3. Combination of micro-and macro-vascular complications.

Diabetic foot. It results from both vascular and neurological disease process, often leads to ulceration and subsequent limb amputation (WHO, 2002).

Diabetic dermopathy. Diabetes is known to alter the normal function of the skin (Le Roith et al., 2000). It is characterized by well- circumscribed brown patches on the lower legs. Histological, the lesions are non-specific and eventually the appearance is of depressed brown scar (Nattrass, 1996).

Orem's Nursing Theory

Orem's general theory of nursing named Self-Care Deficit Nursing Theory (SCDNT) is expressed in the model of nursing system. The conceptual structure of SCDNT is composed of six concepts including self-care, therapeutic self-care demand, self-care agency, self-care deficit, nursing agency, and nursing system, and one peripheral concept, namely, basic conditioning factors. It is presented in three theories: theory of nursing system, theory of self-care deficit,

theory of self-care. These three theories together constitute the general theory of nursing, SCDNT (Orem, 2001; Taylor, Geden, Isaramalai & Wongvatunyu, 2000). Among the theories, theory of self-care related to this study expresses the purpose of taking care of self referred to the self-care requisites, how to take care of self referred to the self-care agency and the outcome known as the self-care practices or self-care system (Taylor, 2000).

According to the Orem's general theory of nursing (SCDNT), self-care is the practice of activities that individuals initiate and perform on their own behalf in maintaining life, health, and well-being. It is the deliberate use of valid means to control or regulate internal and external factors that affect the smooth activity of a person's own functional and developmental processes or contribute to a person's personal well-being. It is learned and goal-oriented activity of individuals. When performed effectively, self-care contributes in specific ways to human conditions that affect life, health, or well-being. Seeking and participating in medical care, as well as nursing and other forms of health care is part of various modalities. Self-care is a form of human activity referred to as deliberate action that has two phases.

Phase 1: Estimative and transitional operation is a period in which a person has to seek knowledge and information about the arising situation. It also reflects a person's thinking and understanding of the situation and their consideration whether the situation can be altered or not, how it can be altered, what options are available, and what the results of such action are, before taking action. The two types of knowledge needed are 1) empirical knowledge concerning the situation, the inner situation, and the outer situation, and 2) antecedent knowledge helpful for observation, provision of meaning to the things observed, and connection of different situations and possible courses of action. The knowledge is important for intentional action, which includes scientific knowledge and common sense knowledge.

Phase 2: Productive operation is a period in which the objective of the action is sought. This is important because it determines the activity a person needs to do and it can be used as a criterion in following-up the activity. If there is evidence indicating that desirable goals are not met or other actions may provide better results, a person may adjust his or her actions accordingly.

“A self-care system is usually sufficient unless the person is faced with a few health care situation requiring adaptation or alternative health behaviors. Self-care requisites arise not only from disease, injury, and disability but also from medical care measures that requires behavioral

modification” (Orem, 2001). The individual developed and operated powers and capabilities for self-care because of health associated factors are not equal to engaging in kinds of actions necessary to know and meet their dependent’s therapeutic self-care demand. The imbalance between power to produce care and the demand for care are referred to as a self-care deficit. Such a deficit relationship can range from partial to complete (Orem, 2001).

When the individual experiences self-care deficit, nursing assistance is required. Nurses design a nursing system which comprises three courses of action: wholly compensatory nursing systems, partially compensatory nursing system, and supportive developmental nursing system, in order to render assistance. The designs of the nursing systems begin when nurses select and use one or some combination of methods of helping in a nursing situation. The helping methods include acting, guiding or supporting another, providing a developmental environment, and teaching another. Through the nursing system, the nurse will assess the individual’s self-care deficits and plans, implements and evaluates nursing actions directed toward supplementing them. In particular, the supportive-developmental nursing systems will be as a core basis for the intervention as this concept would be more effective when used with out-patient who can perform all self-care actions requiring controlled movement while engaging in self-care agency development (Orem, 2001).

1. Universal self-care requisite is naturally necessary self-care which is adjusted according to a person’s age, developmental stage, environmental factors, and other factors related to consumption and living condition which are supportive of life process, the completeness of the structure and different of functions.

