

**THE RELATIONSHIP OF ILLNESS REPRESENTATIONS AND
BELIEFS ABOUT MEDICATIONS TO ADHERENCE TO ORAL
HYPOGLYCEMIC MEDICATIONS IN PERSONS
WITH TYPE 2 DIABETES**



**A THESIS SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR
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ABSTRACT

The purpose of this descriptive, cross-sectional research was to examine the relationship between selected factors from Leventhal and colleagues' Self-Regulatory Model and adherence to oral hypoglycemic medications among persons with type 2 diabetes. A sample of 85 persons with type 2 diabetes who sought treatment at the Endocrinology Department (Diabetic Clinic) and Internal Medicine Department of King Chulalongkorn Memorial Hospital was recruited using random sampling. Data were collected from June to October of 2007. Instruments to collect data were the Demographic Data Questionnaire, the Brief Illness Perception Questionnaire, the Belief about Medicines Questionnaire, and the Medication Adherence Report Scale. Data were analyzed using descriptive statistics and Spearman's rho correlation coefficients.

Analyses revealed that the mean age of the sample was 61.25 years. The majority were female (62.4%) with the average durations of having diabetes at 8.99 years and of taking oral hypoglycemic medications at 8.76 years. Almost 13% of the sample was used to stopping taking hypoglycemic medications. The studied variables, which were significantly correlated with adherence to hypoglycemic medications, were identity ($r = -.32, p = .03$), consequence ($r = -.36, p = .03$), concerns about illness ($r = -.4, p = .01$), necessity of medications ($r = .26, p = .05$), and concern about medications ($r = -.43, p = .01$). The variables which were not significantly correlated with adherence to hypoglycemic medications were timeline, personal control, treatment control, and emotional response.

This study provides information for health care personnel to recognize the problems of medication use and to understand clients' perceptions towards their illness and treatments. Results at this study will help the personnel find appropriate approaches to promote medication adherence among persons with type 2 diabetes, thereby reducing diabetic complications.

KEY WORDS: ILLNESS REPRESENTATIONS/ BELIEFS ABOUT
MEDICATIONS/ MEDICATION ADHERENCE/ ORAL
HYPOGLYCEMIC MEDICATIONS/ PERSONS WITH TYPE 2
DIABETES

137 pages

ความสัมพันธ์ระหว่างการรับรู้ต่อความเจ็บป่วยและความเชื่อเกี่ยวกับยากับความสม่ำเสมอในการ
รับประทานยาตามระดับน้ำตาลของผู้ที่เป็นเบาหวานชนิดที่ 2

THE RELATIONSHIP OF ILLNESS REPRESENTATIONS AND BELIEFS ABOUT MEDICATIONS TO ADHERENCE TO ORAL HYPOGLYCEMIC MEDICATIONS IN PERSONS WITH TYPE 2 DIABETES

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บทคัดย่อ

การศึกษานี้เป็นการวิจัยภาคตัดขวาง เพื่อศึกษาความสัมพันธ์ของปัจจัยคัดสรรตามกรอบแนวคิดการกำกับตนเองของเลเวนฮอลและคณะ กับความสม่ำเสมอในการรับประทานยาตามระดับน้ำตาลของผู้ที่เป็นเบาหวานชนิดที่ 2 กลุ่มตัวอย่าง คือผู้ที่เป็นเบาหวานชนิดที่ 2 จำนวน 85 ราย ที่มาตรวจตามนัดที่คลินิกต่อมไร้ท่อ และคลินิกอายุรกรรม ของโรงพยาบาลจุฬาลงกรณ์ สภากาชาดไทย ซึ่งเลือกโดยการสุ่มตามเกณฑ์ที่กำหนด การเก็บข้อมูลโดยใช้แบบสอบถาม ระหว่างเดือน มิถุนายน ถึงตุลาคม พ.ศ. 2550 เครื่องมือที่ใช้ในการวิจัย ได้แก่ แบบสอบถามข้อมูลส่วนบุคคล แบบสอบถามวัดความเชื่อเกี่ยวกับความเจ็บป่วยอย่างย่อ แบบสอบถามวัดความเชื่อเกี่ยวกับยาตามระดับน้ำตาล แบบสอบถามวัดความสม่ำเสมอในการรับประทานยา วิเคราะห์ข้อมูลโดยใช้สถิติเชิงบรรยายและสถิติสัมพันธ์สหสัมพันธ์ของสปีียร์แมน

ผลการศึกษาพบว่า กลุ่มตัวอย่างมีอายุเฉลี่ย 61.25 ปี ส่วนใหญ่เป็นเพศหญิงร้อยละ 62.4 มีระยะเวลาเป็นเบาหวานเฉลี่ย 8.99 ปี รับประทานยาตามระดับน้ำตาลเฉลี่ย 8.76 ปี เคยหยุดใช้ยารักษาเบาหวาน ร้อยละ 12.94 ตัวแปรที่มีความสัมพันธ์กับความสม่ำเสมอในการรับประทานยาตามระดับน้ำตาลอย่างมีนัยสำคัญทางสถิติได้แก่ การรับรู้อาการ ($r = -.32, p = .03$) การรับรู้ผลที่ตามมาจากการเจ็บป่วย ($r = -.36, p = .03$) ความกังวลเกี่ยวกับความเจ็บป่วย ($r = -.40, p = .01$) การรับรู้ความจำเป็นเกี่ยวกับยา ($r = .26, p = .05$) ความกังวลเกี่ยวกับยา ($r = -.43, p = .01$) ตัวแปรที่ไม่มีความสัมพันธ์อย่างมีนัยสำคัญทางสถิติ ได้แก่ การรับรู้ช่วงเวลาความเจ็บป่วย การรับรู้ความสามารถในการควบคุมตนเอง การรับรู้ประสิทธิภาพในการรักษา และการตอบสนองทางอารมณ์

ผลการศึกษาช่วยให้บุคลากรทางการแพทย์ที่เกี่ยวข้องได้ตระหนักถึงปัญหา มีความเข้าใจกระบวนการรับรู้ต่อความเจ็บป่วยและการรักษาของแต่ละบุคคลในการตัดสินใจกระทำพฤติกรรม ที่จะนำไปสู่แนวทางการให้ข้อมูล การให้คำปรึกษาแก่ผู้ที่เป็นเบาหวานชนิดที่ 2 ที่รับประทานยาตามระดับน้ำตาล เพื่อลดภาวะแทรกซ้อนที่จะเกิดขึ้น

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CHAPTER I

INTRODUCTION

Background and Rationale

Diabetes Mellitus (DM) is an incurable chronic illness and a major global public health problem, affecting millions of new persons with diabetes every year. A study of worldwide diabetes cases in all age groups estimated the global prevalence at 2.8% in 2000 and 4.4% in 2030. The total number of persons with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030 (Wild, Roglic, Green, Sicree & King, 2004).

The situation of the aging population in Thailand is similar to the global trend. According to the Ministry of Public Health, the proportions of outpatients in endocrine, nutrition and metabolic clinics who received treatments from public health facilities in Thailand excluding Bangkok between 2002 and 2004 were 93.89, 106.19 and 112.65 per thousand respectively. A large percentage of persons in this group suffer from diabetes (Office of the Permanent Strategy for Ministry of Public Health, B.E.2547).

The proportions of persons with diabetes who were admitted into public health facilities, due to diabetes, between 2002 and 2004 were 218.24, 380.75 and 444.16 per thousand respectively (Office of the Permanent Strategy for Ministry of Public Health, B.E.2547). Based on the year 2000 Thai population census, the estimated number of Thai adults aged 35 or older with diabetes were 2.4 million people (or a prevalence of 9.6%) (Aekplakorn et al., 2003). Although the total number of people living with diabetes in Thailand cannot be inferred from these statistics, it is clear that the number of people with diabetes is rising.

The World Health Organization (WHO) and the International Diabetes Federation (2004) stated that “Diabetes is a major public health threat that is spreading throughout the globe” and underlined four indexes indicating the increasing threats of diabetes. These are:

- 1) Every year, 3.2 million people world wide die from diabetes;
- 2) One-twentieth deaths is attributable to diabetes. That is 8,700 deaths every day or six deaths every minute;
- 3) One-tenth deaths among adults between 35 and 64 years old is attributable to diabetes; and
- 4) Three-quarters of the deaths among people with diabetes aged under 35 years old are due to their diabetic conditions.

