# PERCEIVED BENEFITS, PERCEIVED BARRIERS, AND
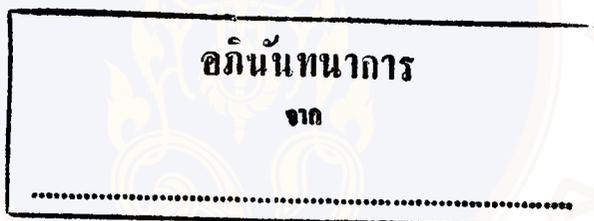
# NUTRITIONAL BEHAVIORS OF THE ELDERLY WITH

# DIABETES MELLITUS

## SUKHUMAL SANPAUNG

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# A THESIS SUBMITTED IN PARTIAL FULFILLMENT

# OF THE REQUIREMENTS FOR

# THE DEGREE OF MASTER OF NURSING SCIENCE

# (ADULT NURSING)

# FACULTY OF GRADUATE STUDIES

# MAHIDOL UNIVERSITY

# 2000

# ISBN 974-664-463-7

Thesis

entitled

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# DIABETES MELLITUS

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was submitted to the Faculty of Graduate Studies, Mahidol University

for the degree of Master of Nursing Science (Adult Nursing)

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# ACKNOWLEDGEMENT

SUKHUMAL SANPAUNG : PERCEIVED BENEFITS, PERCEIVED BARRIERS, AND NUTRITIONAL BEHAVIORS OF THE ELDERLY WITH DIABETES MELLITUS. THESIS ADVISORS : SAUVALUCK LEKUTAI, M.Sc., BONGKOCH KENGKHETKIT, M.Ed., NANTAWON SUWONNAROOP, Ph.D., 91 p. ISBN 974-664-463-7

Diabetes mellitus is one of the major health problem for Thailand 's elderly. The cause of this problem stems partly from inappropriate nutritional behaviors. The purposes of this study were to investigate nutritional behaviors, perceived benefits, perceived barriers, and to examine the contribution of predictive variables on nutritional behaviors of the elderly with diabetes mellitus. The subjects were composed of 120 elderly patients with diabetes mellitus whose ages were 60 years old and over, who attended at the diabetic clinic of the Bangphae Hospital, Watpleang Hospital, Photharam Hospital, and Chombung Crown Prince Hospital. Data were collected through interviews. The instruments used in the study were a personal data form, the perceived benefits questionnaire, the perceived barriers questionnaire, and the nutritional behaviors questionnaire. Data were analyzed by using percentage, mean, standard deviation, and stepwise multiple regression.

The results of this study showed that the overall mean of perceived benefits was at a rather high level ($\overline{X} = 3.47$, S.D. = 0.34), the overall mean of perceived barriers was at a rather low level ($\overline{X} = 2.48$, S.D. = 0.54) and the overall mean of nutritional behaviors was at a rather good level ($\overline{X} = 3.11$, S.D. = 0.32). The results of stepwise multiple regression analysis revealed that perceived benefits, perceived barriers, and educational level could predict nutritional behaviors of the elderly with diabetes mellitus by 38.3 percent at the statistically significant level of 0.001.

The recommendation from this study is that nurses should encourage the elderly with diabetes mellitus to perform appropriate nutritional behaviors. They also should motivate the patients to understand the benefits of eating good food and appropriate for diabetic patients.

โรคเบาหวานเป็นโรคหนึ่งซึ่งจัดเป็นปัญหาสาธารณสุขที่สำคัญของผู้สูงอายุในประเทศไทย สาเหตุส่วนหนึ่งเกิดจากการรับประทานอาหารที่ไม่เหมาะสม การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อศึกษาพฤติกรรมการบริโภคอาหาร การรับรู้ประโยชน์ การรับรู้อุปสรรคและอำนาจการทำนายของการรับรู้ประโยชน์ การรับรู้อุปสรรค และปัจจัยส่วนบุคคลที่มีผลต่อพฤติกรรมการบริโภคอาหารของผู้สูงอายุโรคเบาหวาน กลุ่มตัวอย่างเป็นผู้สูงอายุโรคเบาหวาน ที่มีอายุตั้งแต่ 60 ปี หรือมากกว่า จำนวน 120 คน ซึ่งมารับการตรวจรักษาที่คลินิกโรคเบาหวานโรงพยาบาลบางแพ, โรงพยาบาลวัดเพลง, โรงพยาบาลโพธาราม และโรงพยาบาลสมเด็จพระยุพราชจอมบึง เก็บรวบรวมข้อมูลโดยการสัมภาษณ์ เครื่องมือที่ใช้ในการวิจัย คือ แบบสัมภาษณ์ข้อมูลส่วนบุคคล แบบสัมภาษณ์การรับรู้ประโยชน์ แบบสัมภาษณ์การรับรู้อุปสรรค และแบบสัมภาษณ์พฤติกรรมการบริโภคอาหาร วิเคราะห์ข้อมูลโดยการคำนวณค่าร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และหาอำนาจการทำนายโดยการวิเคราะห์ถดถอยพหุคูณแบบขั้นตอน

ผลการวิจัย พบว่า คะแนนเฉลี่ยการรับรู้ประโยชน์ในการบริโภคอาหาร โดยรวมอยู่ในระดับค่อนข้างสูง ($\overline{X}$ = 3.47, S.D. = 0.34) คะแนนเฉลี่ยการรับรู้อุปสรรคในการบริโภคอาหาร โดยรวมอยู่ในระดับค่อนข้างต่ำ ($\overline{X}$ = 2.48, S.D. = 0.54) และคะแนนเฉลี่ยพฤติกรรมการบริโภคอาหาร โดยรวมอยู่ในระดับค่อนข้างดี ($\overline{X}$ = 3.11, S.D. = 0.32) เมื่อวิเคราะห์ถดถอยพหุคูณแบบขั้นตอน พบว่า การรับรู้ประโยชน์ การรับรู้อุปสรรค และระดับการศึกษา สามารถทำนายพฤติกรรมการบริโภคอาหารของผู้สูงอายุโรคเบาหวานได้ร้อยละ 38.3 อย่างมีนัยสำคัญทางสถิติที่ระดับ 0.001

ผลการวิจัยครั้งนี้ ผู้วิจัยมีข้อเสนอแนะว่า พยาบาลควรส่งเสริมให้ผู้สูงอายุโรคเบาหวานมีพฤติกรรมการบริโภคอาหารที่ถูกต้อง โดยเน้นให้ผู้สูงอายุโรคเบาหวานมีความเข้าใจถึงประโยชน์ในการบริโภคอาหารที่ถูกต้องและเหมาะสมสำหรับผู้ป่วยเบาหวาน

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# CHAPTER I

# INTRODUCTION

**Background and Significance of the Study**

At present, the growth in the number of the elderly population is increasing due to improvements in technologies of medical and public health. People tend to live longer because of the decrease in mortality and the rise in life expectancy. Data from the population survey of Thailand in the year 1999 reported that the population aged over 60 years constituted about 5.3 million ( Institute of Population and Social Research of Mahidol University, 1999 ). It is expected that by the year 2015, the aged population will be approximately 8.4 million ( National Statistics Department, 1996 ). The rapid growth in the number of elderly has caused the important problem of public health because the elderly have decreased functional capacity of organ systems. There is an evidence that the prevalence of chronic illness. The study of Thongcharean, V. and her colleague (1998: 127) found that 75.9 percent of elderly experienced at least one chronic illness such as hyperlipidemia, hypertension, heart disease, musculoskeletal disease, and diabetes mellitus .

Diabetes mellitus is often found in the elderly and it is one of chronic disease that are rising up with severity. In 1997, Health Systems Research Institute reported that the diabetic patients in Thailand were about 900,000 people. In over 60 years age groups , diabetic was estimated to 9 - 15.3 percent of the elderly population (Juntharaprasert, S., 1993: 94) and 99 percent of diabetic patients were non-insulin dependent diabetes mellitus (Himathongkum, T., 1996: 15). Common symptoms of

diabetes including polydipsia, polyphagia, polyuria, eating a lot of food, weight loss and elevate blood glucose level. Major causes of diabetes mellitus are a poor eating lifestyle such as eating high fat and sweet food, eating a lot of food and low fiber food, and also lack of exercise. These causes lead to the obesity and increase the blood glucose level (Boonnak, P. 1999 : 4-9).

Moreover, the relationship between aged - impaired beta cell function will decrease insulin secretion and sensitivity. Peripheral insulin resistance owing to aging is often aggravated by the decrease in lean muscle mass and subsequent increase in adiposity that occurs with aging (Funnell & Merritt, 1993: 46). In addition, the taste bud of the elderly people lack sensitivity, especially sweet taste being lost first. The elderly persons often need increased sweet taste to recognize or enjoy foods and so eating can lead to high blood glucose levels (Keithley, 1996: 9-11).

From these behaviors of the elderly, if they can not care themselves correctly, diabetes mellitus will be more serious and the severe complication will come after. The complications of conditions which are often found in diabetes mellitus are neuropathy, retinopathy, blindness, nephropathy, coronary artery disease, hypertension and cerebrovascular disease (Pannatam , S., 1997 : 35). The majority of diabetic patients always dies from complications such as coronary artery disease and cerebrovascular disease which occurs 4 percent higher than in normal persons ( Valmadrid, et al., 1997 : 26a ). These complications not only effect patients but their families and the nation also. So reducing the complication in the elderly is necessary to control the level of blood glucose by controlling food, exercising, controlling body weight, and always having the medication. Controlling food is an essential factor for controlling diabetes mellitus in the elderly. According to Farr &

Watkinson (1993: 1) they suggested that controlling diabetes mellitus successfully rely on nutrition prior to taking medication. However, problems that often are occurred in the elderly with diabetes mellitus are their inability to control food and overweight ( Chomsamut, K., 1992 : 2 ; Ratchatanavin, R., et al., 1987 : 183 –188 ). Similarly, Limaumnueylap, S. et al. (1993: 36) which found that most of the diabetic patients had low participation in controlling diabetes by control of food intake. Armstrong (1987: 563) suggests that controlling food is very important and significant for the diabetic patients.

From a survey of population in Ratchaburi Province, the total number of population was 813,293 and approximately 91,056 or 11.19 percent of the population was over 60 years (Institute of Population Studies, Chulalongkorn University, 1997). The elderly with diabetes mellitus increased to 8,764 people ( Provincial Public Health Office, Ratchaburi Province, 1998: 20). This illness is the second important disease of the province, and it is the important problem that causes the vast expense to look after.

Ratchaburi is located in a mountainious area with plains on the bank of the river. The way of life is mainly agricultural such as cultivation of grapes, sugar cane, and coconuts. In addition , Ratchaburi Province has livestock husbandry, such as pigs, ducks, and chickens. Thus, the land is highly productive and a variety of food is abundant. Most food is cooked with coconut milk and sugar. The availability of rich food and the cooking style affects diabetic patients and contributes to the major health problem. If the diabetic elderly have the inappropriate nutritional behaviors, such as eating sweet and fatty food or high calorie food, it will make the failure of controlling the blood glucose level. The diabetic elderly should avoid risk factors that cause complications such as alcohol or caffeine consumption. Because the elderly who drink

alcohol with a high carbohydrate such as beer and sweet wine will have a high blood glucose level (Franz. et al., 1994: 492). The goal of nutritional support for a patient with diabetes mellitus is to maintain weight and lean body mass, because weight loss appears to improve glucose uptake. In addition, it increases insulin sensitivity and decreases the blood glucose level (Himathongkun, T., 1996:116). Therefore, diet has an important influence on blood glucose.

The correct nutritional behavior is an essential approach in controlling diabetes mellitus in the elderly. Nurses can help the elderly with diabetes mellitus by promoting nutritional behaviors. If nurses know the factors which influence on the diabetic elderly's nutritional behaviors, they can advise and promote suitable nutritional behaviors for these patients. Therefore, the researcher is interested in studying the nutritional behaviors and factors that influence on the nutritional behaviors of the elderly with diabetes mellitus. The findings can be a guideline for developing appropriate nutritional behaviors in the elderly with diabetes mellitus. In addition, the guideline may reduce complications and enable them to have a better quality of life.

**Research Question**

What is the nutritional behaviors of the elderly with diabetes mellitus and what the relative contribution of marital status, educational level, income, duration of illness, perceived benefits, and perceived barriers to nutritional behaviors ?

**Purpose of the Study**

1. To study the perceived benefits, perceived barriers, and nutritional behaviors of the elderly with diabetes mellitus.

2. To determine the predictive power of predictor variables (perceived benefits, perceived barriers, marital status, educational level, income, and duration of illness) to nutritional behaviors of the elderly with diabetes mellitus.

**Conceptual Framework**

The Health Promotion Model (HPM; Pender, 1996) has been used to guide in this study. Pender 's Health Promotion Model identifies the importance of perceptions in changing behavior. For example, a person might choose to engage in health-promoting behaviors depending on Behavior-Specific Cognition 's and Affect which is composed of 6 factors : perceived benefits, perceived barriers, perceived self-efficacy, activity-related affect, interpersonal influences, and situational influence. Perceived benefits and perceived barriers were two important variables which could affect behavioral outcomes such as nutritional behaviors. Personal factors are also predictive of the given behavior. They are shaped by the nature of the target behavior being considered. Personal factors such as marital status, educational level, and income are considered to have a direct influence on behavioral outcome.

Perceived benefits is one of motivational factor that has been supported in the health-promoting behaviors (Pender, 1996: 68-69). Perceived benefits are the mental representations of positive or reinforcing consequences of behaviors which can be direct motivating behaviors. Such motivation can be achieved through determination of the extent of commitment, plan of action, and engagement of the behaviors in which the anticipated benefits will result. The motivational importance of anticipated benefits is based on personal or vicarious experience of outcomes from prior direct experience with the behavior, or observational learning from others engaging in the behavior. Beliefs in benefits or positive outcome expectations have generally been shown to be

a necessary, although not sufficient condition for engagement in a specific health behavior. If the elderly with diabetes mellitus believe that suitable nutritional behaviors can control blood glucose level, it will make them to have correct nutritional behaviors. Consequently, perceived benefits in nutritional behaviors provide the key to motivate people to take appropriate nutritional behaviors and to develop eating habits that they will maintain throughout their lives.

One factor which may be related to nutritional behaviors is perceived barriers. Perceived barriers have been identified as cognitive perceptual factors influencing the intent to engage in behaviors. Barriers may be imagined or real and consist of perceptions about oneself, situational, and environmental factors. A variety of perceived barriers have been suggested such as inconvenience, difficulties, cost, and unhappiness with treatment. Barriers usually arouse motives of avoidance in relation to a given behavior. When readiness to act is low and barriers are high, action is unlikely to occur. When readiness to act is high and barriers are low, the probability of action is much greater.