2. Developmental self-care requisites are necessary for different changes at different stages in life which affects development.

3. Health deviation self-care requisites are necessary self-care resulting from birth defects, deformity of structure and defective functioning, as well as diagnosis results and medical treatment related to prevention and adjustment to control the growth of such defects and deformity and to relieve their effects.

Requirement for the three types of requisites is known as therapeutic self-care demands (TSCD). Therefore, the TSCD are considered as a major concern in this study in order to assist person with diabetes to meet their self-care agency.

The supportive developmental nursing system will help patients with Type 2 diabetes mellitus to increase self care agency to meet TSCD which are associated with genetic and constitutional defects, human measures and their effects (Orem, 2001). There are six categories of health deviation self-care requisites: (1) seeking and securing appropriate medical assistance (2) being aware of and attending to the effects and results of pathologic conditions and states, including effects on development (3) effectively carrying out medically prescribed diagnostic, therapeutic, and rehabilitative measure; (4) being aware of and attending to or regulating the discomforting or deleterious effects of medical care measures performed or prescribed by the physician, including effects on development (5) modifying the self-concept (and self-image) in accepting oneself as being in a particular state of health and in need of specific forms of health care and (6) learning to live with the effects of pathologic conditions and states and the effects of medical diagnostic and treatment measures in a life-style that promotes continued personal development (Orem, 2001).

Self-care is only one aspect of healthy living but without continuous self-care of therapeutic quality, integrated human functioning will be disrupted. Good health habits are essential in maintaining health and the ability to change old habits to meet new requirement are essential (Orem, 1995). Orem (2001) acknowledges the importance of nursing intervention that help the person in managing of their health problems. Thus, the innovative nursing programs should take patients' self-care perspectives into account and attempt to integrate the supportive developmental nursing program into nursing practices.

Therefore, this study is planned to examine the effectiveness of supportive-developmental nursing program on self-care practices of the patients with Type 2 diabetes. Its results is expected to be used as guidelines for nurses in helping and enhancing self-care practices of the population.

Self-care Practices for Type 2 Diabetes

Self-care practices for Type 2 diabetes stand for a specification of total activities that the diabetes patients should perform such as dietary control, exercise, stress management, medication, and personal hygiene (Likitratcharoen, 2000). Each will be discuss as follows:

Dietary control

According to DeFronzo (1998), dietary control is the most important controlling factor for diabetes mellitus. Dietary control includes types and amount of calorie intake. The goals of dietary control are to control glucose level, cholesterol, and calories. The current

recommendations for the distribution of nutritional calories are 50-55 % of total carbohydrate, 20-30 % of fat, and 10-20 % of protein.

Carbohydrates provides 50-55 % of total energy per day, which is equivalent to 4 kcal per gram. Starch-rich food accounted for most of carbohydrate. Complex carbohydrates include foods with high fiber such as corn, potatoes, carrots, and bean. Simple sugar such as sucrose can be found in fruits, cakes and sweets.

Protein has an energy content of 4 kcals/g. It should be contributing 20-30 % of total energy, especially on plant sources. For patients with diabetic nephropathy, daily protein intake should be kept at the lower level.

Fat is the macronutrient with the highest energy content (9 kcal/g). Fat should be provides 20-30 % of total energy. Cholesterol intake should not exceed, about 300 mg/day. The Type 2 diabetic patients who are overweight should reduce fat intake and increase their exercise.

Fiber can flatten postprandial glucose, insulin, lipid profile and it may also improve insulin sensitivity. The intake of dietary fiber, particularly soluble fibers from leaf-vegetables, fruits, and some whole-grain cereals, should be 40 g/day. The exact mechanisms of dietary fiber are uncertain, but it delays food absorption, and lowers postprandial glucose.

In addition, sodium intake should be limited not exceeding 3,000 mg/day, in order to prevent the complications, such as chronic renal failure or hypertension.