Diabetes-related complications are also major causes of morbidity and mortality. Uncontrolled diabetes can lead to long-term complications, which can be classified as microvascular damages (retinopathy, nephropathy, and neuropathy) or macrovascular damages (peripheral vascular disease, cardiovascular disease) (Funnell & Kruger, 2004).

However, diabetes can be controlled with self-care following a doctor-prescribed treatment plan. Persons with diabetes who adhere to the health practices of nutrition control, exercise, proper medication and right treatment can control their plasma glucose levels within optimal ranges and prevent the occurrences of diabetes-related complications (Vittaya Sridama, B.E. 2541). Such measures should be integrated into daily routines and continuously practiced so that they can live a normal healthy life.

According to a WHO estimate, on average only 50% of persons with chronic disease in developed countries receive continuous treatments. The rates are thought to be much lower in developing countries, as persons with chronic diseases such as asthma, hypertension, diabetes and HIV/AIDS were unable to adhere to medical recommendations (WHO, 2003). In Thailand, a study has shown that only 3% of persons with diabetes were capable of controlling their disease and preventing complications (Chuprapawan, 2000 as cited in Keeratiyutawong, Thampanichawat, Melkus, Khuwatasamrit, & Youngpradith, 2003).

The treatment approach for persons with type 2 diabetes begins with life style change such as dietary control, exercise, etc. Medication is also necessity for most of them because of its relative ease comparing to lifestyle change. However, a systematic review of adherence to oral hypoglycemic medications among these persons between 1966 and 2003 found that for those in the first 6-24 months of treatments the medication adherence rates varied between 36-93% (Cramer, 2004). This result

confirmed the fact that most persons with diabetes are unable to follow prescribed medication regimens.

In Thailand, many studies also point to the problem of medication nonadherence. According to a study by Yuree Chuensomchit (B.E. 2528) on oral hypoglycemic medications of persons with diabetes at the Diabetic Clinic of King Chulalongkorn Memorial Hospital, 4-6% of them were unable to adhere to prescribed drug regimens. Somsak Wara-asawapati's study (B.E. 2535) found that 46.8% of persons with type 2 diabetes forgot to take their medications at times; 11.1% adjusted the dosage by themselves, and 37.4% had herbal medication along with oral hypoglycemic medications. It was also found that the longer they have had diabetes, the less likely they would adhere to the prescribed medications.

This result agrees with a study by Tassanee Sornjaem (B.E. 2546) at the outpatient Diabetic Clinic of Nakornpathom Hospital, which found that 193 of 238 participants (81.1%) failed to adhere to their medications. The six most common ways in which nonadherence occurred were self-adjustment of dosage; wrong dosing time; wrong dosing frequency; dropping medication altogether; using medications other than prescribed; and purchasing medications without prescriptions. Similarly, a study by Suwannee Charoenpichitnanta (B.E. 2532) in persons with diabetes about medication nonadherence at Lerdsin Hospital found that 75.7% of the sample (305 participants) failed to adhere prescribed medications regimen.

The problem of nonadherence to oral hypoglycemic medications also affects hypoglycemic control. Several studies demonstrated the association between medication adherence and glycosylated hemoglobin (A1C, also known as HbA_{1c}) levels (Krapek et al., 2004; Pladevali et al., 2004; Schectman, Nadkarni, & Voss, 2002). Krapek and colleagues (2004) found that a high score of medication adherence is correlated with a low level of A1C in persons with type 2 diabetes, which reflects effective control of diabetes. Similarly, Pladevali and colleagues (2004) found a correlation between medication nonadherence and deterioration of metabolic profiles and clinical symptoms in 677 randomly selected participants, aged 18 years or older, who were diagnosed with diabetes, hypertension, and hypercholesterolemia, and have been prescribed oral hypoglycemic medications, antihypertensive, or lipid-lowering medications between 1999 and 2001.

Such studies point out the significant problems of medication nonadherence among persons with type 2 diabetes. Improved medication adherence should close the gap between potential medication benefits and the benefits that patients actually receive (Rubin, 2005).

A review of studies conducted in Thailand on medication adherence found two studies, which examined nonadherence to hypoglycemic medications and solutions. However, both of them focused only on bio-social factors. Suwannee Charoenpichitnanta (B.E. 2532) found that factors related to medication nonadherence were longer illness duration, more daily medication frequency and longer waiting time prior to receiving medication. Similarly, Tassanee Sornjaem (B.E. 2546) identified factors which are correlated with medication adherence such as marital status, daily medication frequency, etc. However, previous studies failed to sufficiently explain other psychosocial factors for adherence to oral hypoglycemic medications.

After reviewing studies on medication adherence among patients with chronic diseases based on the Health Belief Model and the Health Promotion Framework, it was found that the factors in this framework did not provide a sufficient or clear explanation of certain nonadherence behaviors such as self-adjustment of dosage resulting from side effects. Some factors were also found with low degrees of association with medication adherence. For example, in a study in persons with tuberculosis applying some factors from Health Belief Model, Wongyou (2005) found that only knowledge about side effects and management of side effects are correlated with adherence to anti tuberculosis medications ($r = .2, p < .05$).

According to a review of previous studies on medication behaviors in Thailand, medication adherence is affected by illness perception, belief and personal attitude. A qualitative study by Wanapa Sritanyarat (B.E. 2540) found that in the beginning period after diagnosis, persons with diabetes are willing to try any recommended treatments. Consequently, many admitted to receiving varieties of discontinuous treatments. This result is in line with Leventhal's Self-Regulatory Model, which states that illness representation consists of belief about illness derived from personal experiences with illness, information from the health care system, and cultural sources (Schiaffino, Shawaryn, & Blum, 1998). Also included are the emotional representation of illness and beliefs about medications – which do not appear in the Health Belief

Model and Health Promotion Model. Therefore the Self-Regulatory Model will be helpful to select factors for explaining the relationship between illness representations and medication adherence behavior.

Medication nonadherence is a major health care problem which requires cooperation between the patients and the health care personnel such as doctors, nurses and pharmacists. The study of factors such as illness perception, beliefs about medications and medication adherence enables us to understand personal attitude toward medication adherence behaviors, leading to the improvement of treatment. It will help persons with diabetes to control their plasma glucose levels and achieve a normal healthy life, according to WHO's slogan "Healthy life with diabetes" (Hoover, 1992).

Research Questions:

Are the dimensions of the Self-Regulatory Model dimensions (cognitive representation of illness, emotional representation of illness) and beliefs about medications correlated with adherence to oral hypoglycemic medications in persons with type 2 diabetes?

Study Purpose

The purposes of this study were as follows:

1. To examine the relationships between selected factors and the adherence to oral hypoglycemic medications among persons with type 2 diabetes according to the Self-Regulatory Model (Leventhal, Brissette, & Leventhal, 2003), which consisted of:

- 1.1 The relationship between the "cognitive representations of illness" variables (i.e. identity, consequence, illness timeline, personal control, and treatment control) and the adherence to oral hypoglycemic medications in persons with type 2 diabetes;

- 1.2 The relationships between the "emotional representation of illness" variables (i.e. emotional response, concern about illness) and the adherence to oral hypoglycemic medications in persons with type 2 diabetes;

1.3 The relationships between the “beliefs about medications” factors (i.e. necessity of medications and concern about medications) and the adherence to oral hypoglycemic medications in persons with type 2 diabetes; and

2. To explore the perception toward ‘cause’ of diabetes in persons with type 2 diabetes.

Conceptual Framework

In this study, the researcher used the Self-Regulatory Model developed by Leventhal, Meyer, and Nerenz (1980) and Horne’s (1999) work on medication adherence using the Self-Regulatory Model (1999) as the conceptual framework. This model aims to explain the problem-solving process of people when facing health threats. This model proposes that illness representations happen when a person is threatened from health suffering. Thus, they will use own perceptions and interpretations of experiences to regulate their responses. Illness representation consists of a parallel pair: cognitive representation and emotional representation. Health threats generate both a cognitive representation of the threat, which is a corresponding need for procedures for managing these threats (namely, danger control) and emotional states of fear and distress, which is a corresponding need for procedures to manage these emotions (namely, fear control). Both will establish the goals, specific procedures, and strategies to control threats (Leventhal, Brissette, & Leventhal, 2003; Leventhal, Nerenzy & Steele, 1984).