Besides the perceived benefits and perceived barriers, Pender (1996: 68) indicated that personal factors have influence on health-promoting behaviors. In this study, the researcher selects variables such as marital status, educational level, income, and duration of illness to examine their influences on nutritional behaviors. From a review of literatures, these variables were found to have effects on nutritional behaviors as follows:

Marital status. Spouse in the elderly is an important source of encouragement specially those who have good relations, understanding, non-verbal communication support and continually take care of their health. Muhlenkamp & Sayles (1986: 334

-338) and Kohout & Wallace (1985: 582-589) found that the elderly who lived alone were most at risk of depression. Often when the elderly lost a spouse, they were prone to suffer consequences from isolation, depression, financial worries, and nutritional problems. Eating alone may decrease intake significantly.

Educational level. Education is the way to understand information, and learn about disease and treatment. Thus, individuals tend to be able to practice health correctly (Orem, 1985: 120). Moreover, those who have less education usually have problems such as poor understanding of information and limited ways in searching for knowledge. Pender (1987: 48) concluded that the level of formal education correlated positively with the frequency of preventive actions.

Income. People who have adequate income have a high chance o search for useful things for their health and adequate nutrition (Pender, 1987 : 163). Many elderly live on a fixed income so that the ability to purchase food may be limited, and this limitation may contribute to reliance on high-calorie, low-nutrient foods such as those high in fat and carbohydrates (Levine, 1991: 422).

Duration of illness. This is an important factor that related to learning in life and self adaptation. Marino & Kooser (1981: 56) found that reaction to stress by each person differs according to the duration of illness. The longer they were ill, the more time they had to learn how to cope with the problem in order to undertake self-care activities and to increase self confidence.

In this study, it is expected that if perceived benefits in nutritional behaviors are high and perceived barriers in nutritional behaviors are low, the elderly with diabetes mellitus would tend to develop motivation to engage in appropriate nutritional behaviors. Marital status, educational level, income, and duration of illness

can also determine the nutritional behaviors of the elderly with diabetes mellitus. The conceptual framework of this study is shown in figure 1.
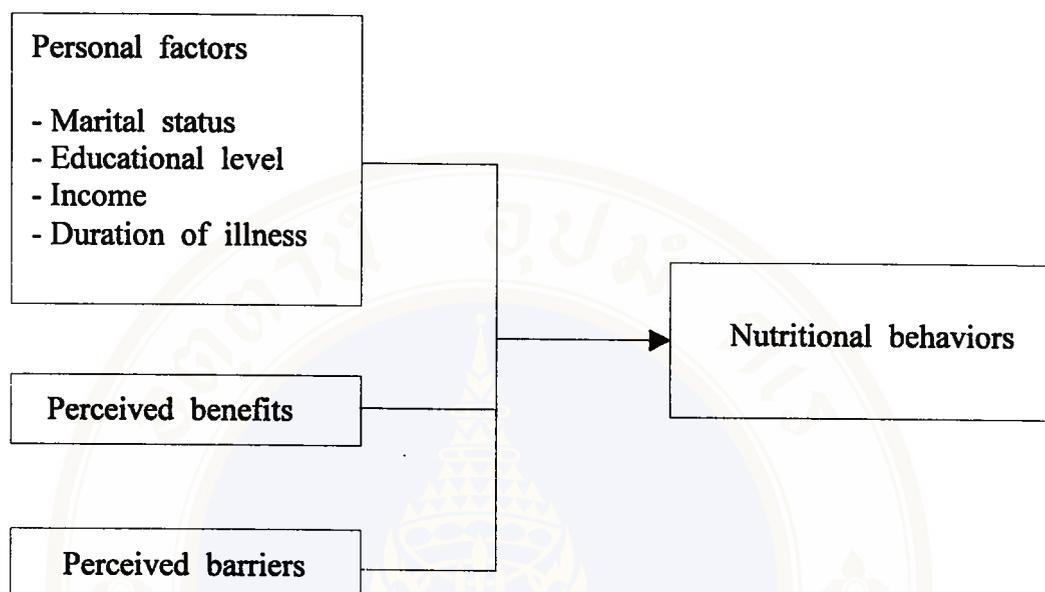


**Figure 1. Conceptual framework**

**Hypothesis**

The perceived benefits, perceived barriers, marital status, educational level, income, and duration of illness can predict the nutritional behaviors of the elderly with diabetes mellitus.

**Scope of the Study**

This research studied perceived benefits, perceived barriers, and nutritional behaviors of the elderly with diabetes mellitus and the predictive power of the perceived benefits, perceived barriers, marital status, educational level, and duration of illness to nutritional behaviors. The subjects were the elderly aged 60 years and over, who were diagnosed as having diabetes mellitus by the physicians and came to attend the diabetic clinic of the out patient department at hospitals in Ratchaburi Province.

**Definition of Terms**

**1. Perceived benefits** is defined as the perceptions, understanding , feelings and thoughts of the elderly with diabetes mellitus of the positive or reinforcing consequences of eating suitable food, which can control blood glucose level, and prevent or decrease complications of diabetes mellitus.

**2. Perceived barriers** is defined as the perceptions, understanding, feelings and thoughts of the elderly with diabetes mellitus about barriers of eating suitable food such as eating habits, cost of food, difficulty of food preparation, lack of time, loss of function ability, and lack of social support.

**3. Nutritional behaviors** is defined as actions or habits in eating food of the elderly with diabetes mellitus, which includes choosing type of food, frequency of consumption, and not eating food that affects to diabetes mellitus such as sweet, high carbohydrate, high fat foods, alcohol and caffeine.

**4. Personal factors** are the characteristics of the elderly such as marital status, education level, income, and duration of illness .

**4.1 Marital status** is defined as the marital status of the elderly with diabetes mellitus which is classified into 2 groups ; married and single including widowed, divorced , and separated .

**4.2 Educational level** is defined as the number of years of education completed by the elderly with diabetes mellitus .

**4.3 Income** is defined as the amount of income in baht per month by the elderly with diabetes mellitus .

**4.4 Duration of illness** is defined as the number of years, starting from the

date that the elderly with diabetes mellitus have been diagnosed by the physician until the date of the study.

**Expected Outcomes and Benefits**

1. Nursing personnel can use the information from this study to help promoting and supporting the nutritional behaviors of the elderly with diabetes mellitus.

2. It may also be used as a guideline for researcher to study other factors that influence on health-promoting behavior of the elderly with diabetes mellitus.
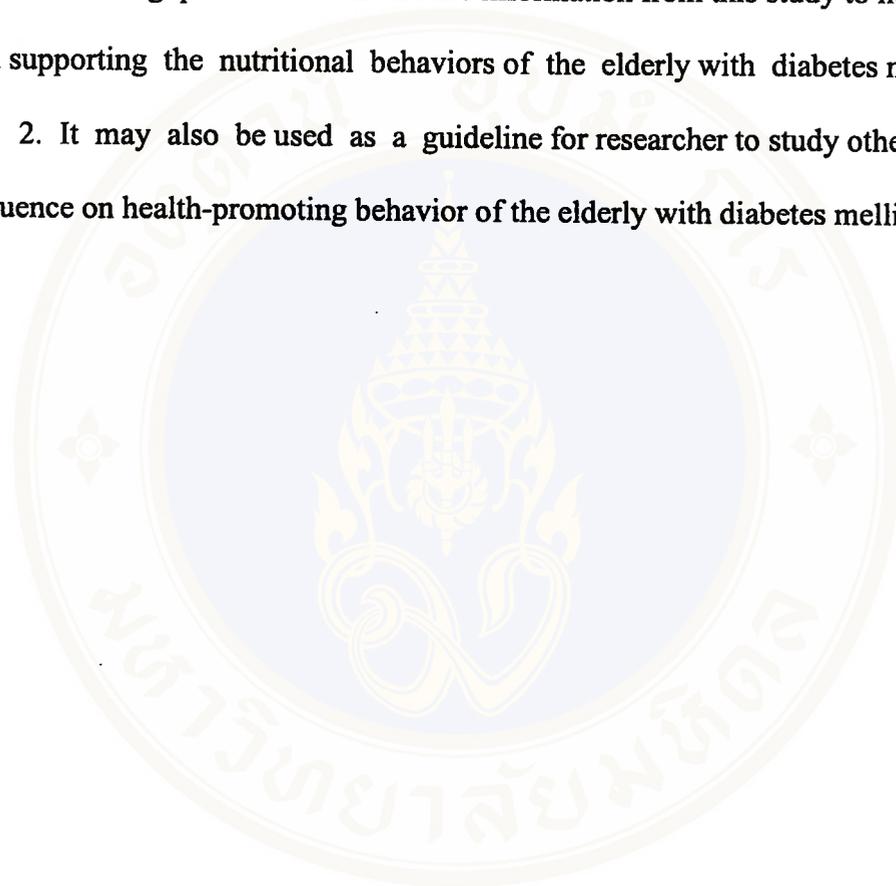
# CARTER II

# LITERATURE REVIEW

This research aimed to study perceived benefits , perceived barriers , and nutritional behaviors of the elderly with diabetes mellitus, and to determine factors influencing on nutritional behaviors of the elderly with diabetes mellitus. Theoretical and empirical literature has been reviewed on the following topics :

1. Changing of aging.

2. Diabetes mellitus in the elderly.

3. Nutritional behaviors of the elderly with diabetes mellitus.

4. Factors related to nutritional behaviors of the elderly with diabetes mellitus.

## 1. Changing of again

The elderly persons, if define by age, are often thought of as individuals who have reached the age of 60 years. Gerontologists have categorized the group of elderly persons by age into three groups (Stabb, 1996: 4; Athikamanon, S., 1998: 11), as follows:

- Early old age, 60-69 years old, most of them can care for themselves and take part in developing society by using their accumulated experience.

- Middle old age, 70-79 years old, half of the middle old age still have good health and can for themselves.

- Late old age, 80 years old over, most of these elderly are taken care of by other people.

When people become elderly, many change in physiological, psychosocial and

economic behavior. Changing of them have an impact on nutritional behaviors of the elderly, as follows:

### 1.1 Physiological changes

When people become elderly, the periodontal bonds that hold the elderly 's teeth may loosen. If the teeth are not structurally sound, the ability to bite and chew can be impaired. The lack of good detention or poorly fitting dentures interferes with chewing and intake of adequate food. With again come, mouth dryness and changes in esophageal motility make swallowing difficult. So difficult in chewing and swallowing, many elderly persons eat less (Keithley, 1996: 9-11).

Taste and smell, the most elderly people will have a decrease in the number of functional receptors in both nasal cavities and papillae on the tongue. The changes in taste particularly affect the receptors for sweet taste. The elderly persons often need increased sweet taste to recognize or enjoy foods because of these sensory losses. In addition, alteration in taste is a side effect of many medication.

Visual losses or changes as well as hearing loss may make obtaining or preparing foods difficult or impossible. The elderly persons may decrease social interaction due to these visual and hearing loses and as mentioned earlier, may decrease their chances of good intake. The elderly persons, for the most part want to be independent; as senses are lost, dependence may be fought and malnutrition may result.

In the stomach, atrophy of the gastric glands may result in decrease production of intrinsic factor and hydrochloric acid, this in turn can interfere with normal digestion and can also contribute to anemia.

Peristalsis of the intestine slows with aging, increasing the likelihood of

constipation and incomplete elimination of feces during a single bowel movement (Boyd & Nihart, 1998: 913-917).

### 1.2 Psychosocial changes

Lack of transportation, loss of functional ability, immobility, limited income, and living alone may lead to social isolation. The older adults living alone may be deprived of stimulating interaction with others and thus lack incentive to cook and eat meals.

Depression frequently accompanies a sense of loss experienced with the death of a spouse or friends, retirement, changes in body appearance , impaired vision, and poor physical fitness. Lack of interest eating and anorexia, common symptoms of depression, result in limited food intake. Opportunities for social interaction and a lifestyle of varied social and physical activities have a positive impact on morale, life satisfaction, and food intake (Horwath, 1991: 811-821 ; Walker & Beauchene, 1991: 300 - 304).

### 1.3 Economic changes

Economic factor has an impact on nutrition of the elderly. Some older adults have an inadequate retirement income. Poor dietary intake is associated with low income (White, 1991: 2087-2097). Limited access to food and food choices plus inadequate facilities for food storage and preparation have a significant impact on both the quantity and quality of food intake. This usually results in a decrease in income, which may occur at a time when an increased amount of money is being spent on medical care. As a result less money may be available for food. Protein foods may be consumed less because they are expensive, require preparation, and are difficult to

chew and swallow. Older persons may consume excessive amounts of carbohydrate food, which are inexpensive , easily stored without refrigeration ,and simple to prepare (Peckenpaugh & Poleman, 1999: 446).

## 2. Diabetes mellitus in the elderly

Diabetes mellitus is a chronic disease caused by abnormalities in the function of insulin which effects metabolism of carbohydrates causing disorder and an increase in blood glucose level. It is always found in the elderly. The main types of diabetes mellitus which is usually seen in the elderly is non insulin dependent diabetes mellitus. ( American Diabetes Association, 1997: s 22 ). The prevalence of diabetes mellitus is rising to approximately 9-15.3 percent of the elderly population (Juntharaprasert, S., 1993: 34). There are many factors which cause diabetes mellitus in the elderly such as genetic history and obesity. Moreover, the relationship between age and the imparied beta cell will decrease insulin secretion and sensitivity (Funnell & Merrit, 1993: 6). Mechanism of elevated glucose when aging derives from abnormal of post-receptor or the abnormally of target cell ( Somchock, J., 1997: 12 ). It was found that the amount of insulin receptor at the cell membrane is less than normal or the response of receptor to insulin is below the normal. It may be found that the insulin in blood vessels is more than normal caused by the higher production and hypersecretion of insulin from the pancreas for effecting imparied insulin resistance.

Risk factors cause to diabetes mellitus which are eating habit, lacking exercise, obesity, and stress as follows:

1. Eating habit. This factor can lead to diabetes mellitus. Because of eating habit especially in more sweet foods such as dessert, soft drink, and juice. The changing of sweet taste buds in older adults can lead to increase sweet taste and majority of the

elderly like to eat sweet foods and eating too much ( Ratchatanavin, R., et al., 1987:183-188 ). It causes to high blood glucose level.