A number of study reviews, shows weight reduction through low calorie consumption and high calorie expenditure are associated with glycemic control (Franz, Bantle, Beebe, Brunzell, Chiasson & Garg, 2002; Parrado, 1998). For most people with diabetes, diet control is the key to managing the disease. Diet for diabetes patients should be planned individually according to the goals of the diet control to achieve normoglycemia and ideal body weight. According to American Diabetes Association (2000), patient should perform dietary control aiming to 1) control blood sugar, serum lipid level, body weight, and blood pressure as near normal, 2) provide adequate calories for various situations, 3) prevent acute and chronic complications, and 4) improve overall health through optimal nutrition.

Calculation of energy requirement for appropriate calories intake should include medication, exercise, physical activity level, and body weight. The American Diabetes Association recommended that energy intake for adults with diabetes should take into consideration physical activity level and nutritional status.

Exercise

People with diabetes are encouraged to participate in a variety of physical activities in order to improve their metabolic control, cardiovascular fitness, psychological well-being, and social interaction. Regular moderate intensity exercise, improves insulin sensitivity (American Diabetes Association, 2000). Many individuals with Type 2 diabetes may have been sedentary for many years and, as a result, are frequently reconditioned and unable to exercise continuously for a longer period of time. A program of gradually increasing exercise sessions, beginning with sessions of 5-10 minutes, is most successful and safest for this group (ADA, 2000).

Exercise appears to be most effective for normalizing blood glucose levels in people with impaired glucose tolerance (IGT) or mild-to-moderate diabetes (Pan et al, 1997). Exercise helps lower blood glucose and increases insulin sensitivity. It also helps to lower blood pressure, improves cholesterol levels, decrease body fat, and reduces the risk of cardiovascular disease (Smeltzer & Bare, 2004). Aerobic exercise was recommended beside moderate intensity exercise. For the best and the fastest results, experts advise frequent high-intensity exercises. For people who have been sedentary or have other medical problems, lower-intensity exercises are recommended. Patients who are taking medications that lower blood glucose, particularly insulin, should take special precautions before embarking on a workout program because at risk of cardiovascular disease (Creviston & Quinn, 2001). They should be checked by their physicians before undertaking vigorous exercise (ADA, Physical Activity/Exercise and Diabetes Mellitus, 2003).

Medication taking

Adhering to prescribed medication is important for living independently and living longer. A study by Harper (1992) revealed that diabetes patients who received medication self-care program had significantly decreased blood pressure due to more accurate medication taking throughout 6 weeks program. Although medication is beneficial to the diabetes, more than fifty percent of the diabetes patients did not continue treatment.

Oral hypoglycemia agents and insulin are widely used in diabetes management and are important aspects of self-management education. People who take these glucose lowering agents need to understand the correct administration, action, and potential side effects of the medication (Agurs, Kumanyika, Tenhave & Campbell, 1997). This implies that self-care administration need to be included in diet education program.

Stress management

The ambiguity and uncertainty of diabetes form a basis of demands including psychosocial, self-management, knowledge and skill that are of immediate or long-term nature. These demands are the source of stress and coping requirements felt by patients (Surwit, Schneider & Feinglos, 1992). Similarly, a study from Ismail (2004), found that people with Type 2 diabetes have to adhere to many self-care responsibility to achieve optimal glycaemic control. The self-care responsibilities include modification of lifestyle, self-monitoring for blood glucose, foot care and administration of medication. The difficulties adhering to these tasks can be associated with psychological problems such as depressive disorders, eating disorders, and stress.

Lustman, Anderson, Freeland, Groot, Camey and Clause (2000) in their review of literatures found that depression was significantly associated with hyperglycaemia ($p < .0001$) among Type 1 and Type 2 diabetes. Furthermore, according to Funnel and Hass (1995), stress is a major contribution to hypoglycemia. Meanwhile Gavard, Lustman and Clousa (1993) found that psychological distress and poor glycemic control are more common among adult. This imply that healthcare providers should concern about stress and prepare to design the most appropriate means available for aiding patients during the coping process.