The specific procedures and strategies for control is known as coping. Coping can take many forms, but two broad categories have been defined – approach coping (e.g. taking medication, going to the doctor, talking to friends about emotions) and avoidance coping (e.g. denial, wishful thinking) (Leventhal, Nerenz., & Steele, 1984). According to this framework, persons are motivated to return to a state of ‘problem-free’ normality. This involves assigning meaning to the problem and formulating illness belief. Thus, the notion is that the symptoms and social messages contribute toward the development of illness belief, which will be constructed according to the five dimensions as the following.

Cognitive representation of illness consists of five dimensions as follows:

1. Identity means the description of relevant characteristics or illness signs which is perceived as the symbol of their illness (Leventhal, Brissette, & Leventhal, 2003). Accordingly, in persons with diabetes, diabetes symptoms (such as thirsty or polyuria) are perceived as the symbol of their illness.
2. Cause means ones' belief about the factors which cause their illness (Hagger & Orbell, 2003: 143). In this study, cause is referred to as ones' belief about factors that cause their diabetes.
3. Consequences mean ones' belief about the impact of their illness on their quality of life or capability. For persons with diabetes, consequences are referred to as the impact of diabetes on their quality of life or capability.
4. Timeline means ones' belief about the treatment duration of their illness.
5. Controllability means ones' belief toward ability to control the illness, which is divided into two parts. Firstly, personal control means self-competency belief to control their illness. For example, in this study, 'I can control my diabetes by self-care.' Secondly, treatment control means belief about treatment efficiency on their illness (such as my current treatment is able to control my diabetes).

This cognitive representation of the problem will give the meaning of the problem and enable us to develop suitable coping strategies. According to Leventhal, Brissette, and Leventhal (2003), identification of illness will result in changes in emotional state as well as in our cognitive representation. When facing with illness problems, ones develop coping strategies in an attempt to return to a state of healthy normality. For emotional representation of illness, persons with type 2 diabetes might appraise and react to health problems (e.g., high blood glucose level) as fear or worry about the effect of the disease to their life.

Additionally, Horne (2003b) used the Self-Regulatory Model to study medication adherence behavior in various populations and proposed that beliefs about medications is an important factor for explaining medication adherence behavior. Horne (2003a) described that beliefs about medications (specific section) consisted of two components: necessity of medications and concern about medications.

Necessity of medications refers to the perception toward the necessity of medications taking, not the efficiency of medications. Horne's (1999) study found that necessity was stronger than the efficiency beliefs in relation to medication adherence.

Concern about medications refers to adversely concrete experiences of medications, such as side effects, and annoyed impact of medications that disturbs daily life. In addition, this concern includes an abstract idea that happens from relaying on daily medications or accumulative effects of medication that cause of worsening health in the long run.

The Self-Regulatory Model suggests that persons seek to understand their illness by developing a working model or representation of what the illness is, its cause, its effects, how long it will last and whether it can be cured or controlled. Representations are elaborated through a variety of idiosyncratic symptoms and illness episodes and information obtained through social and cultural associations. They do not necessarily conform to scientific views, but have been found to guide health behaviors. Individuals are thought to be motivated to regulate or minimize their health-related risk and to act for reducing these health threats in ways consistent with their perceptions of them. Thus, the model suggests that persons act what they believe. In this study, it is proposed that adherence to oral hypoglycemic medications will be influenced by whether it makes sense given his or her particular illness representations and beliefs about medications (Reynolds, 2003). Therefore, the concepts in the Self-Regulatory Model are used to examine their relationships with adherence to oral hypoglycemic medications in persons with type 2 diabetes as Figure 1.

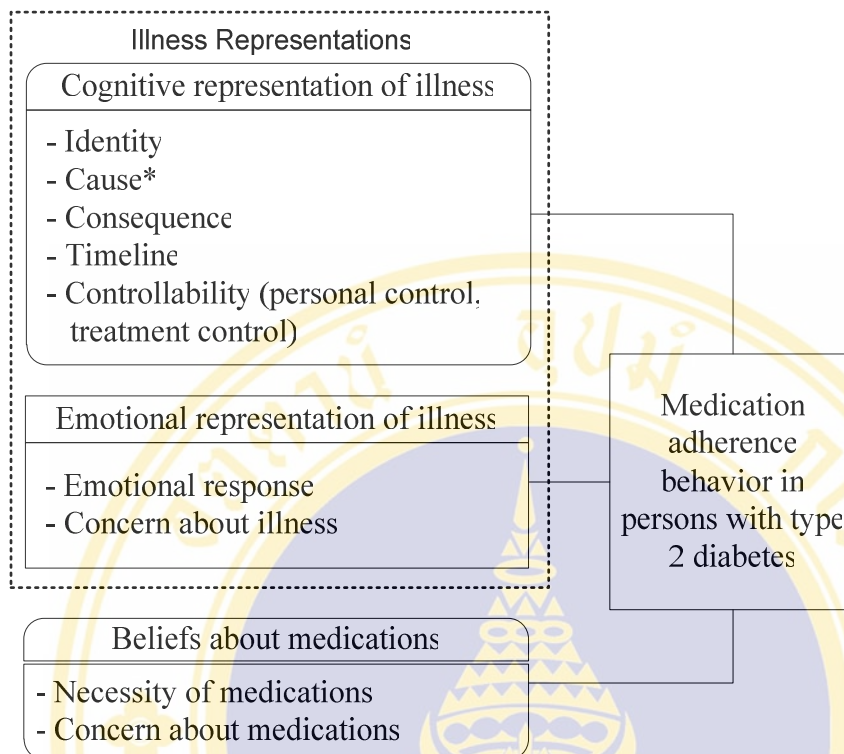


Figure 1 Conceptual framework in this study

* Variable studied by descriptive data

Expected Benefits from the Study

1. The results of this study will help health care personnel understand factors associated with medication adherence behaviors toward oral hypoglycemic medications of persons with type 2 diabetes. The Self-Regulatory Model developed by Leventhal and colleagues (2003) can explain the phenomenon of medication adherence behavior in persons with type 2 diabetes with cognitive and emotional variables. Health care personnel will recognize the problems, understand their perception of illness and treatments, and design new approaches to advise persons with type 2 diabetes.

2. This study will pave way for future studies that examine medication adherence in persons with other chronic diseases.

Definition of Terms

Cognitive representation of illness means the process by which a person responds to diabetes or other perceived health threats. Leventhal et al.'s Self-Regulatory Model consists of 5 dimensions namely identity, cause, consequence, timeline and controllability. In this study, cognitive representation of illness is measured by the Brief Illness Perception Questionnaire (Brief IPQ; Items 1 to 5, and 9) developed by Broadbent, Petrie, Main, and Weinman (2006) and translated into Thai by Sowattanangoong, 2006) as follows:

- **Identity** (Brief IPQ; Items 5) means the perception of diabetes-related symptoms. The question asks the participants to rate their identity perception on a numerical scale of zero to ten. The higher score, the higher numbers of diabetes-related symptoms the participants perceive.

- **Cause** (Brief IPQ; Items 9) means the perception toward the cause of diabetes. An open-ended question was used in persons with type 2 diabetes to describe perceived causes of their diabetes.

- **Consequences** (Brief IPQ; Items 1) mean the perception of the participants toward the impact of diabetes on their physical and mental status. The question asks the participants to rate how much diabetes affects their life on a numerical scale of zero to ten. The higher score, the stronger belief toward the impact of diabetes on their life.

- **Timeline** (Brief IPQ; Items 2) means the perception of the time-course of the treatment. The question asks the participants to rate how long they think their diabetes will last on a numerical scale of zero to ten, by which zero means the belief that diabetes is curable.