2. Lacking of exercise. Exercise effect to insulin resistance of the muscle and adipose tissues. Exercise increase lean body mass, decrease adipose tissue and increase insulin function (Intharumpan,V.,1987:105). The problem of diabetic patient is a lack of exercise and it can increased blood giucose level.

3. Obesity. Most of the elderly with diabetes are overweight (Perri,1993:200). It was found that more glycogen and adipose tissue, that increased insulin resistance and decreased sensitivity of insulin resulting in high blood glucose level.

4. Stress. Most people find that their blood glucose seems to rise during stress. This happens for two reasons. The first reason is a physiological response to stress which produces several stress hormones including adrenaline. These hormones work in opposition to the action of insulin and usually the blood glucose rises. The second reason is that when people are experiencing stress, they try to find ways of alleviating the symptoms and blocking out the problems that cause stress. This is usually of a behavioral nature. Some people find that they eat more than usual or turn to more highly refined carbohydrate foods such as chocolate. Others may drink more alcohol than usual. It causes to increase of blood glucose level.

**2.1 Diagnosis of diabetes mellitus**

The diagnostic criteria 's for diabetic patient should be restricted to those who have one of the following ; a fasting plasma glucose level of 126 mg/dl or over on at least two occasions and/or a random plasma glucose level of 200 mg/dl or over plus classic signs and symptoms of diabetes (American Diabetes Association, 1997: s6).

## 2.2 Symptoms of diabetes mellitus

The clinical symptoms of most cases of diabetes are polyuria, glycosuria, and polydipsia. In addition, to these symptoms, the elderly with diabetes mellitus is usually overweight and many elderly experience symptoms such as pruritus. Other generalized symptoms of disease may include muscle weakness and fatigue (American Diabetes Association, 1997: s 21)

## 2.3 Complications of diabetes mellitus

Diabetic complications in aging may happen quickly and severely and cause the mortality rate to be higher than at a younger age (Juntaraprasert, S. 1993:95). Diabetes mellitus distribution in the body system is as follows:

1. Cardiovascular. Vascular impairment may cause atherosclerosis problem which comes from elevated serum triglycerides levels and the gradual increase of sorbital. This change in vascular causes patients to have problems with hypertension, myocardial infarction, and ischemic heart disease.

2. Neurologic. Diabetic neuropathy can occur at any location of the body but typically affects peripheral nerves such as feet and legs. Problems with peripheral neuropathy in the feet can cause burning and pain. If it is severe, it has no felling at all. It is often found in diabetic patients who have sensory losses in the feet, starting from the extremities of the feet. This will easily cause foot ulcers and eventually may require amputation.

3. Eyes. Diabetic retinopathy occurs in about half of all persons who have had diabetes mellitus for more than 10 years and in about 80 percent of all persons who have had diabetes mellitus for more than 25 years (Peckenpaugh & Poleman, 1999: 255). Diabetic retinopathy is a cause of blindness due to the change of capillaries in

the retina. Tissue ischemia always occurs with nephropathy.

4. Renal. Creatinine clearance decreases with increasing age. If they are diabetic, this cause renal in the elderly or have hypertension. Diabetic nephropathy is the state where protein leaks into urine all the time. If this state becomes severe, there will be renal failure.

5. Blood. Red blood cells have a short life. Platlets will hold and combine together easily and cause the impairment in the veins which can be severe. Moreover, lymphocyte which destroys foreign bodies in the blood and other impaired function cells causes patients to have a lower resistance than normal people.

Therefore, complications are significant problem for diabetic patients, causing death or highly destroying the competency of patients. So the important aim in caring for diabetic patients is to control blood glucose at a normal level.

### 2.4 Management of diabetes mellitus

The elderly with diabetes mellitus may live with well-being, if they can control their blood glucose level regularly. The complications of diabetes mellitus will be prevented of decreased. Nowadays, there are two methods of diabetes mellitus treatment include medication and non-medication.

Non-medication treatment of diabetic elderly is preferably referred to as lifestyle modifications. It is important now. Lifestyle changes, such as changes in nutritional behaviors, weight loss, exercise, and avoidance of risk factors which have the result of increasing blood glucose level. Nevertheless, an appropriate nutritional behavior is a factor that is important in controlling blood glucose level in the elderly. According to Farr & Watkinson ( 1993 : 35 ), they suggested that controlling diabetes mellitus successfully should start with nutrition before using medication.

## 3. Nutritional behaviors of the elderly with diabetes mellitus

Kompayak, J. (1983 : 5) defined nutritional behaviors as a routine eating as like or dislike of diet, number of daily servings, eating behavior and hygienic habit.

Usaha, J. (1995 : 8) defined nutritional behaviors as the overall expression of action about eating as like or dislike of diet and number of daily, including food choices.

Soitor & Crowley (1984 : 91) defined nutritional behaviors as an individual 's activities in selecting and preparing foods for consumption and maintaining good health, including food choices, food preparation and food consumption.

Nowadays the elderly 's health problem is correlated with nutritional behaviors. So diet is generally considered to be the cornerstone of metabolic control in diabetes. American Diabetic Association (ADA) dietary guidelines are thought to be reasonable as the basis for individual dietary recommendations for older adults. Among patients with diabetes over 60 years of age, 40% are overweight and an additional 15% are obese. These patients often achieve improved blood control through reduced calorie intake or with modest amount of weight loss (Reed & Mooradian , 1990 : 883-901). For these patients, eating similar amounts of food at regular times throughout the day may help to smooth out blood glucose levels and prevent a poorly functioning pancreases.

Older adults with diabetes mellitus have the same age-related problems with nutrition as medication interactions, and diminished senses of taste and smell are factors that can negatively impact nutritional behaviors. Nutrition is an important part of nursing care for the patients. Guidelines for diabetic patients include the following recommendations :

**1. Energy.** Energy requirements vary for each individual, and will depend on their energy need. The approximate energy requirement for the diabetic elderly is 1,400-1,800 calories per day (Intharumpan, V.,1988: 55). The dietary recommendation for diabetic elderly is no more than 30% of total calories from fat. Fifty to sixty percent calories should be provided by carbohydrate and 10-15% of total calories should be provided by protein ( Farr & Watkinson, 1993 : 36-39 ; Monahan, 1994 : 1228 ).

**2. Carbohydrate.** The diabetic elderly should increase complex carbohydrates such as vegetables, citrus fruits, beans, cereals, brown rice, and whole-wheat which will result in increased dietary fiber. It is often known as slow release carbohydrate, as they take longer to be broken down into glucose. They are absorbed slowly and this lead to a more gradual increase in blood glucose levels. The diabetic elderly should decrease refined carbohydrates, such as sweets, chocolate, honey, jam, desserts, and produce a rapid increase in blood glucose levels (Fuessl, et al., 1987 : 463-468; Vinik & Jenkins, 1988 : 160-173).

**3. Fat.** Fat intake should be limited due to the increased risk of arterial disease in diabetic patients. The fat content of the diet should be no more than 30-35% of total calories per day. The intake of saturated fat should be reduced. Food high in saturated fat such as lard, palm oil, coconut oil, cream, butter, fatty meat will result in increased blood cholesterol level. Diabetic elderly should increase eating of unsaturated fat 10-15% of total calories from food. Polyunsaturated fats are generally referred to as linoleic acid are found in soybean oil, sunflower oil, corn oil. These will effect to decrease cholesterol by getting rid of cholesterol in bowel by stimulating oxidation.

So that the diabetic elderly should select food for reducing fat intake such as choose lean cuts of meat and trim off any visible fat, make more use of fish and chicken without the skin. In addition, they should prepare food by baking, grilling, boiling, steaming, or poaching food instead of frying.

**4. Protein.** The diabetic elderly should have appropriate protein intake because protein 's function is building and repairing all of the various body tissues. Protein intake should come from animals and plant protein sources in order to get completely essential amino acid. Sources of protein such as meat without fat, fish, chicken, egg, nuts, and milk. Calories from protein intake usually make up 10-15% of total calories per day. With the onset of diabetic nephropathy, lower intakes of protein should be considered. High protein diet will related progression of renal disease, regardless of the underlying pathology. This is because they are more at risk of developing renal disease and a reduction in dietary protein may reduce albuminuria and glomerular filtration rate in early nephropathy (Zeller, et al., 1991 : 78-84).

**5. Avoiding caffeine and alcohol intake.** The diabetic elderly should be avoid coffee, stimulants, and alcohol intake. Drinking coffee has long been suspected of being a risk factor of coronary hearth disease (Willhalmsan & Marmot, 1996 : 921). Alcohol is a high in calories (7 kcal/g) and is metabolized in a manner similar to fat (Franz, 1990 : 136). So that always drinking alcohol is effect to high cholesterol level because alcohol decrease the oxidation of fat. In addition, drinking alcohol with a high carbohydrate content such as wines, beer, and most liqueurs which will result in increased blood glucose level (Farr & Watkinson, 1993 : 40-41).

**6. Controlling amount of food intake.** The diabetic elderly should have same amounts of food intake, eat a variety of food daily, eat slowly, and chew finely. In additional the elderly with diabetes should drink water 10-12 a cup of glass or over 2,500 cc./day.

## 4. Factors related to nutritional behaviors of the elderly with diabetes mellitus

### 4.1 The Health Promotion Model (HPM)

The Health Promotion Model uses a wellness orientation and focuses on what motivates individuals to increase their levels of well-being and self-actualization (Pender, 1996 : 51). HPM is based on expectancy-value theory and social cognitive theory. The model provides an approach for explaining and predicting health-promoting behaviors such as nutritional behaviors. In 1996, the revised HPM was developed and consists of three parts : individual characteristics and experiences, behavior - specific cognitions and affects, and behavioral outcome (see Figure 2). Individual characteristics and experiences have both an indirect effect through behavior-specific cognitions and affects and a direct effect on behavioral outcome.

Individual characteristics and experiences compose of two variables, prior-related behavior and personal factors. Prior-related behavior is behavior in the past that has direct and indirect effects on future health behavior. Personal factors, including demographic and biological characteristics, can be variables selected for a particular health behavior (Pender, 1996 : 67). Although personal factors are proposed to have direct influence on cognition processes and health-promoting behavior, some personal factors cannot be changed ; therefore, they are seldom considered.

The six variables within behavioral-specific cognitions and effects are perceived

benefits of action, perceived barriers to action, perceived self-efficacy, activity-related effect, interpersonal influences, and situational influences. These variables can be changeable by nursing actions ; therefore, they are crucial for intervention (Pender, 1996 : 97).

The last principal factor is behavioral outcome which is considered to be the action phase. There are three stages to this: commitment to a plan, immediate competing demands and preferences, and health - promoting behavior. Health-promoting behavior is the last variable in the model and it is composed of health responsibility, exercise, nutrition, interpersonal relations, spiritual growth and stress management. Ultimate action of the HPM will eventually be directed toward a positive health outcome for the patients.

**Individual Characteristics and experiences**

**Behavior-Specific Cognitions and Affect**

**Behavior Outcome**

Perceived benefits of action

Perceived barriers to action

Prior related behavior

Perceived Self-efficacy

Immediate competting demands and preferences

Activity-related affect

Personal Factors; biological psychological sociocultural

Commitment to a plan of action

Health promoting behavior

Interpersonal influences

Situational Influences

**Figure 2. Pender's Health Promotion Model.**

Many researchers showed that individual characteristics of the sample including marital status, educational level, income, and duration of illness might influence the nutritional behaviors of each person. Therefore, perceived benefits, perceived barriers, marital status, educational level, income, and duration of illness are proposed to be the variables that can predict nutritional behaviors in this study.

**4.2 Perceived benefits in nutritional behaviors of the elderly with diabetes mellitus.**

Perceived benefits is personal perceptions and cognition of performance of the behavior (Pender, 1996: 68). Anticipated benefits of action are mental representations of the positive or reinforcing consequences of a behavior. Vicarious experience of outcomes from prior direct experience or observations from others engaging in the behavior will be the main motivation to engage in the behavior. Perceived benefits of a person or outcome expectations in activities will have benefits to that person in changing his or her characters. Individuals tend to invest time and resources in activities with a high likelihood of increasing their experience of positive outcomes. Perceived benefits will support in the majority of the pattern of nutritional behaviors. Pender (1996: 68) classified perceived benefits as being in the first ordinal class from 6 classified classed of behavior-specific cognition. The elderly with diabetes will lose their memory but the aged will choose to remember something that they believe is valuable to themselves so they can memorize it and can carry it out correctly (Becker & Maiman, 1975 : 20 ; Wedchapat, S. 1995 : 180). The way to promote healthy behavior in the diabetic elderly is to encourage them to perceived benefits of controlling their blood glucose level as much as possible ( American Diabetes Association, 1997: s 61). In the study of Janz and Becker (1984: 28), it was found that

perceived benefits of treatment are related with participation in nutrition of diabetic patients. Sechrist and colleagues ( 1987: 357-365 ) indicated that perceptions of benefits for the individual are important in determining action of any health-promoting behavior. Thus, perceived benefits may impact differently on the initiation of behaviors versus the long-term maintenance of behaviors (Palank, 1991: 821) such as perceived benefits of avoiding sweet and high fat food, eating low fat diet, eating high fiber food to help patients in decreasing blood glucose and cholesterol. From reviewing literatures, it was found that perceived benefits have an influence on health-promoting behavior. Conton & Murphy (1990 : 6) and Houts (1989 : 172) found that perceived benefits of a healthy diet were significantly correlated to positive nutritional behaviors. Thongpila, P. (1999 : IV) studied the health-promoting behaviors of 100 elderly with hypertension. The results showed that the perceived benefits had a positive relationship with health-promoting behavior of the elderly with hypertension. This was similar to the study of Nirattharadorn, M. (1996 : II) which found that perceived benefits had a positive relationship with health-promoting behaviors of the adolescent pregnant women. This corresponds with the study of Kasekan, K. (1998 : 65) which studied the health-promoting behaviors of 100 elderly with diabetes mellitus. The results found that the perceived benefits of actions had a positive relationship with health-promoting behaviors of the elderly with diabetes mellitus.