Stress has a direct effect on glucose metabolism in diabetes patients due to release of hormone. Psychological stress leads to omission of medicine, diet, and exercise (Michell, 1995). Stress is a major contributor to hyperglycemia and may even precipitate the onset of diabetes. There is a need to increase therapy functioning in order to reduce stress among diabetes patients (Surwit et al., 2002).

Personal hygiene

Personal hygiene is very important for Type 2 diabetes patients have higher incidence of infections than non-diabetic person. Chronic hyperglycemia in diabetes causes dysfunction of immunization. High blood sugar level is associated with infection, and infection makes it more difficult to control blood sugar (American Association of Diabetes Educator, 2005). All diabetic patients should receive a comprehensive foot examination at least once a year to identify high-risk foot conditions (ADA, 2000). Patients with high risk infection should have appropriate of management personal hygiene. Patients should understand the implications of the loss of sensation, importance of foot monitoring on a daily basis, proper care of foot, skin care, and the selection of appropriate footwear. Smoking cessation should be encouraged to reduce the risk of

vascular complications. Report by ADA, Preventive Foot Care in People with Diabetes (2003), stated that 50% to 75% of lower extremity amputations are performed on people with diabetes. More than 50% of these amputations are thought to be preventable, provided that patients are taught foot care measures and practice them on a daily basis. Additionally, to prevent infection and foot complications, patient must have a good control of blood sugar, good hygiene of the whole body, and avoid source of infection.

According to Smeltzer and Bare (2004), nurses must focus their attention on hygiene and skin care. Diabetes patients' are at risk for skin infection, especially between two skin surface such as groin, and axilla, and for the obese, under the breast, where chafing and fungal infections tend to occur. In addition for female diabetes patient were advice about measure to avoidance vaginal infections, which occurs more frequently when blood glucose levels are elevated. As always opportunity should be taken to teach patient about daily oral care. Another study by Sandberg, Sundberg, Fjellstrom and Wikblad (2000) revealed that periodontal disease was more advanced among individuals with Type 2 diabetes than among non-diabetes especially patients with low income (Lalla, Park, Papapanou & Lamster, 2004). Despite an increased risk for periodontal disease among Type 2 diabetes patients, as Tomer and Lester (2000) mention that greater promotion is needed in diabetes educational for oral health information.

The Supportive-Developmental Nursing Program on Persons with Diabetes

The supportive-educative nursing system was namely by (Orem, 2001). Supportive-developmental nursing system was proposed by (Orem Study Group, 2004). The nursing system comprises of teaching, guiding, supporting, and providing environment. The effectiveness of the intervention was evaluated by the changes in self-care behaviors, self-care efficacy, and diabetic control as the following studies.

Keeratiyutawong (1994) used participatory action research to develop the model of promoting self-care among diabetic patients to control the level of glycosylate hemoglobin, increase perceived self-care agency, and patients' satisfaction with care. The sample consisted of 30 patients with Type 2 diabetes attending the out-patient clinic. There are individual and group meetings once a month for four months. Perceived self-care agency and satisfaction with care were measured before and after entering the program. The results indicated that after participating in self-care promotion program for four months the patients' level of HbA1c decreased

significantly, whereas perceived self-care ability and satisfaction with care increased significantly compared to before entering the program.

Plodnaimuang (1999) studied the effectiveness of an educative-supportive program to improve perceived self-care efficacy. The patients mean score on the total and each dimension of perceived self-care efficacy were significantly higher than those before entering the program. The mean of fasting blood sugar level decrease significantly in each month compared to the prior month, while the mean score in diet control, medication taking, and stress management were significantly higher than those in the first month.

Sanaun (1999) studied the effect of the supportive educative nursing system on knowledge, self-care, and metabolic control in Type 2 diabetes. Forty two subjects were randomly assigned into experimental or control group. The experimental group received the supportive-educative nursing system while the control group received routine care. The results indicated that after 8 weeks of intervention the mean scores of knowledge and self-care in the experimental group were significantly higher than those before the experiment and those of the control group. In addition, the mean score of metabolic control in the experimental group was significantly better than those before the experiment.