- **Controllability** means the perception of the ability to prevent and control the illness, which can be divided into personal control and treatment control as follows:

- 1) **Personal control** (Brief IPQ; Items 3) means the personal perception about their own ability to control their diabetes. The question asks the participants to rate how much they can personally control their diabetes on a numerical scale of zero to ten. The higher score, the higher confidence the participants perceive.

2) Treatment control (Brief IPQ; Items 4) means the personal perception about the potentials to treat or impede the exacerbation of diabetes with the use of oral hypoglycemic medications. The question asks the participants to evaluate the efficacy of hypoglycemic medications on a numerical scale of one to ten. The higher score, the stronger belief toward the efficacy of the oral hypoglycemic medications to treat their diabetes.

Emotional representation of illness is the emotional response when diagnosed with diabetes, consisting of emotional response and concerns of illness. In this study, emotional representation of illness was measured with the Brief Illness Perception Questionnaire (Brief IPQ; Items 6, and 8) developed by Broadbent, Petrie, Main and Weinman (2006) and translated into Thai by Sowattanangoong (2006) as follows:

- **Emotional response** (Brief IPQ; Items 8) means personal feelings toward diabetes. The question asks the participants to rate the effects that diabetes has on their feelings on a numerical scale of zero to ten, by which ten representing the strongest effects they feel.

- **Concern about illness** (Brief IPQ; Items 6) means personal concerns toward diabetes. The question asks the participants to rate their concerns about diabetes on a numerical scale of one to ten, by which ten representing the strongest concerns about diabetes.

Beliefs about medications mean the belief about the medications, which can be divided into 1) necessity of medications, and 2) concern about medications. The Beliefs about Medicines Questionnaire in the part of Specific (BMQ-Specific) was developed by Horne, Weinman, & Hankins (1999) which was used to measure this variable by which it has two dimensions:

- **Necessity of medications** means the perception toward the necessary to adhere to the oral hypoglycemic medications. In this study, the necessity of medications is measured by the first dimension with five items of the Beliefs about Medicines Questionnaire-Specific (BMQ-Specific), namely the BMQ-Necessity. The score in this part ranges from 5 to 25. The higher score, the stronger belief about the requirement of medication for controlling plasma glucose levels.

- **Concern about medications** means concerns about use of medications such as the danger of medication, dependence, long-term medication accumulations

and worsening effects of medications. In this study, concern about medications is measured by the second dimension with five items of the Beliefs about Medicines Questionnaire-Specific (BMQ-Specific), namely the BMQ-Concerns. The score in this section ranges from 5 to 25. The higher score, the higher concern about taking diabetes medications.

Medication adherence means the ability to take oral hypoglycemic medications accurately, regularly, and continuously in order to control plasma glucose level within an optimal range according to the doctor's prescription. This includes taking the medication with the right dosage, time, and frequency, but not dropping medication during the mid-course, not adjusting the dosage by self, not skipping parts of the medication schedule and not taking two doses of medication too close together or too far apart. Medication adherence in this study was measured with the Medication Adherence Report Scale, developed by Horne (1996), consisting of five questions with the score of one to five. The higher the score, the better the medication adherence.

CHAPTER II

LITERATURE REVIEW

This chapter includes a literature review as the following topics:

- I. Diabetes and its consequences
- II. Diabetes and treatment
- III. Medication adherence behavior of persons with diabetes
- IV. Benefits from medication adherence for persons with diabetes
- V. Factors related to medication adherence among persons with diabetes
- VI. Theoretical frameworks and theories for medication adherence studies.

I. Diabetes and its Consequences

Diabetes mellitus is a group of metabolic disease characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. (The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 1997) As the understanding of the etiology and pathogenesis of diabetes improved, the American Diabetes Association (ADA, 1997) and the World Health Organization (WHO, 1997) introduced a new system of classification for Diabetes mellitus based on etiology and pathology, replacing the old treatment-oriented classification of IDDM and NIDDM. The terms insulin-dependent diabetes mellitus (IDDM) and non-insulin-dependent diabetes mellitus (NIDDM) previously used to classify patients based on treatment were eliminated, while the terms type 1 and type 2 diabetes, based on etiology and pathogenesis, are retained.

Diabetic is now classified into 4 types according to the etiology and pathology. (ADA, 2006; The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 1997)

1) Type I diabetes.

Type I diabetes results from the destruction of pancreatic islet β -cell, usually leading to complete insulin deficiency.

2) Type 2 diabetes.

Type II diabetes results from a progressive insulin secretory defect with background insulin resistance.

3) Other specific types of diabetes.

These include diabetes cases resulting from genetic defects of β -cell function, genetic defects in insulin action, diseases of the exocrine pancreas, endocrinopathy, infections, induction by medications or chemicals and other generic syndromes sometimes associated with diabetes.

4) Gestational diabetes mellitus (GDM) which develops during pregnancy.

Signs and symptoms

Diabetes affects various parts of the body. Elevated plasma glucose level leads to signs and symptoms of the disease. The four most important signs are: (Kiratiyutawong, Thampanichawat, Melkus, Khuwatsamrit, & Youngpradith, 2003: 34; Thep Himathongkam, B.E. 2547)

1. Polyuria or frequent urination. When the glucose concentration in the bloodstream is raised beyond the renal threshold (approximately 180 mg/dl in healthy adults), reabsorption of glucose in the proximal renal tubuli is incomplete, and part of the glucose remains in the urine. This increases the osmotic pressure of the urine and inhibits the reabsorption of water by the kidney, resulting in increased urine production.

2. Polydipsia or excessive thirst. Frequent urination increases fluid loss and the lost blood volume will be replaced osmotically from water held in body cells, causing dehydration and increased thirst.

3. Weight loss. As body cells are unable to use glucose, the body switches to stored fats and protein as energy source, resulting in loss of body mass. Combined with dehydration, this leads to rapid weight loss.

4. Polyphagia or increased appetite. Responding to the starvation as a result of loss of body mass, patients will experience increased appetite and need more food intakes.

Diagnosis criteria for diabetes

The current diagnosis criteria for diabetes mellitus have been modified from those previously recommended by the National Diabetes Data Group (1979) and

World Health Organization (1985) The new diagnostic criteria for diabetes in non-pregnant adult are as follows: (ADA, 2005c)

1. Fasting plasma glucose (FPG) level of 126 mg/dl (7.0 mmol per L) or above. “Fasting” is defined as no caloric intake for at least 8 hours.
2. Symptoms of diabetes and casual glucose reading of 200 mg/dl (11.1 mmol per L) or above. “Casual” is defined as any time of day without regard to time since last meal.
3. Two-hour postprandial plasma glucose (2hrPPG) reading of 200 mg/dl (11.1 mmol per L) or above after a glucose load of 75 g. The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 g of anhydrous glucose dissolved in water.

Each test should be repeated on a different day to confirm the diagnosis. It should be noted that the FPG cut-off point has been modified from 140 mg/dl to 126 mg/dl due to studies in Pima Indians, Egyptians and Americans which have shown that the incidences of microvascular complications increase sharply among individuals with FPG above the level of 126 mg/dl (Pawana Keeratiyutawong, B.E. 2546).

Recommendations for diabetes screening of asymptomatic adults are as follows: (ADA, 2006)

1. Testing for diabetes should be considered at 3-years interval beginning at age 45 years, particularly in those with BMI of 25 kg/m² or higher (This criterion may need adjustments for some ethnic groups and those with polycystic ovary syndrome).
2. Testing should be considered at a younger age or be carried out more frequently in individuals with BMI of 25 kg/m² or higher (This criterion may need adjustments for some ethnic groups and those with polycystic ovary syndrome.) and one or more of the following risk factors:
 - 1) Family history of diabetes. (i.e. parents or siblings with diabetes)
 - 2) Habitual physical inactivity.
 - 3) Impaired glucose tolerance (i.e. FPG < 126 mg/dl and 2-h plasma glucose between 140 and 199 mg/dl during an OGTT) or impaired fasting glucose (i.e. FPG between 100 and 125 mg/dl) in previous tests).
 - 4) Delivery of a baby weight over 9 lb (4 kg) or history of gestational diabetes mellitus (GDM).