**4.3 Perceived barriers in nutritional behaviors of the elderly with diabetes mellitus.**

The perceived barriers is a cognitive perceptual factor influencing intent to engage in behavior (Pender, 1996 : 68-69). Such barriers may be imagined or real and consist of perceptions about oneself or situational and environmental factors such as

the unavailability, inconvenience, expenses, difficulty, or time consuming nature of a particular action. Barriers are often viewed as the blocks, hurdles, and personal costs of undertaking a given behavior such as satisfaction from giving up health-damaging behaviors also constitute a barrier. When readiness to act is low and barriers are high, action is unlikely to occur. When readiness to act is high and barriers are low, the probability of action is much greater (Pender, 1996 : 69). Barriers are important variable can predict the health-promoting behavior or cooperated of the patients. Diabetes mellitus has management with controlling blood glucose level. The diabetic patients should be perform properly according to health professional 's suggestions such as avoiding risk factors, controlling diet everyday. These are affected to the way of life of the diabetic elderly. The limitation to activities of the aging, financial problems, and travelling that effect to health-promoting behavior. In such case, some of the elderly person are living alone, lack of transportation, loss of functional ability, depressing, lose of memory, which results in limited food intake and barriers to appropriate nutritional behaviors of the diabetic elderly. Polly (1992: 46) studied the relationship between diabetes specific health beliefs and adherence to the diabetes regimen and glycemic control in 102 elderly with NIDDM. The results found that perceived barriers to treatment was significantly and negatively correlated to adherence. Glasgow and colleagues (1986 : 78) studied the barriers to regimen adherence among 65 adults and adolescents with diabetes mellitus. It was found that the greatest number of barriers were dietary control and exercise. There was a significantly negative relationship between barriers and adherence for each therapeutic regimen. According to the study of Tongila, P. (1999 : 72) and Junchanakit, J. (1998 : 92) which found that perceived barriers to actions had a negative relationship with

health-promoting behaviors of the elderly with hypertension and chronic obstructive pulmonary disease, respectively.

It is conclude that perceived benefits and perceived barriers have an influence on nutritional behaviors. So nurses should encourage the diabetic elderly to have high perceived benefits and low perceived barriers to make them confident about appropriate nutritional behaviors.

**4.4 Personal factors that influence on nutritional behaviors of the elderly with diabetes mellitus.**

### 4.4.1 Marital status

The elderly with spouse would not be lonely as they have a close friend to share. Moreover, their spouse are a caregiver to console, to encourage and to consult with providing warmth and security. Spouse is counter part and provide understanding and this help them to attain a better quality of life (Apichartabutr, J. 1997 : 36). Muhlenkamp & Sayles ( 1986 : 334 – 338 ) and Kohout & Wallace (1985: 582-589) found that the elderly persons who lost a spouse were prone to suffer consequences from isolation , depression, financial worries, and nutritional problems. Eating alone may decrease intake significantly. This was similar to Pairou , P. ( 1996 : 116 ) studied the relationship between the selected factors and self - care behaviors of 400 elderly in Nakornprathom Province. The result showed that the spouse in elderly had a better nutritional behaviors than the single elderly. Vilailert, S. (1993:53) studied the relationship between health behaviors and health status of 170 elderly in Chonburi Province. The results revealed that the nutritional behaviors of the married elderly were at a good level because they have a couple to take care in food.

In contrast, Ratanaamornchai , D . ( 1992 : 115 ) studied the relationship between demographic characteristics, perceived health status and perceived control of health on lifestyle of 400 elderly in Angthong Province. The results showed that the elderly person who had different marital status had no different nutritional behaviors. This was because most of the elderly lived with relatives and offspring whose encouraged them to perform the appropriate nutritional behaviors.

### 4.4.2. Educational level

Education is an indicator of ability in thinking. Those who are able to well understand health information have a good level of activity for self-care ( Orem, 1985 : 120, 175 ), and they have a better chance of acquiring useful methods to encourage health activity than lower educational levels (Pender, 1987: 163). Pender (1987: 48) concluded that the level of formal education correlated positively with the frequency of preventive actions. This corresponds with a study of Pothivara, S. (1986: II), which showed that highly education diabetic patients have significantly better knowledge of diabetes, self-care and co-operation in treatment than less education patients. Similar to Mahasitthiwat, Y.(1996: 108) studied the relationship between perception of bio-psychosocial change, self esteem, and health behavior of 200 elderly. The results showed that highly education elderly had nutritional behaviors better than less education elderly. Johnson ( 1991: 15-19 ) studied the relationship between the demographic characteristics and health-care practice of 250 elderly in the rural area. The results of this study showed that highly education persons have a better nutritional behaviors than less education ones. Ratanaamornchai, D. ( 1992: 46 ) found that the elderly person who had different educational level, had different nutritional behaviors. This is in contrast to a study of Kurat, S. (1996: 58) which no

found that educational level had no relationship with health-promoting behaviors. Similarly, Sumpunyu, O. (1996:102) studied of demographic factors, health perception and health-promoting behavior of 275 hypertensive patients at Lopburi Province. It was found that the education level had no relationship with health - promoting behaviors of hypertensive patients. This was because there were other factors which had influence on nutritional behaviors of the chronic obstructive pulmonary disease and hypertensive patients more than education level. In addition, most of the subjects had a primary education and not attending school. Thus, the educational level was rather homogenous and could not be brought to predict the nutritional behaviors.

### 4.4.3 Income

Income is an important factor which indicate the economic and social conditions of the elderly with diabetes mellitus. The high income person has a good chance in searching for something that is useful in caring for themselves (Pender, 1987 : 163). Many elderly people live on a fixed income that the ability to purchase food may be limited, and this limitation may contribute to reliance on high-calorie, low nutrient foods such as those high in fat and carbohydrates (Levine, 1991: 422). The study of Rattanaamornchai, D. ( 1992: 117 ) found that the elderly with a high income had nutritional behaviors better than the elderly with lower income. This was similar to Tantiwattanasathean, K.(1991: 117-123) who studied the relationship between selected factors and health - promoting behaviors of 200 elderly in the rural Northeastern Region. The results found that income had a positive relationship with the nutritional behaviors of the elderly persons. Vilailert, S. (1993:55) found that the high income of the elderly had better nutritional behaviors than the low and moderate income groups. In contrast, Kasekan, K. (1998:65) found that income had no

relationship with health-promoting behavior in nutrition of the elderly with diabetes mellitus. This was because these were other factors which had influence on nutritional behaviors of the elderly with diabetes mellitus more than income and most of the elderly lived with family and relatives who could supported income and encouraged them to perform suitable nutritional behaviors. So income could not be brought to predict this nutritional behaviors.

### 4.4.4 Duration of illness

Duration of illness is an important factor that related to learning in life and self adaptation. Patients in the first period may lose confidence in any action related to health because they lack knowledge and experience. The patient who has a short duration of illness may be uncertain and cannot adapt to their medical treatment and behavior. Duration of illness of the elderly with diabetes mellitus is related to their learning and self-care. A long duration of illness will cause improvement in their self-care. This was similar to the study of Sakulpan, N .(1991: 92) which studied the relationship between social support, related factors and self - care behavior of the diabetic patient. The results found that the duration of illness was related to the self-care behavior in the diabetic patient. Tantayothai, V. (1982: 54-71) found that diabetic patients who had a long duration of illness were confident to behave properly. In contrast, Abram ( 1996: 160 ) found that the chronic patients who had duration of illness 6-12 months could adjusted themselves. If the illness continued for more than 24 months, patients would feel desperate and uncertain to the illness and lose confidence. Glasglow and colleagues ( 1987: 404-405 ) found that the duration of illness was related to medical treatment. Patients suffering from diabetes for more than 10 years. This corresponds with a study of Sirintharagsri,B. (1984: 7 which found

that  diabetic patients who had a longer illness would be disappointed and desperate  in taking  care of their health and had a tendency to negative health.  Kasekan, K. ( 1998: 65 ) found  that duration of illness  had no relationship with health-promoting behaviors of the elderly with diabetes mellitus.  This was because most of the subjects had  a duration of illness  less than  five years.  So the  duration of illness was rather homogenous and could not be brought to predict the nutritional behaviors.

In conclusion, literature review and related studies showed  that  diabetes mellitus in elderly  would  be  a  major  problem in health care system.  The  primary  goal  of treatment  of  the  patient with  high  blood  glucose level  is to achieve  the  maximum reduction  in  the  risk  of  the  complications.  Non-pharmachologic treatment  such as controlling  diet or suitable  nutritional  behaviors should  be recommended because  it has  many  benefits, especially  in  controlling blood  glucose  level.  Pender 's Health Promotion  Model (1996) is of particular interest and has been examined in  this study. The  researcher  has  chosen  perceived  benefits and perceived  barriers which  are the factors in behavioral-specific cognitions and affects.  Also, personal factors that affect nutritional  behaviors, namely  marital status, educational level, income,  and  duration of illness, were chosen in this study.

# CHAPTER III

# METHODOLOGY

## Research Design

This study was a descriptive research and the purposes of this study were to describe the perceived benefits, perceived barriers, and nutritional behaviors of the elderly with diabetes mellitus, and to identify the prediction factors of perceived benefits, perceived barriers, and personal factors to nutritional behaviors of the elderly with diabetes mellitus.

## Population and Sampling

The population of this study was the elderly with diabetes mellitus who were 60 years of age or over. These patients must have a fasting blood glucose level of 140 mg % or greater. A diagnosis of diabetes mellitus was made according to the criteria of the American Diabetes Association (1997). The population of this study were selected from the diabetic clinic in the out patient department at ten district hospitals in Ratchaburi Province.

## Sample Selection

1. The researcher randomly chose four out of ten district hospitals in Ratchaburi Province by simple random sampling by drawing lots. There were Bangphae Hospital, Watpleang Hospital, Photharam Hospital, and Chombung Crown Prince Hospital.

2. The researcher estimated the sample size using Thorndike 's formula (1978

cited in Verran, 1989: 561) as follows:

$$n \geq 10k + 50$$

When            n = number of sample size

                k = number of independent variables

There were six independent variables in this study. By using the above formula, the sample size was calculated to be 110 elderly subjects. In order to have an equal number from each hospital, the researcher added 10 subjects. Therefore, the total number of 120 elderly subjects was used in this study. The researcher obtained 30 subjects from each hospital.

3. By using a systemic random sampling technique, the researcher randomly chose from the list of names of the elderly with diabetes mellitus from medical records. The list of name was ordered by consonant from the out patient department in the four hospitals by choosing sample group that had the interval = 7, so it was calculated from the following formula :

$$I = \frac{N}{n}$$

When            I = interval

                N = the number of the elderly with diabetes mellitus from each hospital per month approximately 200 patients.

                n = sample group of each hospital

                $$I = \frac{200}{30}$$

                $$= 6.7$$

After getting the interval, the researcher randomly selected one number from one to seven by drawing lots. When getting the start number, the researcher selected

the next number by adding seven until thirty patients were obtained. Some of the patients may be failed to follow up during the selection, they were left off. The researcher selected the next number by adding to seven.

**Setting**

Ratchaburi is a province is located in the Western region of Thailand. It is about 100 Kilometers far from Bangkok. It consists of ten districts and one sub-commune district. The total elderly population was 91,056 or 11.19 percent of the total population (Institute of Population Studies, Chulalongkorn University, 1997). It was found that 8,764 elderly had diabetes mellitus (Ratchaburi Provincial Health Office, 1998 ). The major source of public health services including one central hospital and nine district hospitals. The selected hospitals in this study were Bangphae Hospital, Watpleang Hospital, Photharam Hospital, and Chombung Crown Prince Hospital. Data were obtained from diabetic clinic of four hospitals. The time schedule of these diabetic clinics were as follows :

- The Diabetic clinic of Watpleang Hospital was opened on Tuesday and Friday at 8.00 A.M. to 12.00 A.M.

- The Diabetic clinic of Photharam Hospital was opened on Wednesday at 8.00 A.M. to 4.00 P.M.

- The Diabetic clinic of Bangphae and Chombung Crown Prince Hospital were opened on Tuesday and Thursday at 8.00 A.M. to 12.00 A.M.

**Instrumentation**

The instruments used in this study were questionnaires which were developed by the researcher after reviewing the literature and related research. There were three

parts of the questionnaire as follows:

**Part 1 Personal data.** This part was included gender, age, marital status, educational level, income, adequacy of income, living arrangement, duration of illness, financial support, food preparation, number of daily food serving, and blood glucose level.

**Part 2 The perceived benefits and perceived barriers in nutritional behaviors**

**2.1 The perceived benefits in nutritional behaviors questionnaire.**

This questionnaire was consisted of 14 items. The scale items were ranged on the continuum with values from 1 to 4. The positive items are number 1, 2, 3, 4, 5, 7, 9, 11, 14 and negative items are 6, 8, 10, 12, 13.

**The meaning of the answers**

Strongly agree is defined as the statement totally relevant to the respondent 's feeling and thinking.

Mostly agree is defined as the statement much relevant to the respondent 's feeling and thinking

Slightly agree is defined as the statement slightly relevant to the respondent 's feeling and thinking.

Disagree is defined as the statement totally irrelevant to the respondent 's feeling and thinking.

**Scoring criteria**

The questionnaire of perceived benefits in nutritional behaviors has both positive and negative meaning as the following:

|              | Positive | Negative |
|--------------|----------|----------|
| Strongly agree | 4 | 1 |
| Mostly agree | 3 | 2 |
| Slightly agree | 2 | 3 |
| Disagree | 1 | 4 |

**Interpretation of score**

$\overline{X}$  1.00 – 1.49   means the elderly with diabetes mellitus has low perceived benefits in nutritional behaviors.

$\overline{X}$  1.50 – 2.49   means the elderly with diabetes mellitus has rather low perceived benefits in nutritional behaviors.

$\overline{X}$  2.50 – 3.49   means the elderly with diabetes mellitus has rather high perceived benefits in nutritional behaviors.

$\overline{X}$  3.50 – 4.00   means the elderly with diabetes mellitus has high perceived benefits in nutritional behaviors.

**2.2 The perceived barriers in nutritional behaviors questionnaire**

This questionnaire was consisted of 12 items. The scale items were ranged on the continuum with values from 1 to 4.

**The meaning of the answers**

Strongly agree is defined as the statement totally relevant to the respondent 's feeling and thinking.

Mostly agree is defined as the statement much relevant to the respondent 's feeling and thinking.

Slightly agree is defined as the statement slightly relevant to the respondent 's feeling and thinking.

Disagree is defined as the statement totally irrelevant to the respondent 's feeling and thinking.

**Scoring criteria**

In the questionnaire of perceived barriers have all negative meaning as the following:

| | | |
|---|---|---|
| Strongly agree | = | 4 |
| Mostly agree | = | 3 |
| Slightly agree | = | 2 |
| Disagree | = | 1 |

**Interpretation of score**

$\overline{X}$   1.00 – 1.49   means the elderly with diabetes mellitus has low perceived barriers in nutritional behaviors .