Muangkae (2002) studied on the effectiveness of an educative-supportive program on perceived self-care efficacy and diabetic control in Type 2 diabetes. The results of the study indicated that the mean score of each dimension of perceived self-care efficacy after entering the program were significantly higher than those obtained before entering the program. The mean scores of diet control, medication management, hygiene and foot care, and stress management before entering the program were moderate to high. This finding was consistent with those from previous studies (Plodnaimuang, 1999; Keeratiyutawong, 1994). According to Muangkae (2002), an educative-supportive program based on Orem's nursing theory, which uses integrative helping methods; teaching, guiding, providing environment, and building relationship, enable the diabetes patients to improve perceived self-care efficacy.

Result of two meta-analyses on supportive-educative intervention research for diabetic patients in Thailand (Hanucharunkul et al., 2000; Likitrachoen, 2001) found that weight mean effect size on metabolic control was moderate. According to Likitrachoen (2001) the largest average effect size ($M = 1.65$, $SD = 1.11$) was self-care ability.

However, in addition, there is no exact study on the supportive-educative nursing system focusing on the self-care practices such as dietary control, exercise, medication taking, stress management, and personal hygiene but there are studies looking at the effect of supportive-educative nursing system on the self-care practices of chronic illness. Most of them indicated satisfactory effects.

Boonchaury (2001), studied the effectiveness of educative-supportive program on perceived self-care efficacy on diabetic control in elderly women with uncontrolled Type 2 diabetes, her findings indicated that after entering the program, the mean score of the total and on each dimension of perceived self-care efficacy that refers to the patients' confidence in themselves to successfully perform necessary self-care including dietary control, medication, exercise, hygiene and foot care and stress management were significantly higher than that obtained before entering the program ($p < .0001$).

Agurs-Collin et al., (1997) studied on weight loss and exercise program designed to improved diabetes management in older African-Americans. The subjects were overweight African-Americans. Sixty four people with Type 2 diabetes were randomized to either an intervention (12 weekly group sessions, 1 individual session, and 6 biweekly group sessions) or usual care (1 class and 2 informational mailings). Clinical and behavioral variables were assessed at 0, 3, and 6 months of treatment. The results found a significant difference in the intervention versus usual care was observed for weight, physical activity, and dietary intake of fat, saturated fat, cholesterol, and nutrition knowledge at 3 month and for weight at 6 month, and mean HbA1c values at 3 and 6 months.

Supee (1993) studied the effect of supportive-educative nursing system on exercise ability, and capacity to control dyspnea symptoms in 43 chronic obstructive pulmonary disease (COPD) patients. The subjects received the intervention 2 times every 4 weeks (after the end of intervention). It was found that the samples had a mean score of self-care behavior, exercise ability, and capacity to control dyspnea symptoms that was statistically higher than prior to the experiment ($p < .001$).

Furthermore, Folden (1993) tested the effects of the supportive-educative nursing system of self-care agency in 68 elderly stroke patients. The experimental group received the supportive-educative nursing system by 4 guided programs of physical activity after the treatment. The mean score of self-care agency in the experimental group was higher than in the control group.

In summary, Type 2 diabetes mellitus is a chronic illness that affects many organs and health of individuals, families and communities. The patient's self-care agency is decreased while the self-care demand is increased. The self-care demands include dietary control, exercise, medication taking, stress management, and personal hygiene. Therefore, supportive developmental nursing system by using helping methods, such as teaching, guiding, support, and providing environment for self-care development would make the patients to be active participants in their own self-care practice. For this reason, the researcher is interested in studying the effect of supportive-developmental nursing program on self-care practice for Type 2 diabetes. The results will be used as a guideline in planning and providing care for continuously self-care behavior. The nursing system includes helping methods activities such as the following.

1. Teaching is the appropriate method for the development of knowledge and capabilities for self-care. The knowledge and skill-learning practice will be given to new Type 2 diabetes and being diagnosed less than 3 months. The nurse will teach based on the education guideline for diabetes patient to enables development of attention, trust and willingness to learn. According to Orem (2001), giving knowledge that is congruent with the person's needs can bring about better practice.