- 5) Hypertension (BP $\geq$ 140/90 mmHg).
- 6) High-density lipoprotein (HDL) $\leq$ 35 mg/dl (0.90mmol/l) and/or a triglyceride level $>$ 250 mg/dl (2.82 mmol/l).
- 7) Other clinical conditions associated with insulin resistance (e.g. polycystic ovary syndrome or acanthosis nigricans).
- 8) History of vascular diseases.

Complications of diabetic mellitus

Persons who have elevated plasma glucose level for a sustained period of time may experience diabetes-related complications which affect various systems. These complications are of two types: acute and chronic

1. Acute complications

1.1 Loss of consciousness due to diabetic ketoacidosis (DKA), hyperglycemic hyperosmolar non-ketotic coma or lactic acidosis. DKA often occurs in persons with type 1 diabetes who have not received insulin. When the body cannot use sugar as energy source, it turns to fat, resulting in the accumulation of acidic ketone in the bloodstream. Hyperglycemic hyperosmolar non-ketotic coma is more common in persons with type 2 diabetes and may cause hemiparesis or convulsion. Lactic acidosis coma is rare but may be found in patients with liver or kidney diseases.

1.2 Hypoglycemic (low blood glucose level) coma may happen when the persons with diabetes receive too much insulin, over-exercise or take their meal later or less than usual.

2. Chronic complications. An extended period of uncontrolled high blood glucose level (Sumoultha Sererat, B.E. 2539) leads to microvascular and macrovascular pathology which can result in chronic complications and death.

2.1 Hypertension persons with diabetes are approximately twice more at risk of hypertension. Those who suffer both from diabetes and hypertension are more at risk of heart disease and macro- and microvascular diseases. Hypertension may result from changes at the renal tubules, which allow sodium accumulation and increase blood volume. Insulin also stimulates the secretion of catecholamines. High plasma glucose levels also increase blood volume. All these changes result in hypertension.

2.2 Cardiovascular disease. Damages to coronary arteries may result in heart disease and myocardial infarction. Damages to cerebral arteries can cause strokes or coma. Hyperlipidemia aggravates these complications.

2.3 Kidney disease (nephropathy). Damages to renal capillaries affect the filtering capability of the kidney. Waste product accumulations in the bloodstream can cause a coma in patients with end-stage nephropathy. Nephropathy is often found in persons with type 2 diabetes who have high plasma glucose levels for ten years or more, but can happen sooner if the plasma glucose level is uncontrolled.

2.4 Retinopathy. Persons with diabetes are twenty times more at risk of retinopathy. Hemorrhage or occlusion of blood vessels supplying the retina can cause acute blindness. Poor control of plasma glucose level, coupled with hypertension, speeds up and worsens retinopathy.

2.5 Peripheral neuropathy. High plasma glucose levels affect nerve induction. Persons with long-term diabetes may feel numbness or paraesthesia in their legs and feet. Occlusion of the capillaries can also cause hypoxia to peripheral nerve cells.

2.6 Infections. Persons with diabetes are more prone to infections including skin infections, because high plasma glucose levels impair white blood cell functions. Such infections must be treated immediately or they become abscesses (Sumoultha Sererat, B.E. 2539). Inflammation of the feet may damage blood vessels, causing gangrenes (Sunthon Tuntanun, & Valai Inthumphun, B.E.2532). Persons with diabetes face ten-fold risks of leg amputation, comparing to non-diabetics. As for Thailand, a report showed that persons with diabetes had twenty-five percent lifetime probability of amputation. A major cause of leg amputation is exacerbated foot wounds (Thep Himathongkam, B.E. 2547). Other systems are also at risk of infections, especially the urinary system and the respiratory system. Persons with diabetes are 2-3 times more likely to have urinary infections because the deterioration of the automatic nervous system impairs the urges to urinate, causing urine retention. Impaired immune system also leads to respiratory infections. Tuberculosis is a common finding.

Because of the aforementioned complications, it's critical that persons with diabetes take uninterrupted care of their health, as well as receive effective treatments from medical professionals who can also support their self-care in various areas such

as dietary control, medication, exercise and hygiene so that they can better control their blood sugar and metabolic levels and prevent potential complications.

II. Diabetes Treatment

Diabetes treatment aims to:

1. Alleviate symptoms such as fatigue, polyuria and polydipsia.
2. Avert preventable complications such as foot wounds, blindness and kidney failure.
3. Prevent treatment-related adverse affects such as drug allergies or hypoglycemia.
4. Improve the quality of life for persons with diabetes.

Treatment goals

Many studies show that glycemic control can reduce or delay complications. A prospective randomized clinical trial of Diabetes Control and Complication Trial (DCCT) Research Group (1993) found that the glycemic control maintaining glycosylated hemoglobin level under 8% could reduce the risks of microvascular complications in the coronary venules among persons with type 1 diabetes. Another study by United Kingdom Prospective Diabetes Study Group (1998) found that for every percent reduction of A1C in persons with type 2 diabetes could reduce the incidence of complications by 21%, diabetes-related death by 21%, myocardial infarction by 14% and microvascular complications. Currently, American Diabetes Association (2005b) uses the term 'A1C' to substitute for the term 'HbA_{1C}' for avoidance of confusion between this term and hemoglobin in the complete blood count (CBC) test.

Therefore, the major goals of treatment for both type 1 and 2 diabetes mellitus remain unchanged: to achieve metabolic control and to prevent or delay the complications that are associated with diabetes mellitus (Frier & Yale, 2004). These goals can be achieved only through the collaboration between patients, doctors, nurses, pharmacists, nutritionists and other medical personnel. They must together determine the treatment goals (to be adjusted as needed) (Varaphon Vongthavaravat, B.E.2548).

Table 1 Goals of Diabetes Treatment (American Diabetic Association, 2006)

1. Glycemic control	Goal
Glycosylated hemoglobin (A1C)	< 7 %
Preprandial capillary plasma glucose	90-130 mg/dl
Peak postprandial plasma glucose	< 180 mg/dl
2. Blood pressure	< 130/80 mmHg
3. Lipid control	
Low-density lipoprotein (LDL) cholesterol	< 100 mg/dl
Triglyceride	< 150 mg/dl
High-density lipoprotein (HDL) cholesterol	> 40 mg/dl
4. Prevention and treatment of diabetes-related complications	
Key concepts in setting glycemic goal	
- Goals should be individualized especially for children, pregnant women, the elderly and those with underlying diseases.	
- Less intensive glycemic goals may be indicated in persons with severe or frequent hypoglycemia	
- Postprandial glucose may be targeted if A1C goals are not met despite reaching preprandial glucose goals	

Effective diabetes treatment must be accompanied by routine health practices including the followings:

1. Dietary control

Dietary control routine is a critical aspect of diabetes treatment. Dietary control goals in persons with diabetes are (ADA. 2005a)

1.1 To reduce plasma glucose levels so that they are as close to normal range as possible

1.2 To control body weight within optimal range

1.3 To prevent or delay complications of diabetes

1.4 To provide sufficient nutrients for the body's need and enable persons with diabetes to have a healthy life.

The Nutrition Sub-Committee of the Diabetes Care Advisory Committee of Diabetes UK (2003) has summarized and adjusted some parts of the diet composition for persons with diabetes recommended by the European Association for the Study of Diabetes and the American Diabetes Association as shown in Table 2.

Many studies have shown the efficacy of nutrition therapy. A study by Delahanty and Halford (1993) which tracked glycemic control and complications in 623 persons with type 1 diabetes for nine years found that those who adhered to nutritional therapy for more than 90% of the study period had significantly lower average A1C levels than those with 45% adherence. Another randomized study by Franz et al (1995) in 179 persons with type-2 diabetes found that the 6-month A1C levels decreased by 0.9%, in the Practice Guideline Nutrition Care group, 0.7% in the Basic Nutrition Care group, and no change in the control group.

After reviewing the efficacy of nutritional therapy in evidence-based researches, randomized controlled trials, observational studies and meta-analyses, it was found that nutritional therapy positively affected metabolic levels such as plasma glucose levels and A1C levels. (Pastors, Franze, Warshaw, Kulkarni, & Daly, 2002) In addition, nutritional therapy was also found to reduce health care expenditures for persons with type 2 diabetes (Franz et al., 1995).