$\overline{X}$   1.50 – 2.49   means the elderly with diabetes mellitus has rather low perceived barriers in nutritional behaviors .

$\overline{X}$   2.50 – 3.49   means the elderly with diabetes mellitus has rather high perceived barriers in nutritional behaviors .

$\overline{X}$   3.50 – 4.00   means the elderly with diabetes mellitus has high perceived barriers in nutritional behaviors .

**Part 3 The nutritional behaviors questionnaire.**

This questionnaire was consisted of 17 items. The scale items were ranged on the continuum with values from 1 to 4. The positive items are number 3, 6, 7, 8 and negative items are 1, 2, 4, 5, 9, 10, 11, 12, 13, 14, 15, 16,17.

**The meaning of the answers**

Regularly practice is defined as the elderly with diabetes mellitus has done on

the relevant nutritional behaviors everyday.

Often practice is defined as the elderly with diabetes mellitus has done on the relevant nutritional behaviors at 4-6 days per week.

Sometimes practice is defined as the elderly with diabetes mellitus has done on the relevant nutritional behaviors at 1-3 days per week.

Never practice is defined as the elderly with diabetes mellitus has never done on the relevant nutritional behaviors.

**Scoring criteria**

In the questionnaires of nutritional behaviors have both positive and negative meaning as the following:

|                      | Positive | Negative |
|----------------------|----------|----------|
| Regularly practice   | 4        | 1        |
| Often practice       | 3        | 2        |
| Sometimes practice   | 2        | 3        |
| Never practice       | 1        | 4        |

**Interpretation of score**

$\overline{X}$  1.00 – 1.49   is defined as the elderly with diabetes mellitus has poor nutritional behaviors.

$\overline{X}$  1.50 – 2.49   is defined as the elderly with diabetes mellitus has rather poor nutritional behaviors.

$\overline{X}$  2.50 – 3.49   is defined as the elderly with diabetes mellitus has rather good nutritional behaviors.

$\overline{X}$  3.50 – 4.00   is defined as the elderly with diabetes mellitus has good nutritional behaviors.

**Validity and Reliability**

   **Validity of instrument**

   The questionnaire were initially tested for their content validities and language to the following 5 experts which concluding a nutritionist, and four nursing instructors who had experienced in the area of nutrition, medical nursing, aging, and mental health and psychiatric nursing.

   **Reliability of instrument**

   The developed questionnaires of perceived benefits in nutritional behaviors, perceived barriers in nutritional behaviors, and nutritional behaviors were pilot tested in 30 elderly with diabetes mellitus, which had similar characteristics to the subject. Thereafter the questionnaires were calculated for their reliability by Statistical Package of the Social Science (SPSS) for Windows. The results obtained for reliability of the instruments were as follows :

   Perceived benefits in nutritional behaviors questionnaire = 0.80

   Perceived barriers in nutritional behaviors questionnaire = 0.78

   Nutritional behaviors questionnaire  = 0.82

**Data collection**

   The process for data collection was as follows :

   1. An introductory letter was prepared by the Faculty of Graduate Studies, Mahidol University and delivered to the Directors of Bangphae Hospital, Photharam Hospital, Watpleang Hospital, and Chombung Crown Prince Hospital, in order to get approval in conducting the study.

   2. After the permission was obtained from administration of each hospital,

the researcher contacted to the targeted hospital to provide more detail of plan and schedules for data collection.

3. Steps of data collection were as follows:

3.1 Selected the elderly with diabetes mellitus by list names of them from the medical record.

3.2 Randomed sample patients by using systemic random sampling.

3.3 Explained to the prospective sample of the purpose and the procedure of this study, and got consent forms from the sample.

3.4 The data were collected by interviewing the subjects using to the personal data form, nutritional behaviors questionnaire, perceived barriers questionnaire, and perceived benefits questionnaire, respectively. The interview time was approximately 40 - 45 minutes for each subject. The researcher allowed the subject to ask any questions and the researcher answered the questions when finished the interview.

**Protection of Human Subjects**

Before collecting the data, the researcher provided the consent form ( see Appendix B ) to the subjects for protection of human subjects . The diabetic patients who agreed to participate were informed that there were no physical risks as a result of the participation in this study. However, some subjects might experience temporary discomfort when discussing about their feeling and their own situation. The participates were free to refuse to answer any question that they did not want to discuss. They also were free to have significant others present with them during the interviews. There was no cost to them nor would they receive any payment. During the interview, participants could ask question or stop the interview at any time. Due to the fact that some subjects with diabetes mellitus might not be able to read the

consent form, the researcher read the consent form to them.

**Data analysis**

Data analysis was performed by Statistical Package of the Social Science (SPSS) for Windows. The analysis of data obtained in this study, according to the following steps :

1. Demographic data of the sample were analyzed by frequency, and percentage distribution.

2. Perceived benefits, perceived barriers, and nutritional behaviors were analyzed by mean and standard deviation of the overall score and each items.

3. Pearson's product moment correlation coefficients were performed to determine the relationship between marital status, education level, income, duration of illness, perceived benefits, perceived barriers, and nutritional behaviors.

4. Multiple correlation coefficients between predictor factors and nutritional behaviors using stepwise multiple regression analysis. The calculation of the multiple correlation coefficient required that the variables used must be at least in the interval scale. Therefore, the variables in the nominal scale must be adjusted to dummy variables (Prasertratanasint, S. & Rodmanee, L., 1984: 27) as follows:

Marital status : Married                                    =       1

Single/Divorced/Widowed/Separated          =       0

# CHAPTER IV

# RESULTS

The objective of this descriptive research was to study the perceived benefits, perceived barriers, and nutritional behaviors of the elderly with diabetes mellitus. A sample of 120 diabetic patients was recruited from the diabetic clinic in the out patient department of Bangphae Hospital, Watpleang Hospital, Photharam Hospital, and Chombung Crown Prince Hospital. The results were presented in 4 parts:

1. Demographic characteristics of the elderly with diabetes mellitus.

2. Perceived benefits and perceived barriers of the elderly with diabetes mellitus.

3. Nutritional behaviors of the elderly with diabetes mellitus.

4. The prediction of perceived benefits, perceived barriers, marital status, educational level, income, and duration of illness to nutritional behaviors of the elderly with diabetes mellitus.

**Part 1   Demographic characteristics of the elderly with diabetes mellitus.**

**Table 1** Number and percentage of the samples categorized by gender, age, marital

status, and educational level (n = 120).

| Demographic characteristics | Number | Percent |
|---|---|---|
| Gender | | |
| Female | 90 | 75.0 |
| Male | 30 | 25.0 |
| Age (years) | | |
| 60-69 | 90 | 75.0 |
| 70-79 | 27 | 22.5 |
| 80 and over | 3 | 2.5 |
| ( $\overline{X}$ = 66.04,  S.D. = 5.69,  Range = 60-87 ) | | |
| Marital status | | |
| Married | 87 | 72.5 |
| Widowed/ Divorced/ Separated | 28 | 23.3 |
| Single | 5 | 4.2 |
| Educational level | | |
| Not attending school | 25 | 20.8 |
| Primary school | 65 | 54.2 |
| Secondary school | 16 | 13.3 |
| Diploma | 8 | 6.7 |
| Bachelor degree | 6 | 5.0 |

From Table 1, the majority of the samples were females. About 75.0% of the

samples were aged between 60 - 69 years. Most of them were married and more

than half of the samples had primary school education·

**Table 2** Number and percentage of the samples categorized by income, adequacy of income, financial support, and living arrangement (n = 120).

| Demographic characteristics | Number | Percent |
|---|---|---|
| Income (Baht/month) | | |
| ≤ 1,000 | 35 | 29.2 |
| 1,001 -5,000 | 61 | 50.8 |
| 5,001 -10,000 | 15 | 12.5 |
| 10,001 -15,000 | 6 | 5.0 |
| ≥ 15,001 | 3 | 2.5 |
| ($\overline{X}$ = 5,032.50, S.D. = 4,584.74, Range = 500-30,000 ) | | |
| | | |
| Adequacy of income | | |
| Adequate | 78 | 65.0 |
| Inadequate | 42 | 35.0 |
| | | |
| Financial support * | | |
| Offspring | 84 | 70.0 |
| Salary | 50 | 41.7 |
| Pension | 20 | 16.7 |
| | | |
| Living arrangement | | |
| Live with children | 91 | 75.8 |
| Live without children | 24 | 20.0 |
| Live alone | 5 | 4.2 |

* answer more than one

Table 2 showed that the majority of the samples had income 1,001-5,000 Baht per month. More than half of the samples had adequate income. About 70.0% of them had financial support from their offspring. And most of the sample lived with their children.

**Table 3**  Number and percentage of samples categorized by food preparation, number of daily food serving, duration of illness , and blood glucose level (n = 120).

| Demographic characteristics | Number | Percent |
|---|---|---|
| **Food preparation** | | |
| Members of family | 75 | 62.5 |
| On their own | 45 | 37.5 |
| | | |
| **Number of daily food serving (meals)** | | |
| 2 | 9 | 7.5 |
| 3 | 75 | 62.5 |
| 4 | 20 | 16.7 |
| 5 | 16 | 13.3 |
| | | |
| **Duration of illness (years)** | | |
| 1-5 | 65 | 54.2 |
| 6-10 | 32 | 26.7 |
| > 10 | 23 | 19.1 |
| ($\overline{X}$ = 6.86, S.D. = 5.56, Range = 1-25 ) | | |
| | | |
| **Blood glucose level (mg %)** | | |
| 60-120 | 62 | 51.7 |
| 121-180 | 30 | 25.0 |
| > 180 | 28 | 23.3 |
| ($\overline{X}$ = 156.38, S.D. = 55.65, Range = 60-351) | | |

Table 3 showed that the majority of samples prepared food by members of family and had 3 meals per day. More than half of the samples had duration of illness from 1 to 5 years, and had blood glucose level from 60 to 120 mg %.

**Part 2    Perceived benefits and perceived barriers of the elderly with diabetes mellitus.**

**Table 4**  Mean, standard deviation, and level of perception of perceived benefits in nutritional behaviors of the samples in each item and overall.

| Perceived benefits | X̄ | S.D. | Level of perception |
|---|---|---|---|
| **Perceived eating benefits in each item** | | | |
| - avoiding sweet fruit will decrease blood glucose level. | 3.93 | 0.31 | high |
| - avoiding drinking coffee with sugar will decrease blood glucose level. | 3.71 | 0.67 | high |
| - avoiding drinking soft drinks will decrease blood glucose level. | 3.60 | 0.71 | high |
| - avoiding eating less sweet tasting fruit will decrease blood glucose level. | 3.60 | 0.59 | high |
| - avoiding eating fatty food such as coconut cream will decrease body weight. | 3.54 | 0.66 | high |
| - avoiding eating animal oil will decrease cholesterol. | 3.53 | 0.59 | high |
| - avoiding less starchy food will decrease blood glucose level. | 3.51 | 0.62 | high |
| - eating vegetables will decrease blood glucose level. | 3.49 | 0.64 | rather high |
| - avoiding drinking stimulants will decrease blood glucose level. | 3.43 | 0.89 | rather high |
| - avoiding eating desserts during meals will decrease blood glucose level. | 3.39 | 0.64 | rather high |
| - eating food on time will control blood glucose level. | 3.27 | 0.71 | rather high |
| - avoiding drinking alcohol will decrease blood glucose level. | 3.24 | 0.96 | rather high |
| - eating food of the same portions will decrease blood glucose level. | 3.23 | 0.93 | rather high |
| - controlling body weight by controlling food will decrease blood glucose level. | 3.13 | 0.86 | rather high |
| **The overall perceived benefits** | **3.47** | **0.34** | **rather high** |

Table 4 showed that the overall mean of perceived benefits score for this sample was at a rather high level. The highest mean score item was avoiding eating sweet fruit will decrease blood glucose level. Controlling body weight by controlling food will decrease blood glucose level had the lowest mean score.

**Table 5**  Mean, standard deviation, and level of perception of perceived barriers in nutritional behaviors of the samples for each item and overall.

| Perceived barriers | X̄ | S.D. | Level of perception |
|---|---|---|---|
| **Perceived barriers for each item** | | | |
| - controlling food everyday is boring. | 3.12 | 0.56 | rather high |
| - visual or movement problems make you difficult to prepare food. | 3.04 | 0.63 | rather high |
| - chewing and swallowing problems make you difficult to eat vegetables. | 2.87 | 0.70 | rather high |
| - eating food not on time and having an over eating habit. | 2.83 | 0.87 | rather high |
| - liking sweet taste do cannot decrease sweet food consumption. | 2.63 | 0.71 | rather high |
| - not understanding health staff 's suggestions. | 2.53 | 0.74 | rather high |
| - members of the family do not help in controlling food. | 2.42 | 0.71 | rather low |
| - controlling food strictly does not control blood glucose level. | 2.40 | 0.60 | rather low |
| - going out to a party does not controlling consumption food. | 2.39 | 0.60 | rather low |
| - cooking food yourself is a waste of money. | 2.04 | 0.64 | rather low |
| - cooking food without animal oil causes less consumption. | 1.78 | 0.62 | rather low |
| - eating sweet and high fat food wastes time in cooking. | 1.76 | 0.57 | rather low |
| **The overall perceived barriers** | **2.48** | **0.54** | **rather low** |

Table 5 showed that the samples had the overall mean score of perceived barriers at the rather low level. The highest mean score was controlling food everyday is boring and the lowest mean score was eating sweet and high fat food wastes time in cooking.