The content consisted of definition of diabetes, its clinical effects, and severity of its complications, including the patients' self-care management on dietary control, exercise, medication taking, stress management, and personal hygiene.

2. Guiding is provided to the diabetes to help them perform activities and self-care. Orem (2001) has stated that guidance is the presentation that a person selects in making decision by herself through support from nurses. Nurse assesses the problems including the capabilities to practice by talking and discussing. When the people have health problems, the nurse will provide suggestions for them to make their own suitable choice for practice.

3. Supporting by speech and listening can help to create a person's confidence to continuously perform self-care activities. Nurses have to choose an appropriate approach for each situation and each individual. Supportive has influence in pushing for a better behavioral potentiality of a diabetes patient by reducing stress, and fostering confidence to cope with problems and enabling them to be patience with the disease. Giving the diabetes with accurate understanding and knowledge, will instill confident and pride in themselves.

4. Providing environment for self-care development will motivate the diabetes to establish competence in self-care and appropriately adjust their behaviors.

Measurement of Self-care Practice

To determine the self-care practice with Type 2 diabetes, a valid measurement is needed. Many types of measurement can be used to measure the level of self-care practice. Young, Taylor and Renpenning (2001) recommended that the measurements could be used to measure self-care practice based on Orem's theory are: (1) Denyes Self-Care Practice Instrument (DSCPI), and (2) Child and Adolescent Self-Care Practice Questionnaire.

Denyes (1988) developed a 17-item self-response instrument measuring general self-care actions, e.g., following through on health decisions and specific actions such as following a balanced diet. Item responses range from 0% to 100%. She reported evidences of content and construct validity derived from her original instrument, and its internal consistency reliabilities ranged from 0.84 to 0.92.

The Child and Adolescent Self-Care Practice (DSCAI). It consists of 35-item, 5-point Likert scale that can determine children's and adolescents' performances as self-care agents (Moore, 1995). Initial attempts at establishing reliability and validity met with modest success. Internal consistency reliability was adequate, particularly for a new instrument. The reliability and validity of the Child and Adolescent Self-Practice Questionnaire has been established only with children and adolescent between the ages of 9 to 18. In order to use the instrument with other age groups requires additional instrument testing.

To measure performance of self-care practice of Type 2 diabetes, an instrument consisting 37 questionnaires was developed because the two instruments above were specific to children and very general. Thai version instrument to measure nurses' ability in assessing self-care practices of diabetes by (DOUNGCHAN, 2004) was translated into English by a bilingual Thai-English expert. The English version will translate to Malaysian version by a bilingual English-Malaysian expert. The Thai version instrument composed of 37 items that reflect three steps of self-care. 1) Seeking of relevant knowledge, (2) Making decision (3) Operating activities. Each step composed of items reflecting self-care practice for five actions performed by the persons with Type 2 diabetes such as dietary control, exercise, medication taking, stress management, and

personal hygiene. All the statements from items no. 1 to no. 37 were modified into question by changing the term “I” to “you”. The instrument will be tested for reliability and validity.

Summary

Type 2 diabetes is the most prevalent form of diabetes and has become one of the most common chronic disease all over the world. There is much evidence which indicated that the diabetes complications can be prevented through dietary control, exercise, medication taking, stress management, and personal hygiene. Thus, it is essential to prepare nurses to give supportive-developmental nursing program to the diabetes population in the clinical practice. Previous studies have established that supportive-developmental nursing program was able to increase patients self-care practice.

Orem’s general theory of nursing provides a system theory of self-care. According to the theory, self-care was defined as “the practice of activities that individuals initiate and perform on their own behalf in maintaining life, health, and well being; and when performed effectively, it contributes in specific ways to human structured integrity, human functioning, and human development”. In the supportive-developmental nursing program, nurses will use helping methods such as teaching, guiding, supporting, providing environment, and building relationship to assist individuals with self-care deficit. These helpings methods will increase patients’ self-care agency to meet their therapeutic self-care demands. Two existing instruments based on Orem’s theory were general measure of self-care practice and specific to children. Therefore, a valid and specific measure is needed for measuring self-care practices of Type 2 diabetes.