Table 2 Diet Composition for Persons with Diabetes (The Nutrition Sub-Committee of the Diabetes Care Advisory Committee of Diabetes UK 2003: 424)

Component	Comment
Protein	Not >1 g per kg body weight
Total fat	< 35% of energy intake
Saturated + trans-unsaturated	< 10% of energy intake
n-6 Polyunsaturated fat	< 10% of energy intake
n-3 Polyunsaturated fat	Eat fish, especially oily fish, once or twice weekly
cis-Monounsaturated	10-20% (60-70% of energy intake)
Total carbohydrate	45-60%
Sucrose	Up to 10% of daily energy, provided it is eaten in the context of a healthy diet. Those who are overweight or who have hypertriglyceridaemia should consider using non-nutritive sweeteners where appropriate
Fiber	No quantitative recommendation Soluble fiber: has beneficial effects on glycemic and lipid metabolism Insoluble fiber: no direct effects on glycemic and lipid metabolism but its high satiety content may benefit those trying to lose weight and it is advantageous to gastrointestinal health
Vitamins and anti-oxidations	Encourage foods naturally rich in vitamins and anti-oxidations. With the exception of some patients in 'Special Groups' and 'Special Situations' (qv) there is no evidence for the use of supplements and some evidence that some are harmful
Salt	= 6 g sodium chloride per day

2. Exercise

Suitable exercise regularly practiced is beneficial to health. In persons with diabetes, it can also be treatment (Sumoultha Sererat, B.E.2539). Exercise promotes overall physical strength and reduces cholesterol and triglyceride levels. The increased HDL-cholesterol level also increases glucose tolerance and oxygen transport to organs. Regular exercise helps prevent diabetes and improve type 2 diabetes conditions (Vallnee Nithiyanun, B.E.2539). As the body metabolizes more sugar, those who are overweight will lose some weight and may become less dependent on medications to control their plasma glucose levels. Exercise also increases blood circulation, improves blood pressure and strengthens vital organs such as the heart and the lungs, as well as promotes physical and mental well-being (Sumoultha Sererat , B.E.2539).

The American Diabetes Association (2006) has studied the results of exercise-related randomized controlled trials and meta-analyses and issued recommendations regarding the effects of exercise on glycemic and weight control of persons with type 2 diabetes, exercise frequency, pre-recommendation patient assessment, specific regimen for those with uncontrolled blood sugar and for those with long-term diabetic complications as follows: (ADA,2006)

- 1) To improve glycemic control by body weight control and reduce CVD risks, at least 150 min/week of moderate-intensity aerobic physical activity (50-70% of maximum heart rate) is recommended and/or at least 90 min/week of vigorous aerobic exercise (> 70% of maximum heart rate). The physical activity should be distributed over at least 3 days/week and with no more than 2 consecutive days without physical activity.

- 2) In the absence of contraindications, people with type 2 diabetes should be encouraged to perform resistance exercise three times a week, targeting all major muscle groups, progressing to three sets of 8-10 repetitions at a weight that cannot be lifted more than 8-10 times.

Persons with diabetes who inject insulin need to adjust their diet and dosage according to their exercise time, duration and routine, as insulin inhibits the liver's glucose synthesis and release. Muscles also metabolize more sugar during exercise,

resulting in lower plasma glucose levels. Therefore, patients can experience hypoglycemia during exercise.

3. Hypoglycemic medications

Persons with diabetes who cannot control their plasma glucose levels by dietary control and exercise may need to use medication. Moreover, plasma glucose levels constantly change according to the type and quantity of diet, exercise, acute complications, use of certain drugs and renal degeneration. Therefore, it is necessary to continually adjust dosage or treatment method for maximum health benefits and safety of them. Even though who can control their plasma glucose levels will eventually experience setbacks, as the pancreas continues to lose its functions (Wethaka Klinwichit et al., B.E. 2546). This is shown by the United Kingdom Prospective Diabetic Study Group (UKPDSG, 1995). Tracking 2,025 persons with type 2 diabetes over several years, the study concluded that their A1C levels gradually increased as pancreatic functions deteriorated, despite adjustments in dosage and use of additional medications. Therefore, patient treatment must be constant to maintain optimal plasma glucose levels.

Persons with diabetes must be aware of the efficacy and adverse effects of oral hypoglycemic medications, as well as be knowledgeable of how to use them appropriately and safely. Oral hypoglycemic drugs will be effective as long as the pancreas retains some of its insulin-producing function. Non-insulin hypoglycemic medications are classified according to their mechanisms as follows: (Inzucchi, S.E., 2002)

1) Insulin secretagogue

1.1) Sulfonylurea stimulates pancreatic beta cells to secrete insulin by closing K_{ATP} potassium channel. It also inhibits the liver's glucose synthesis, resulting in reduced fasting plasma glucose levels and increased insulin efficiency in transporting glucose to tissues through increasing insulin-binding sites. Therefore, its efficacy depends on the functional level of the patient's pancreas.

Within this class, there are two generations of medications with the same mechanism and efficacy, although the second generation has increased potency. The medication is found in bloodstream one hour after ingestion, therefore it should be

taken 30 minutes before the meal. Taking the medication together with or after the meal will result in reduced its absorption.

The first generation of medications in this class consists of tolbutamide, acetohexamide and chlorpropamide, while the second generation comprises glibenclamide, gliclazide and glipizide. Side effects are rare but may include nausea, vomiting, allergic rash, jaundice, low white blood cell counts and weight gain. Overdosing may cause hypoglycemia.

1.2) Non-sulfonylurea insulin secretagogue. The new expensive drug repaglinide has the same mechanism as sulfonylurea. It is fast-acting and has a short-life of one hour, therefore should be taken 15 minutes before the meal.

2) Insulin sensitizer

2.1) Biguanide is a long acting drug whose effects can last 8-12 hours. It increases glucose metabolism of muscles, reduce glucose absorption in the intestines and inhibit the liver's glucose synthesis. As it does not stimulate the pancreas, its glucose-reducing effect is not very pronounced. Therefore it can be used singly in overweight patients or together with sulfonylurea when sulfonylurea alone is no longer effective. The medication currently in use in this class is metformin. Side effects are loss of appetite, nausea, and lingering bitterness in the mouth. Therefore it should be taken with food or immediately after to reduce complications of the digestive system. A study of metformin found that it can lower the incidence of heart disease and related death in overweight persons with diabetes. (UKPDS, 1998 as cited in Varaphon Vongthavaravat, B.E. 2548)

Cautions: This medication can cause lactic acid accumulation, therefore it is contraindicated in persons with chronic liver disease, kidney or lung disorders, shock, leukemia and alcoholism. In addition, it can cause B12 vitamin deficiency when used for an extended period (Kirpichnikow, McFarlane, & Sowers, 2002).

2.2) Thiazolidinedione (TZD) is an insulin sensitizer which lowers insulin resistance by stimulating response of target cells, lowers glucose releases from the liver and increases glucose metabolism in muscles. There are two medications in the market: rosiglitazone and pioglitazone.

Caution: It should be cautions when prescribed to persons with liver or heart disease and women on contraceptives (Thep Himathongkam, B.E.2547).

3) Alpha glucosidase inhibitor binds with alpha glucosidase intestinal enzyme which breaks down starch, effectively slowing down starch digestion and absorption and prevents abrupt increasing of blood glucose level after meals. This medication should be taken along with the first mouthful of food. Medications in this category already available in Thailand are acarbose and voglibose. Side effects are gas, bloating, stomach ache and mild diarrhea (Vittayasridama Sridama, B.E.2541:21).

Table 3 The Comparison of Medication Types, Usage and Glucose-Lowering Efficiency (Defronzo, 1997 & Inzucchi, 2002).