## Part 3    Nutritional behaviors of the elderly with diabetes mellitus.

**Table 6** Mean, standard deviation, and level of nutritional behaviors of the samples

for each item and overall.

| Nutritional behaviors | $\overline{X}$ | S.D. | Level of behavior |
|---|---|---|---|
| **Nutritional behaviors of each item** | | | |
| - avoiding drinking stimulants such as glucose containing refreshment. | 3.75 | 0.57 | good |
| - avoiding drinking alcohol. | 3.56 | 0.67 | good |
| - eating vegetables. | 3.55 | 0.58 | good |
| - avoiding eating entrails. | 3.45 | 0.58 | rather good |
| - avoiding drinking soft drinks. | 3.25 | 0.61 | rather good |
| - avoiding eating prepared food. | 3.20 | 0.59 | rather good |
| - cooking food with vegetable oil. | 3.18 | 0.56 | rather good |
| - avoiding cooking food with animal oil. | 3.09 | 0.99 | rather good |
| - avoiding eating bread or cake. | 3.06 | 0.69 | rather good |
| - avoiding eating sweet fruits. | 2.98 | 0.57 | rather good |
| - avoiding eating food with coconut cream. | 2.96 | 0.57 | rather good |
| - eating lean meat. | 2.93 | 0.65 | rather good |
| - avoiding eating high fat food such as rice with chicken. | 2.92 | 0.64 | rather good |
| - avoiding adding sugar in food. | 2.78 | 0.77 | rather good |
| - eating food of the same portions at every meal. | 2.76 | 0.73 | rather good |
| - avoiding drinking coffee or malt extracted beverages with sugar or sweetened condensed milk. | 2.48 | 0.89 | rather poor |
| - avoiding eating desserts. | 2.36 | 0.70 | rather poor |
| **The overall nutritional behaviors** | **3.11** | **0.32** | **rather good** |

Table 6 showed that the overall mean score of nutritional behaviors was at a rather good level. The means of the nutritional behaviors in each item were mostly at rather good level. Only 2 items were at rather poor level in the item of " avoiding eating desserts " and " avoiding drinking coffee, cocoa, malt extracted beverages with sugar or sweetened condensed milk.

**Part 4 The prediction of perceived benefits, perceived barriers, marital status, educational level, income, and duration of illness to nutritional behaviors of the elderly with diabetes mellitus.**

**Table 7** Matrix of correlation coefficient among the predictive variables and nutritional behaviors.

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. Marital status | 1.000 | | | | | | |
| 2. Educational level | .134 | 1.000 | | | | | |
| 3. Income | .095 | .242** | 1.000 | | | | |
| 4. Duration of illness | .032 | .121 | .001 | 1.000 | | | |
| 5. Perceived benefits | .172 | .350** | .075 | .196* | 1.000 | | |
| 6. Perceived barriers | -.201* | -.209* | .034 | -.307** | -.458** | 1.000 | |
| 7. Nutritional behaviors | .103 | .366** | -.017 | .221* | .535** | -.474** | 1.000 |

* $p < 0.05$, ** $p < 0.01$

Table 7 showed that educational level, perceived benefits, and duration of illness had positive relationship with nutritional behaviors ( $p < 0.01$, $p < 0.01$, and $p < 0.05$, respectively), but the perceived barriers had a negative relationship with nutritional behaviors ( $p < 0.01$).

**Table 8** Multiple correlation coefficients between predictors and nutritional behaviors of the samples by stepwise multiple regression analysis ·

| Steps | Variables | Mutiple R | $R^2$ | $R^2$ Change | F Overall | b | Beta | t |
|-------|-----------|-----------|-------|--------------|-----------|---|------|---|
| 1 | Perceived benefits | .535 | .286 | .286 | 47.223*** | .501 | .535 | 6.872*** |
| 2 | Perceived barriers | .593 | .352 | .066 | 31.781*** | -.266 | -.290 | -3.458*** |
| 3 | Educational level | .619 | .383 | .031 | 24.015*** | .058 | .189 | 2.418** |

Overall  constant (a)  =  2.599

\*\* $p < 0.01$ ,  \*\*\* $p < 0.001$

Table 8 showed that in the first step of the stepwise multiple regression, perceived benefits was selected to the equation which could be able to predict the nutritional behaviors of 28.6 % ($p < 0.001$).

In the second step, the perceived barriers was selected to the equation which increased the predictive power up to 35.2 % ($p < 0.001$).

In the third step, the educational level was selected to the equation which increased the predictive power up to 38.3 % ($p < 0.001$). After entering other predictors, it was found that the predictive coefficient differed insignificantly. The analysis was then terminated in the third step.

From the stepwise multiple regression analysis, it showed that the predictors which could be able to predict nutritional behaviors at a statistically significant level were perceived benefits, perceived barriers, and educational level. These predictors could jointly explain the variation of nutritional behaviors of 38.3% ($p < 0.001$).

# CHAPTER V

# DISCUSSION

This study was to determine perceived benefits, perceived barriers, personal factors (marital status, educational level, income, and duration of illness) as predictors of nutritional behaviors of the elderly with diabetes mellitus. The results will be discussed according to the objectives and hypothesis of the research.

**Objective 1 : To study perceived benefits, perceived barriers, and nutritional behaviors of the elderly with diabetes mellitus.**

**Nutritional behaviors of the elderly with diabetes mellitus**

The results showed that the mean score of the overall nutritional behaviors of the elderly with diabetes mellitus was at a rather good level ( $\overline{X}$ = 3.11, S.D. = 0.32 ). This can be explained because most of the subjects (75.0 %) were female who were judged by society to be housewives and they had to care of their family member 's health. This made them skillful and have experience in health care (Clarke, 1995 :29). Most of the subjects had diabetes mellitus for more than 1 year so they could adapt to the illness and arrange their nutritional behaviors to be appropriate to the treatment plan. In addition, 75.8% of the subjects lived with their families so they got help about preparing food. Also, they had tender love and attentive care from the members of their families to encourage them to perform suitable nutritional behaviors (Burean, 1996: 1-7). Most of the subjects were educated and were followed up at the diabetic clinic, where they received advice from doctors and nurses. Orem

(1985 : 120) stated that education was the way to understand information and learn about disease and treatment. Furthermore, most of subjects had adequate income, which enabled the patients to consume healthy food appropriate for diabetic patients.

When considering each item, it was found that the subjects had nutritional behaviors mostly at a rather good level. In addition, the results showed that the subjects had nutritional behaviors at a good level for the item of " avoiding drinking stimulants, alcohol, and eating vegetables " ( $\overline{X}$ = 3.75, S.D. = 0.57 ; $\overline{X}$ = 3.56, S.D. = 0.67 ; $\overline{X}$ = 3.55, S.D. = 0.58, respectively ). This may be because the subjects knew that drinking alcohol and stimulants is not good for their health, so they avoided drinking them. In addition, most subjects were females who did not like drinking alcohol and stimulants, because most of the elderly felt that drinking alcohol was not appropriate behavior for Thai women. The patients said that after being diagnosed with diabetes mellitus, they were able to stop drinking alcohol as advised by health care providers and other diabetic patients. Most subjects knew that eating vegetables can control blood glucose. About 59.2 % of subjects ate vegetables everyday (Table 11). Most elderly like eating fresh, boiled, and fried vegetables with sauce made from chili paste. Although they had a chewing problem, they could eat boiled or fried vegetables instead of fresh vegetables. This reason caused the subjects to have a good nutritional behaviors.

There were 2 items showing rather poor nutritional behaviors, which were the items of "eating desserts" ($\overline{X}$ =2.36, S.D. =0.70), and "drinking coffee, cocoa, or malt extracted beverages with sugar or sweetened condensed milk" ( $\overline{X}$ =2.48, S.D. =1.10 ). This may be because 15.0 % of the subjects still ate desserts everyday ( Table 11 ). Their reasons were that most of them knew eating desserts increased blood glucose

level, but they could not decrease eating desserts because they were addicted to sweet tastes. Also, they said eating sweet food made them feel fresher and have more energy. If they did not eat sweet food, they would feel exhausted. And 20.8 % of the subjects still drank coffee , cocoa , or malt extracted beverages with sugar or sweetened condensed milk everyday ( Table 11 ). The subjects knew drinking coffee or malt extracted beverages with sugar or sweetened condensed milk could increase the blood glucose level , but they still drank this beverage every morning for breakfast because their addiction coffee. If they did not drank this beverage, they would feel irritable. In the interviews, when they drank coffee or malt extracted beverages, they added a little sugar or sweetened condensed milk but added a lot of boiling water. They felt that it was not a sweet taste, so they still drank their beverage everyday.

**Perceived benefits in nutritional behaviors**

The results showed that the mean score of the overall perceived benefits in nutritional behaviors was at a rather high level ($\overline{X}$ = 3.47, S.D. = 0.34). This meant that the subjects had a rather good understanding, feelings and thoughts about correct nutritional behaviors which could control their blood glucose level and prevent the complications of diabetes mellitus. This may be because most subjects (75.0 %) were in the age group between 60 to 69 years old. People at these ages were usually healthy enough to work and they were able to do everything by themselves. They still had good thoughts and decisions, which made them choose behaviors that supported good nutritional behaviors. In addition, most subjects (54.2 %) had a duration of illness between 1 to 5 years, which was a long time that the subjects had experience in controlling food and they received the outcome from performing

correct nutritional behaviors. Most subjects (79.2 %) were educated, so this may be a reason why the subjects knew how to take care of themselves and they had a way to understand information and learn about the disease and treatment. In addition, 75.8 % of subjects lived with their families, so the patients had attentive care from the members of family to encourage them to perform suitable nutritional behaviors. Pender (1996: 69) said that the family provided the best support to patients to feel worthy and to encourage positive behaviors. Besides, all subjects in this study were followed up at the diabetic clinic. It is possible that they had more chance to receive the nutritional knowledge in order to control blood glucose level. The diabetic clinic at each hospital in this study has a policy of giving information and health education to patients and supporting patients in performing behaviors for good health care. Especially information is given that the correct nutritional behaviors is a factor that can control diabetes mellitus. When patients know what the benefits are from suitable nutritional behaviors, they can use this knowledge to practice in order to control blood glucose level. Nowadays, public mass media provides widely knowledge and information about self - health care ( Junchanakit, J., 1998: 71). The elderly have a better opportunity to learn and search for advice about proper nutritional behaviors. Pender (1996: 67) said that any person who perceived the benefits of health-promoting behavior would have good health behavior. According to the study of Kasekan, K. (1998: 78) it was found that perceived benefits of health-promoting behavior in the diabetic elderly influenced health-promoting behavior.

When considering each item, most subjects had perceived benefits at a rather high to high level. The study found that the subjects had perceived benefits at a high level in 7 items of " avoiding eating sweet fruit, avoiding eating fatty food, avoiding

drinking coffee or malt extracted beverages with sugar or sweetened condensed milk, avoiding drinking juice or soft drinks, eating less sweet tasting fruit, eating less starchy food, will decrease blood glucose level, and avoiding eating animal fat will decrease cholesterol ($\overline{X}$ = 3.93, S.D. = 0.31 ; $\overline{X}$ = 3.54, S.D. = 0.66 ; $\overline{X}$ = 3.71, S.D. = 0.67 ; $\overline{X}$ = 3.60 , S.D. = 0.71 ; $\overline{X}$ = 3.60 , S.D. = 0.59 ; $\overline{X}$ = 3.51 , S.D. = 0.62 ; $\overline{X}$ = 3.53, S.D. = 0.59 , respectively). This may be because the subjects had diabetes mellitus for a long time, so they could adapt and accept the disease. When they were in doubt, they could ask for consultation from the doctors and nurses. Most subjects knew that sweet fruit, fatty food, soft drinks, and beverages with sugar or sweetened condensed milk will increase blood glucose level, so they avoided eating these foods. In the interviews, the subjects said that in most cases they experienced the benefits themselves through advice from doctors and nurses.

Besides, it was found that the subjects had perceived benefits at a rather high level in 7 items of " eating vegetables, avoiding drinking stimulants, avoiding eating desserts during meal, avoiding drinking alcohol, eating food of the same portion, controlling body weight by controlling food, will decrease blood glucose level, and eating food on time will control blood glucose level" ($\overline{X}$ = 3.49, S.D. = 0.64 ; $\overline{X}$ = 3.43 , S.D. = 0.89 ; $\overline{X}$ = 3.39 , S.D. = 0.64 ; $\overline{X}$ = 3.24 , S.D. = 0.96 ; $\overline{X}$ = 3.23, S.D. = 0.93 ; $\overline{X}$ = 3.13, S.D. = 0.86 ; $\overline{X}$ = 3.27, S.D. = 0.71, respectively). This may be because the subjects did not understand enough about the benefits of eating good food appropriate for diabetic patients. In the interviews, the patients said that most of the time, the health staff would advise the patients on what and what not to eat but they did not actually explain about the benefits of food such as eating food on time, avoiding drinking stimulants and alcohol. Besides, 9.2 % of the subjects

disagreed that avoiding drinking alcohol could decrease blood glucose level (Table 9). It is possible that they had never drank alcohol because most subjects were female. This may be because the patients thought that drinking alcohol did not increase the blood glucose level. Most subjects may know that alcohol is not good for their health but do not know that avoiding alcohol can decrease the blood glucose level.

**Perceived barriers in nutritional behaviors**

The results showed that the mean score of the overall perceived barriers in nutritional behaviors was at a rather low level ( $\overline{X}$ = 2.48, S.D. = 0.54 ). This means that the subjects have less obstacles to perform nutritional behaviors, which is explained because the subjects have had diabetes mellitus for a long period so they were accustomed to the illness and have learned to take care of themselves. Human beings naturally take time to adapt themselves to anything. Time would help the patients to develop their knowledge, ability to care for themselves and accept all changing conditions better. They may have obtained knowledge from doctors, nurses or other kinds of mass media, where they could get the idea to compare between the advantages and disadvantages of nutritional behaviors. People would evaluate between benefits and barriers before making up their mind (Pender, 1987: 65) and they would avoid all barriers for making them healthy and protecting them from complications. In addition, most of subjects were the young elderly, so they were still strong and they were able to do everything by themselves. They still had good thoughts and decisions, which made them choose behaviors that supported good nutritional behaviors. Most subjects (75.8 %) lived with their families so they got help about cooking and the members of their families encouraged them to

perform suitable nutritional behaviors. Sixty five percent of the patients had adequate income, which enabled them to obtain appropriate means to take care of their health. All of these caused their mean scores of perceived barriers to be rather low.

When considering in each item, it was found that the subjects had perceived barriers at a rather high level in 6 items of " controlling food everyday is boring " ($\overline{X}$ = 3.12, S.D. = 0.56), " visual or movement problems make difficult to prepare food " ($\overline{X}$ = 3.04, S.D. = 0.63), " chewing and swallowing problems make difficult to eat food " ($\overline{X}$ = 2.87, S.D. = 0.70) , " eating food not on time and having an over eating habit " ($\overline{X}$ = 2.83, S.D. = 0.87), " liking sweet taste do cannot decrease sweet food consumption" ($\overline{X}$ = 2.63, S.D. = 0.71), and " do not understand health staff's suggestions " ($\overline{X}$ = 2.53, S.D. = 0.74). This may be because the subjects were elderly who had experienced many changes in the aging process. For example, the taste buds were changed especially the sweet taste bud that made the elderly like to eat mcre sweet food. When people are aging, their teeth may loosen which causes them to have difficulty in chewing and swallowing. The changing of vision and movement of the aging, meant it was not comfortable to prepare food themselves. In addition, diabetes mellitus is a chronic disease, so food needs to be controlled all time. This was the reason why some diabetic patients felt bored or uncomfortable when they had to control food. This agreed with Klinger (1984: 32-37) who said that discomfort of treatment , and a long - term practice extremely hindered the participation of patients in the treatment plan and would be a barrier to health useful behavior. In the interviews, some of the patients said that their children always prohibited them from eating some foods such as desserts, soft drinks, or high

fat food, which made them bored.