Class	Drugs		Usage	FPG	A1C
	Trade names	Generic names	dosage-mg/day (doses per day)	decrease (mg/dl)	decrease (%)
1. Insulin secretagogue			30 minutes before meals (1-2 doses/day)		
1.1. Sulfonylurea <u>Short acting,</u> <u>2nd generation</u>	Minidiab	Glipizide	2.5-20 mg/day	60-70	0.9-2.5 (1.5-2)
	Diamicron	Gliclazide	40-320 mg/day		
	Diamicron MR Glurisor	Gliquidone	15-120 mg/day		
<u>Long acting,</u> <u>2nd generation</u>	Amaryl	Glimipiride	1-8 mg/day		
	Daonil	Glibenclamide	2.5-20 mg/day		
	Euglucon				
1.2 Non-Sulfonylurea	Novonorm	Repaglinide	15 minutes before meals 1.5-12 mg/day (3 doses/day)	60-70	1.7-1.9

Table 3 The Comparison of Medication Types, Usage and Glucose-Lowering Efficiency (DeFronzo, 1997 & Inzucchi, 2002). (continued)

Class	Drugs		Usage dosage-mg/day (doses per day)	FPG decrease (mg/dl)	A1C decrease (%)
	Trade names	Generic names			
2. Insulin sensitize					
2.1 Biguanide	Glucophage	Metformin	After meals 500-3,000 mg/day (1-3 doses/day)	60-70	0.8-3 (1.5-2)
1.2. Thiazolidine -dione (TZD)	Avandia		Before or after meals 4-8 mg/day (1-2 doses/day)	35-40	1.1-1.6
	Actos		15-45 mg/day(1 doses/day)		
2. Glucosidase inhibitor	Glucobay	Acarbose	<u>Together with food</u> 150-300 mg/day(3 doses/day)	20-30	0.6-1
	Basen	Voglibose	0.6-0.9 mg/day(3 doses/day)		

Medications of choice for glycemic control for persons with diabetes are as follows (Varaphon Vongthavaravat, B.E.2548).

1) Persons with type 1 diabetes are given insulin. They generally start with dietary control and exercise, sometimes with medication.

2) Persons with type 2 diabetes with FPG lower than 250 mg/dl should start with insulin sensitizers. If FPG is lower than 150 mg/dl, glucosidase inhibitor may be considered.

3) Persons with type 2 diabetes with FPG between 250 and 350 mg/dl and those with obvious signs and symptoms indicating considerably low insulin levels should start with insulin secretagogues, particularly short-acting second-generation sulfonylurea.

4) Persons with type 2 diabetes with FPG higher than 350 mg/dl indicating very low insulin levels. For those who are contraindicated against medications with severe adverse effects such as seizures, dehydrated or unlikely to benefit from oral medications should start with insulin injection. When not contraindicated, sulfonylurea can be considered for some patients with short-term assessment (between one day and one week). If not effective, the patients should be given insulin or insulin together with sulfonylurea.

Type 2 diabetes is the most common form of diabetes. Risk factors for type 2 diabetes are age, gender (female), obesity and inactivity. In addition, it is often found in women with history of gestational diabetes, those with hypertension or hyperlipidemia (Preeyanuch Yamwong, B.E.2549). Treatment should start with dietary control combined with exercise. When plasma glucose level is still higher than normal, oral hypoglycemic medications may be prescribed (Thep Himathongkam, B.E.2547). Persons with diabetes generally do not need insulin injection with the exception of some patients who may need insulin to help control plasma glucose levels in later stage. (The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 1997)

III. Medication Adherence Behavior of Persons with Diabetes

Medication nonadherence in persons with diabetes is a common problem. Several studies found that persons with diabetes often seek alternative treatments, try other medications by themselves, use additional treatments without sharing the information with their health care personnel and adjust medication dosage without consulting their physicians. (Busara Kertpuengboonpracha, B.E. 2534; Chantira Borisut, B.E. 2540; Narumon Sombutpo, & Supa Kotcha, B.E. 2541; Noppawan Assawarat, B.E. 2536; Wanapa Sritanyarat, B.E. 2540; Somsak Wara-aswapati, B.E. 2535)

However, several trials designed to test ways to enhance patients' self-management and to provide appropriate care and treatment showed that patients' self-management capabilities and glycemic control efficiency increased after enrollment in the trials. This is because, through the studies, researchers became better aware of the patients' backgrounds and able to deal with their problems. These problems of medication nonadherence reflected personal attitudes and beliefs about self-management of medications. (Apiradee Plodnaimuang, B.E. 2542; Somchit Hanucharurnkul, Pawana Keeratiyutawong & Valla Tantayotai, B.E. 2539)

Somchit Hanucharurnkul, Pawana Keeratiyutawong, and Valla Tantayotai (B.E. 2539) found that before enrolment in the trial there was no significant correlation between glycosylated hemoglobin (A1C) levels and self-management of medications ($r = .04$, $p > .05$), but once in the study, self-management of medications is significantly associated negatively with A1C levels ($r = -.50$, $p < .001$). To explain this, the researcher reasoned that before the trial doctor was not aware of the participants' actual medication adherence. Seventeen out of the thirty participants turned out to have dropped their medications for different reasons, but through the study, the researcher enhanced the participants' capacity to communicate their problems and doubts to the doctor, as well as played the role of mediator to convey those issues. As a result, the doctor was able to individualize the treatment for each patient which proved to be more effective in controlling A1C levels as they were better adhered too.

Sukon Menethip (B.E. 2539) reviewed 81 researches conducted in Thailand up to B.E. 2539 on diabetes care and found that most were knowledge concerning the providing of care for persons with diabetes, particularly health care program management. The next most common topic was health-related behaviors of persons with diabetes such as self-care behaviors or capabilities, dietary habits and controls, medication-related behaviors and exercise-related behaviors which made up only 28.39% of all studies. In addition, these studies used broad perspectives to examine interrelating factors, rather than focusing on individual behaviors in details.

A further search found only two studies on medication adherence in persons with diabetes. One study conducted on 305 persons with diabetes at Lerdsin Hospital found that 75.7% (n = 231) did not adhere to their medications. Out of 197 participants were interviewed, 57 failed to adhere to their prescribed medications. On the other hand, information gleaned from the medical records of 146 participants found 77.4% (n = 113 with medication nonadherence (Suwannee Charoenpichitnant, B.E. 2532).

Tatsanee Sornjaem (B.E. 2546) found that 81.1% of a sample at Nakorn Pathom Hospital's Diabetes Clinic did not adhere to medication nonadherence regularly. The data collection proceedings had two methods: interviews and medical record reviews. Among 153 participants were interviewed, 53.6% (n = 82) failed to adhere to their prescribed medications. Likewise, for information gleaned from the medical records of 117 participants, 66.7% (n = 78) did not adhere to medications prescribed.

In sum, these studies on medication nonadherence show that a number of persons with diabetes failed to adhere to their prescribed medications, while health care personnel were not aware of the behavior. The review of experiment-based and descriptive studies of medication nonadherence of persons with diabetes points to the obvious problems that occur when they do not adhere to the treatment plans prescribed by the physicians.

Although several studies show that programs to promote patients' self-care are effective in improving patients' health, they inadequately covered the issues involved in medication adherence in Thai persons with diabetes. Such as perception toward their illness or beliefs about medications, this study aims to examine the factors related to medication adherence in Thai persons with diabetes.

IV. Benefits from Medication Adherence for Persons with Diabetes

Many studies confirmed the effectiveness of medication adherence in treating diabetes. A study by Ampika Koonka (B.E. 2543) on glycemic controls found that fasting plasma glucose levels in those who properly adhere to their medications were significantly lower than in those who did not adhere to their medications ($p < .05$).

This agrees with a study by Schectman, Nadkarmi and Voss (2002) which examined the association between diabetes metabolic control and medication adherence conducted at a university-based internal medicine clinic serving a low-income population in rural central Virginia. The sample comprised 810 persons with type 2 diabetes who received oral hypoglycemic medications from the clinic pharmacy and had at least one glycosylated hemoglobin (A1C) determination during the study period. The data collection period lasted 15 months. Multiple linear regression was used to examine the association of A1C level as well as change in A1C level with medication adherence. The change in A1C over time was found to be strongly associated with medication adherence: for each 10% adherence increment, there was a 0.13% greater decrease in A1C ($p < .0001$).