Besides, it was found that the subjects had perceived barriers at a rather low level in 6 items of " members of the family do not help in controlling food " ($\overline{X}$ = 2.42, S.D. = 0.71), " controlling food strictly do not control blood glucose level " ($\overline{X}$ = 2.40, S.D. = 0.60), " going out to a party do not control eating food " ($\overline{X}$ = 2.39, S.D. = 0.60), " cooking food by yourself is a waste of money " ($\overline{X}$ = 2.04, S.D. = 0.64), " cooking food without animal oil causes less consumption " ($\overline{X}$ = 1.78, S.D. = 0.62), " eating sweet and high fat food is a waste of time " ($\overline{X}$ = 1.76, S.D. = 0.57). This was the reason that most subjects lived with their family (75.8 %) and were helped to prepare food. Families can support the patients to encourage appropriate nutritional behaviors. The subjects lived with families, so cooking themselves could save more money than buying prepared food from the market. In addition, when the patients went to a party, they could avoid eating or drinking unhealthy food such as high fat and sweet food, because they knew that high fat or sweet food could increase the blood glucose level. This reason might be because the subjects received information about nutritional behaviors from health care providers.

**Objective 2 : The study of predictive power of the nutritional behaviors of the elderly with diabetes mellitus from the predictive variables which were ; perceived benefits, perceived barriers, marital status, educational level, income, and duration of illness.**

**Hypothesis : Perceived benefits, perceived barriers, marital status, educational level, income, and duration of illness can predict nutritional behaviors of the elderly with diabetes mellitus.**

The results of this study showed that perceived benefits, perceived barriers, and

educational level contributed significantly to the prediction of nutritional behaviors. Altogether, 38.3% of the variance in nutritional behaviors was explained by these variables. Marital status, income, and duration of illness did not contribute to the regression. So the results of the study partly supported the hypothesis and can be explained as follows :

**Perceived benefits.** This was the first factor that could predict the nutritional behaviors of the elderly with diabetes mellitus. It was found that the perceived benefits could predict the nutritional behaviors by 28.6 %. This meant the subjects with high perceived benefits would have good nutritional behaviors. On the contrary, those with low perceived benefits would have poor nutritional behaviors. It could be explained that the perceived benefits were the motivation to arouse or persuade the elderly with diabetes mellitus to be hopeful and have correct nutritional behaviors. The result of high perceived benefits would result in good nutritional behaviors for the elderly with diabetes mellitus. This is in accordance with Pender (1996: 67) who said that an individual's plan to engage in a particular behavior often hinges on the anticipated benefits or outcomes that will occur. Anticipated benefits of action are mental representations of the positive or reinforcing consequences of a behavior. This corresponds with the study of Tongpila, P. (1999: 84-85) which found that perceived benefits had a positive relationship with nutritional behaviors of the elderly with hypertension. In addition, it was congruent with the study of Junchanakit, J. (1998: 91) which found a positive relationship between perceived benefits and nutritional behaviors of the elderly with chronic obstructive pulmonary disease.

**Perceived barriers.** This was the second factor that could predict the nutritional

behaviors of the elderly with diabetes mellitus. From the study, it was found that perceived barriers could increase the prediction by 35.2 %. It inferred that the elderly with diabetes mellitus had a high level of perceived barriers and would have poor nutritional behaviors. On the contrary, those with a low level of perceived barriers would have good nutritional behaviors. Pender (1996: 69) noted that barriers are often viewed as the blocks, hurdles, and personal cost of undertaking a given behavior. Barriers usually arouse motives of avoidance in relation to a given behavior. When readiness to act is low and barriers are high, action is unlikely to occur. When readiness to act is high and barriers are low, the probability of action is much greater. The results of this study were congruent with the study of Tongpila, P. (1999: 86) which found that perceived barriers had a negative relationship with nutritional behaviors of the elderly with hypertension. Polly (1992: 46) who studied the relationship between diabetes specific health beliefs and adherence in the diabetic regimen and glycemic control in 102 elderly with NIDDM. It was found that perceived barriers to treatment had a negative correlation to adherence.

**Educational level.** This was the third factor that could predict the nutritional behaviors of the elderly with diabetes mellitus. From this study it was found that educational level could increase the prediction for 38.3 % . It was concluded that the patients with a high level of education would have good nutritional behaviors. On the contrary, those with a low level of education would have poor nutritional behaviors. It was congruent with Pender ( 1982: 161-163 ) who said that highly education persons will have a chance to get a good occupation and high income. They have a better chance to acquire useful methods for their health care, and can search for nutritional value in order to eat appropriate foods. This corresponds with the

study of Ratanaamornchai, D. (1992: 46) and Mahasitthiwat, Y. (1996: 108) which found that highly educated elderly people had nutritional behaviors which were better than people with lower education .

Marital status , income , and duration of illness , did not contribute to the prediction of nutritional behaviors of the elderly with diabetes mellitus. The explanation of the results was as follow :

**Marital status**.   Marital status was not related to the nutritional behaviors of the elderly with diabetes mellitus because most of the subjects ( 61.70 % ) were married. Thus, this variable was rather homogenous.  In addition, 95.8 % of the subjects lived with relatives, a spouse or family and received love, and caring from their family members. This enhanced them to have reinforcement to perform the proper nutritional behaviors in order to promote their health ( Burean, 1996: 1-7 ). Because of Thai tradition , the elderly must be admired as the leaders of the family, and the members of the family always gave them loving - kindness and treated them with acts of respect. When the aging were sick , they were well cared by everyone in the family. For this reason, the differences in marital status did not influence the nutritional behaviors of the elderly with diabetes mellitus. This was similar to Ratanaamornchai, D. (1992: 115) who found that the differences in marital status did not have an influence on nutritional behaviors of the elderly. It was because they were married and most of the elderly lived with a family who encouraged them to perform suitable nutritional behaviors.

**Income**. Income was unable to predict the nutritional behaviors of the elderly with diabetes mellitus. This was because most of the subjects ( 50.8% )

had an average income from 1,001 - 5,000 baht per month, and 54.55 % of the subjects received financial support from their families. It was concluded that the people who have high income will have a better opportunity to search for anything good for self care, and they also have access to better health centers, and can search for nutritional values in order to eat appropriate foods ( Pender, 1987: 163 ). Regarding the treatment fees, if the patient's spouses were pensioners or their offspring were government officers, they could be reimbursed for health care expenses . Besides, the government had set up a program of elderly health-welfare service. Although diabetes mellitus was a chronic disease, the patients were enabled to be cured as usual and made healthy. And most of them had enough money to pay (65.0%), which could allow for a sufficient, healthy and valuable diet. This was similar to Intaranukulkit, O. (1993: 76) who found that income was not related to the nutritional behaviors of the peptic ulcer patients.

**Duration of illness.** Duration of illness could not predict the nutritional behavior of the elderly with diabetes mellitus. This may be because in this study, the researcher studied the duration of illness, starting from one year when the elderly with diabetes mellitus had been diagnosed by the physicians. It is possible that the long time period helped the patients to adapt to the disease. In addition, the result in this study found that 56.7 % of the subjects had a duration of illness between 1 to 5 years. Thus, this variable was rather homogeneous. Diabetes mellitus was generally found to have a period of time for adapting to this disease and treatment plan of about 4 months after being diagnosed ( MacRae – Holmes, 1986: 196 ). In this study it was found that the subjects have been ill for a long time, and had already passed the crisis period of self–adaptation. These factors allowed

them to receive suggestions about how to behave themselves and they had a long time to learn to improve their health behavior. This corresponds with the study of Kasekan, K. (1998: 65) who found that the duration of illness did not have an influence on nutritional behaviors of the diabetic elderly, because they had a long time of illness, and tried to adapt to a correct lifestyle in order to prevent complications and the harm which may occur. Therefore, duration of illness could not be used to predict nutritional behaviors.
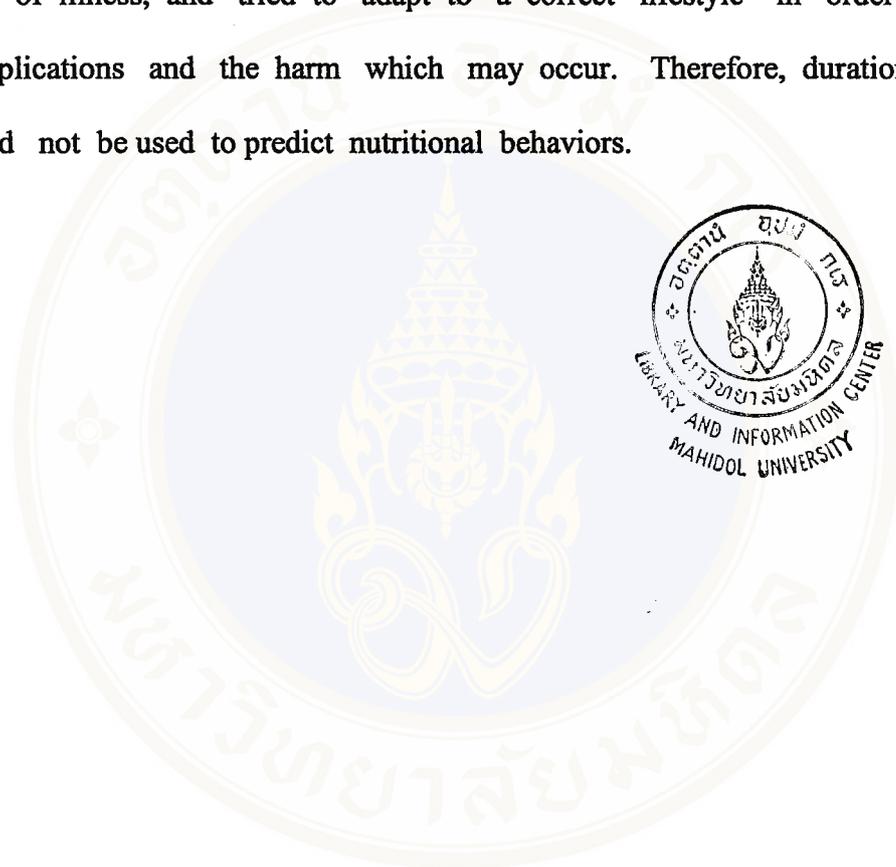
# CHAPTER VI

# CONCLUSION

## Summary of the study

This descriptive research aimed to study the perceived benefits, perceived barriers and nutritional behaviors of the elderly with diabetes mellitus.

The study was carried out on 120 patients aged 60 years and over who had been diagnosed diabetic and came to follow up at the diabetic clinic in the out patient department of Bangphae Hospital, Watpleang Hospital, Photharam Hospital, and Chombung Crown Prince Hospital in Ratchaburi Province.

The instruments used in this study were the questionnaire of personal data form, and the questionnaire of perceived benefits, perceived barriers, and nutritional behaviors of the elderly with diabetes mellitus. The data were analyzed by using frequency, percentage, mean, standard deviation, Pearson 's product moment correlation coefficient, and stepwise multiple regression analysis were employed in this study.

## Results

1. It was found that 75.0 percent of the elderly with diabetes mellitus were females; 75.0 percent were aged between 60-69 years old; 72.5 percent were married 54.2 percent had primary school education ; 50.8 percent had income between 1,001-5,000 baht per month ; 65.0 percent had adequate income ; 70.0 percent had income from their offspring 75.8 percent lived with their families ; 62.5 percent had food prepared by members of their family; 62.5 percent had food 3 times a day ;

54.2 percent had a duration of illness of between 1 - 5 years, and 46.7 percent had a blood glucose level of between 60-120 mg %.

2. The nutritional behaviors of the subjects was at a rather good level ( $\bar{\bar{X}}$= 3.11, S.D. = 0.32 ) ; perceived benefits in nutritional behaviors was at a rather high level ($\bar{X}$= 3.47, S.D. = 0.34) ; perceived barriers in nutritional behaviors was at a rather low level ($\bar{X}$= 2.48, S.D. = 0.34).

3. The perceived benefits, perceived barriers, and educational level explained 38.3 % of the variance in nutritional behaviors of the elderly with diabetes mellitus at a statistically significant level of 0.001.

## Implications and Recommendations

### Implication and Application of Research Findings

The results of the study found that nutritional behaviors of the elderly with diabetes mellitus was at a rather good level. Hence, the patients should be encouraged to increase the behavior to be at good level. There were 2 behaviors with a rather poor level ; eating desserts and drinking coffee, cocoa, and malt extracted beverages with sugar or sweetened condensed milk. The researcher would like to make the following suggestions to encourage better nutritional behaviors as follows :

1. Nurses should be more interested in the non formally educated persons, because this factor has an influence on the nutritional behaviors of the elderly with diabetes mellitus. Nurses who care for them should give advice, knowledge and information concerning encouragement for their correct nutritional behaviors.

2. Patients should be told or educated exactly how they should care for themselves as well as the benefits for so behaving . This includes eating vegetables, less sweet fruits instead of more sweet fruits and desserts, because they contain fiber

which reduces the cholesterol and blood glucose level. In addition, they should eat desserts and drink coffee, cocoa, or malt extracted beverages with artificial sweetener instead of sugar or sweetened condensed milk, because it can control the blood glucose level. During the interviews, the patients said that most of the time the health professionals would advise them on what and what not to eat but they did not actually explain the benefits of food. Thus, nurses should emphasize the benefits of correct nutritional behaviors to the diabetic elderly. Furthermore, nurses can provide information about the kind of food which is suitable for the diabetic elderly such as low fat, low sweet, and high fiber food. There should be a special emphasis about avoiding alcohol with high glucose content such as beer or sweet wine; and avoiding stimulants such as glucose containing refreshment. Besides, nurses should encourage the patients to understand the benefits of eating good food which is appropriate for diabetic patients. Therefore, nurses should coordinate with the diabetic elderly for group support of a nutritional program. This program can help the diabetic elderly exchange experiences, nutritional knowledge, methods of controlling food, and especially they can find ways to help or solve the barriers or problems in nutritional behaviors among patients and health professionals.

**Implication for Further Studies**

1. A quasi study to test the intervention based on perceived benefits and perceived barriers should be studied. This may include the additions of modeling, performance accomplishment, and group helping in the nutritional program.

2. In this study the research did not study in depth about the perceived benefits and barriers in nutritional behaviors of the elderly with diabetes mellitus. In fact,

when a person is aging, they have many problems with lifestyles. It is recommended that a qualitative research should be conducted to get in depth information about benefits and barriers in nutritional behaviors, in order to use the results to construct the instruments of nursing intervention about perceived benefits and barriers in nutritional behaviors.

3. This study was specific to the elderly with diabetes mellitus who followed up at a diabetic clinic. Further study may investigate other diabetic patients who attend at the general out patient departments.

4. This study was specific to the elderly with diabetes mellitus who had a duration of illness starting from one year. Further study may investigate the patients who have a duration of illness of less than one year.

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    พยาบาลศาสตร์ บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล.

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# APPENDIX

# APPENDIX  A

## List of experts

The name of qualified persons who examined the validity of the perceived benefits, perceived barriers in nutritional behaviors questionnaire and the nutritional behaviors questionnaire for the elderly with diabetes mellitus.

1. Assistant Professor Preyanuj Yamwong

    Department of Preventive and Social Medicine

    Faculty of Medicine Siriraj Hospital, Mahidol University

2. Associate Professor Pranee Toupairoa

    Department of Medical Nursing

    Faculty of Nursing, Mahidol University

3. Associate Professor Vilaiwan Tongcharean

    Department of Fundamental Nursing

    Faculty of Nursing, Mahidol University

4. Assistant Professor Luksana Inglub

    Department of Fundamental Nursing

    Faculty of Nursing, Mahidol University

5. Assistant Professor Yajai Sitthimongkol

    Department of Mental Health and Psychiatric Nursing

    Faculty of Nursing, Mahidol University

# APPENDIX B

**- Consent Form**

**- The Questionnaires**
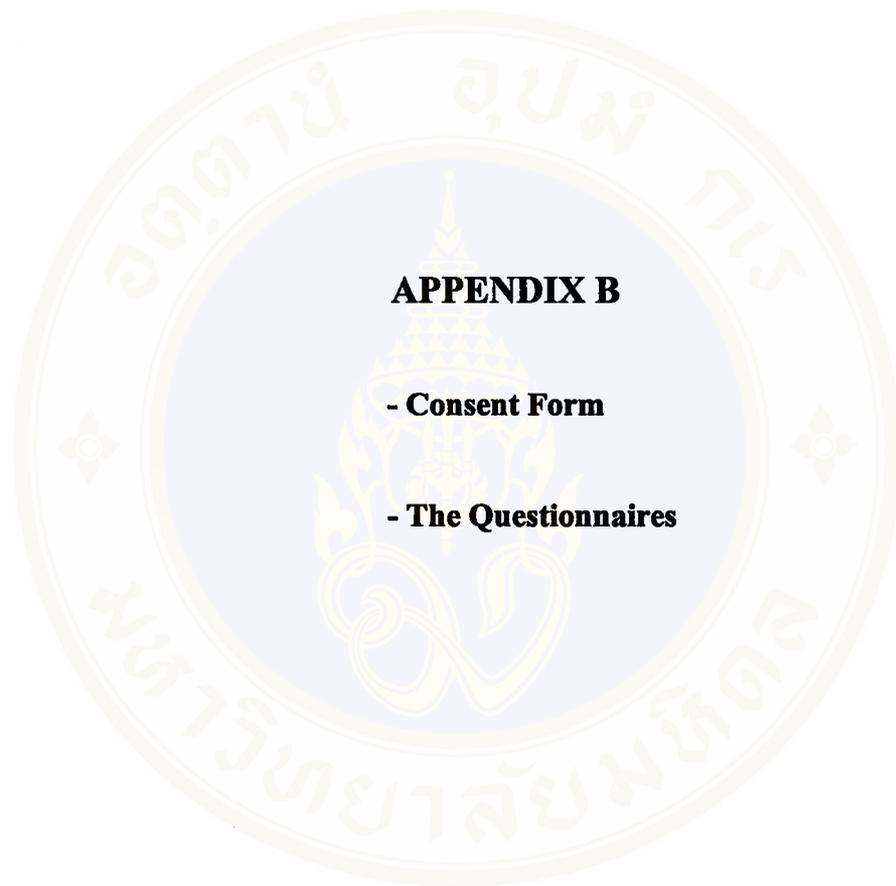
## Consent  Form

My name is Sukhumal Sanpaung. I am student in a master degree program  at  the Faculty of Graduate Studies, Mahidol University. I am studying about perceived benefits, perceived barriers, and nutritional behaviors of the elderly with diabetes mellitus. The objectives of the study are to set the guideline for helping and nursing the elderly with diabetes mellitus ; and to encourage them to have the correct nutritional behaviors.

If you agree to participate with this study, I would like you to answer the questionnaire about the personal information, the nutritional behaviors, the perceived barriers and perceived benefits in nutrition behaviors for just only within 40 - 45 minutes. All the information are confidential, without disclosure name to the other. All the data will be analyzed totally for the interest of the development in nursing.

In case of you have any suspicion for taking part in the study, I am willing to give you the answer all the time, and you have the right to refuse to take part in this study with out any impact with you. And there is no condition if you want to withdraw after taking part in the study. The success of this study depends on your cooperation and sacrificing time ; and I would like to express my gratitude to you too.

Sukhumal  Sanpaung

No.............................

Hospital..................

# Questionnaire

### Personal data of the elderly with diabetes mellitus

**Explanation:** The interviewer marks ✓ in the ( ) or fill the blank according to the answer of the interviewees.

1. Sex

   ( ) Male          ( ) Female

2. Age..................years

3. Marital status

   ( ) Married        ( ) Single        ( ) Widowed, Divorced, Separated

4. Educational level

   ( ) Not attending school        ( ) Primary school

   ( ) Secondary school            ( ) Certificate/ Diploma

   ( ) Bachelor degree             ( ) Others, please specify..................

5. Income per month.....................Baht.

6. Adequacy of income

   ( ) Adequate                    ( ) Inadequate
   ...

   ...

   ...

   ...
12. Blood glucose level........................ mg %

# Questionnaire

**Perceived benefits and perceived barriers in nutritional behaviors of the elderly with diabetes mellitus.**

**Explanation:** The interviewer marks ✓ in the right block according to the answer of the interviewees. In each answer means:

Strongly agree       means   the statement which corresponds to your feeling and thinking wholly.

Mostly agree       means   the statement which corresponds to your feeling and thinking considerably.

Slightly agree       means   the statement which corresponds to your feeling and thinking slightly.

Disagree       means   the statement which does not corresponds to your feeling and thinking.

**For example**

| Statements | Strongly agree | Mostly agree | Slightly agree | Disagree |
|---|---|---|---|---|
| 1. Eating food on time will control blood glucose level. | | | | ✓ |

The example shows that you do not agree with eating food on time can control blood glucose level.

**The questionnaire of perceived benefits in nutritional behaviors.**

| Perceived benefits | Strongly agree | Mostly agree | Slightly agree | Disagree |
|---|---|---|---|---|
| 1. Eating food on time will control blood glucose level. | | | | |
| 2. Eating less starchy foods such as rice, noodles, taro will decrease blood glucose level. | | | | |
| ... | | | | |
| ... | | | | |
| ... | | | | |
| ... | | | | |
| ... | | | | |
| ... | | | | |
| ... | | | | |
| ... | | | | |
| ... | | | | |
| ... | | | | |
| 14. Cooking food with animal oil, palm oil, or coconut oil will increase the level of cholesterol. | | | | |

**The questionnaire of perceived barriers in nutritional behaviors.**

| Perceived barriers | Strongly agree | Mostly agree | Slightly agree | Disagree |
|---|---|---|---|---|
| 1. Controlling food everyday is boring. | | | | |
| 2. Eating sweet and high fat food wastes time in cooking. | | | | |
| … | | | | |
| … | | | | |
| … | | | | |
| … | | | | |
| … | | | | |
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| … | | | | |
| … | | | | |
| … | | | | |
| … | | | | |
| … | | | | |
| 12. Going out to a party make yours unable to controlling food. | | | | |

# Questionnaire

**Nutritional behaviors of the elderly with diabetes mellitus.**

**Explanation** : The interviewer marks ✓ in the right block according to the answer of the interviewees. In each answer means:

Regularly practice      means  you performs the relevant nutritional behaviors

everyday.

Often practice      means  you performs the relevant nutritional behaviors at 4 - 6

days in a week.

Sometimes practice   means  you performs the relevant nutritional behaviors at 1 - 3

days in a week.

Never practice      means  you never performs the relevant nutritional behaviors.

**For example**

| Statement | Regularly practice | Often practice | Sometime practice | Never practice |
|-----------|-----------|-----------|-----------|-----------|
| 1. You eat high fat food such as fatty rice with chicken. | | | | ✓ |

The example shows that you never eat high fat food such as fatty rice with chicken.

| Nutritional behaviors | Regularly practice | Often practice | Sometimes practice | Never practice |
|---|---|---|---|---|
| 1. You eat high fat food such as fatty rice with chicken. | | | | |
| 2. You eat food with coconut cream such as curry. | | | | |
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| 17. You buy prepared food to eat instead of cooking with yourself. | | | | |

# APPENDIX C

## Result

**Table 9** Percentage of perceived benefits of the samples ( n = 120 ).

| Perceived benefits | Strongly agree | Mostly agree | Slightly agree | Disagree |
|---|---|---|---|---|
| - avoiding eating sweet fruit will decrease blood glucose level. | 95.0 | 3.3 | 1.7 | - |
| - avoiding drinking coffee with sugar will decrease blood glucose level. | 80.0 | 13.3 | 4.2 | 2.5 |
| - avoiding drinking soft drinks will decrease blood glucose level. | 70.0 | 23.3 | 3.3 | 3.4 |
| - eating less sweet tasting fruit will decrease blood glucose level. | 65.0 | 30.0 | 5.0 | - |
| - avoiding drinking stimulants will decrease blood glucose level. | 65.0 | 16.7 | 14.2 | 4.2 |
| - avoiding eating fatty food such as coconut cream will decrease blood glucose level. | 61.7 | 32.5 | 4.2 | 1.7 |
| - avoiding eating animal oil will decrease cholesterol. | 58.3 | 36.7 | 5.0 | - |
| - eating less starchy food will decrease blood glucose level. | 57.5 | 35.8 | 6.7 | - |
| - eating vegetables will decrease blood glucose level. | 55.8 | 38.3 | 5.0 | 0.8 |
| - avoiding drinking alcohol will decrease blood glucose level. | 51.7 | 30.0 | 9.2 | 9.1 |
| - eating food of the same portions will decrease blood glucose level. | 48.3 | 34.2 | 9.2 | 8.3 |
| - avoiding eating desserts will decrease blood glucose level. | 47.0 | 46.3 | 5.8 | 0.8 |
| - controlling body weight by controlling food will decrease blood glucose level. | 41.7 | 32.5 | 23.3 | 2.5 |
| - eating food on time will control blood glucose level. | 40.0 | 48.3 | 10.0 | 1.7 |

**Table 10** Percentage of perceived barriers of the samples ( n = 120 ).

| Perceived barriers | Strongly agree | Mostly agree | Slightly agree | Disagree |
|---|---|---|---|---|
| - controlling food everyday is boring. | 37.5 | 41.7 | 16.6 | 4.2 |
| - visual or movement problems make you difficult to prepare food. | 35.0 | 50.0 | 10.8 | 4.2 |
| - chewing and swallowing problems make you difficult to eat vegetables. | 31.7 | 37.5 | 23.3 | 7.5 |
| - eating food not on time and having an over eating habit. | 29.2 | 37.5 | 20.8 | 12.5 |
| - liking sweet taste do cannot decrease sweet food consumption | 24.0 | 39.5 | 22.0 | 14.5 |
| - not understanding health staff's suggestions. | 19.1 | 41.7 | 22.5 | 16.7 |
| - members of the family do not help in controlling food. | 9.2 | 43.3 | 39.2 | 8.3 |
| - controlling food strictly does not control blood glucose level. | 8.3 | 35.0 | 46.7 | 10.0 |
| - going out to a party does not control blood glucose level. | 15.0 | 23.3 | 49.2 | 12.5 |
| - cooking food by yourself is a waste of money. | 7.5 | 20.8 | 40.0 | 31.7 |
| - cooking food without animal oil causes less food consumption. | 2.5 | 15.0 | 40.0 | 42.5 |
| - eating sweet and high fat food wastes time in cooking. | 4.2 | 10.8 | 44.2 | 40.8 |

**Table 11** Percentage of nutritional behaviors of the samples ( n = 120 ).

| Nutritional behaviors | Regularly practice | Often practice | Sometimes practice | Never practice |
|---|---|---|---|---|
| - drinking stimulants such as glucose containing refreshment. | 1.7 | 1.7 | 16.7 | 80.0 |
| - drinking alcohol. | 2.5 | 0.5 | 31.7 | 63.3 |
| - eating vegetables. | 59.2 | 36.7 | 4.2 | - |
| - eating entrails. | - | 4.2 | 46.7 | 49.2 |
| - drinking soft drinks. | 0.8 | 6.7 | 59.2 | 33.3 |
| - eating prepared foods. | 0.8 | 6.7 | 66.7 | 25.8 |
| - cooking food with vegetable oil. | 50.0 | 25.8 | 12.5 | 11.7 |
| - cooking food with animal oil. | 1.3 | 10.4 | 55.8 | 32.5 |
| - eating bread or cake. | 4.2 | 8.3 | 65.0 | 22.5 |
| - eating sweet fruits. | 2.5 | 10.0 | 75.0 | 12.5 |
| - eating food with coconut cream. | 0.8 | 15.8 | 70.0 | 13.3 |
| - eating lean meat. | 14.2 | 67.5 | 15.0 | 3.3 |
| - eating high fat food such as fatty rice with chicken. | 1.7 | 20.0 | 63.3 | 15.0 |
| - adding sugar in food. | 6.7 | 23.3 | 55.8 | 14.2 |
| - eating food of the same portions. | 17.5 | 40.8 | 41.7 | - |
| - drinking coffee with sugar. | 20.8 | 28.3 | 33.3 | 17.5 |
| - eating desserts. | 15.0 | 59.2 | 22.5 | 3.3 |

# BIOGRAPHY

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