Moreover, Cramer (2004; 1218) reviewed 17 studies conducted from 1996 to 2003 and found that adherence to oral hypoglycemic medications and insulin was correlated with effective glycemic control. The review also showed that patient's adherence to hypoglycemic medications also affected health care expenditures. A longitudinal cohort study of 755 participants of 65-years-old or older with type-2 diabetes who were enrolled in a Medicare Health Maintenance Organization (HMO) for 1-5 years found that increasing adherence to oral hypoglycemic medications was the strongest predictor of decreases in total annual health care costs. ($\beta = .14$, $p < .001$) (Balkrishnan et al., 2003)

Also Lau and Nau (2004) examined the association between oral hypoglycemic medication nonadherence and subsequent hospitalization among individuals with type 2 diabetes. The Sample consisted of 900 persons with type 2 diabetes who were 18 years old or older from the Mid-Western University HMO and have received oral hypoglycemic medications for two years (2000-2001). Multivariate logistic regression analyses were performed when hospitalization in 2001 was regressed on nonadherence

to the oral hypoglycemic medication regimen in 2000, while controlling for nonadherence to medications for hypertension and dyslipidemia and for hospitalization in 2000, age, sex, intensity of the diabetes drug regimen, and comorbidities. The result showed that those who did not adhere to their medications in 2000 had 2.53 times more risks of hospitalization in 2001 than those who adhered to their medications (odds ratio 2.53; 95% CI 1.38-4.64).

Similar results can be seen in a study to examine factors related to glycemic control in persons with type 2 diabetes at Paholpolpayuhasena Hospital, Kanchanaburi Province which found that patients who took their medications at irregular times had a relative risk of 1.57 ($1.11 < RR < 2.22$); patients who missed their medications once a week had a relative risk of 2.05 ($1.33 < RR < 3.17$); and patients who missed their medications more than once a week had a relative risk of 2.19 ($1.49 < RR < 3.21$) (Pakamas Nampraditkul, B.E. 2536).

From the aforementioned studies, it is clear that persons with diabetes should adhere to their medications in order to control their plasma glucose levels, prevent complications, and reduce health care costs both individually and nationally, as medication nonadherence prolongs and exacerbates the disease and causes many negative consequences.

V. Factors Related to Medication Adherence among Persons with Diabetes

Perception and Beliefs about Illness and Treatment

Several studies showed that patients often base their decisions about medication adherence on personal perception and belief. Noppawan Assawarat (B.E. 2536) examined factors that affected medication adherence of 20 outpatients with diabetes in a hospital in Ayuttaya Province. These case studies use purposive sampling to select patients for in-depth interviews at their houses. The data collected in a 5-month period. The author found that medication-related behavior were identified into three groups: 1) those who took only prescribed medications and strictly adhered to the treatment plans, 2) those who used herbal treatments or other medication alongside prescribed medications, with strong beliefs in these alternative treatments, and 3) those who used

herbal treatments or other medication alongside prescribed medications, but at times lacked confidence in these alternative treatments. The differences in behaviors of the three groups may come from individual differences in the nature of illness, perception and belief about the illness and treatment, previous medication experiences and moral supports from family and community.

Concerning the perception of timeline, when patients believe that diabetes could be cured, they tend to seek new treatments such as herbs and medicinal brews. These trials and errors may lead to medication nonadherence.

Eight patients were found to perceive the risks of diabetes complications, causing fears and efforts to take better care of themselves, particularly through medication adherence. Eight patients were found to have firm beliefs in and strictly adhere to their prescribed medications. As they did not believe in the efficacy of traditional medication and believed that the prescribed hypoglycemic medications were the best treatment, they did not adjust the dosage by themselves.

The result of this in-depth study is in line with the Self-Regulatory Model describing the perception of life-threatening illness which patients base their behaviors on. It also shows the relationship between the decision regarding treatment and illness perception such as identity, timeline, controllability, emotional responses and necessity of medications which play important roles in medication adherence to hypoglycemic medications.

Busara Kertpuengboonpracha (B.E.2534) examined disease explanation approach consisting of perception and beliefs about cause, symptoms, complications, severity, treatment and evaluation, as well as patients' life situations which affected self-care recommendations given by physicians. The case studies conducted through in-depth interviews with 20 patients from a community hospital found that perception and belief about symptoms resulted from direct experiences. All 20 participants could recall their first symptoms from many years ago. As symptoms changed, patients' behaviors also changed. Ten patients did not complete all the prescribed doses due to different reasons. Self-adjustments of dosage were found in 5 participants – 2 received insulin injections and 3 oral hypoglycemic medications. The key reason for the adjustments was self-detection of irregular symptoms.

Timeline perception was also found to correlate with medication-related behaviors. Twelve participants used herbal medication in the hope of a cure during the first period of their illness. Some of them stopped taking hypoglycemic medications altogether. Twelve participants dropped the herbal medication when it failed to meet their expectations. Three participants were still using both.

This study showed that persons with diabetes decided to stop, suspend or adjust their prescribed medications, due to their belief in the efficacy of herbal medications which they heard from various sources. Once they have experience with herbal medications and assess its efficacy, they used the result as a basis to decide their adherence to prescribed oral hypoglycemic medications. This corresponds with the behaviors of those who have no experience with herbal medications, most of whom had no faith in it because they had witnessed similar experiences of those close to them.

Concern about illness was similarly found to affect medical adherence. Some patients considered quitting hypoglycemic drugs when they realized with distress that their disease cannot be cured, but many felt that they would be able to deal with the disease in due course. Such diverse emotional responses manifested in different medical adherence behaviors.

Such studies into the life situations of patients afford an opportunity to understand their reasons for medication adherence or nonadherence. Concurring with the Self-Regulatory Model, it is clear that personal perception – based on information from direct experience, social environment or health care providers – regarding identity, timeline, consequences and belief about medications as well as emotional responses must be taken into account.

Patumphan Monokulanun (B.E. 2535) examined the perception and belief of persons with diabetes in relation to their self-care behaviors in qualitative case studies of 10 patients (5 males and 5 females) at a Lampang Province community hospital. All participants were married and 40 years of age or older and had been taking oral hypoglycemic medications for more than three years and had not experienced any diabetes complications. It was found that the factor that determined self-care behaviors in these patients was the health-related motivation. This was a result of their adherence

to the doctors' recommendations on dietary control and medication and the consequential improvement of their symptoms.

In addition, the study also found that another factor that affected medication adherence was personal belief about curability. Those who accepted that the disease could not be cured would continue their medications even after the symptoms disappeared, while those who believed otherwise would stop the medications only to resume treatments when the symptoms reappeared.

Although this study was based on Becker and Maiman's Health Belief Model, its results demonstrated that patients based their medication adherence decisions on the perception of improving symptoms as well as the perception of timeline for diabetes treatments. These correspond to the illness perception of identity and timeline in the Self-Regulatory Model.

This is similar to Wanapa Sritanyarat's qualitative study (B.E. 2540) based on Grounded theory, Examining self-care according to the perspectives of diabetic adults, it found that in the beginning persons with diabetes might or might not understand their emerging symptoms and would start looking for explanations or diagnosis. Once diagnosed, they would experience depression and fears of death which would drive them to seek treatments. When they were explained the health impacts of diabetes and could control their fears, they and their families would become more optimistic and hopeful of a cure and would experiment different treatments in order to manage and live with diabetes, which included self-care and medication.

Once they have gone through these 'trials and errors' and found no cure, they would recognize the value of continuous care and stop seeking new treatments (Wanapa Sritanyarat, B.E. 2540). These 'trials and errors' and 'treatment stopping' resulted in medication nonadherence.

The result of this study can be explained in terms of medication adherence by the Self-Regulatory Model. The shifts in emotional representation of illness such as fears and concerns lead either to the decision to adhere to medications to prevent complications and threats or to medication nonadherence as a result of timeline perception.

A qualitative study by Orasa Punpakdee (B.E. 2542) on self-care behaviors of patients with unspecified hypertension, a chronic disease like diabetes, found that

hypertensive patients' perception, either that hypertension was curable or incurable – was associated with adherence to treatment plans. Patient who believed that hypertension was curable would use their medications intermittently, stopped them entirely or sought alternative treatments like herbal medications or folks pills. The research analyzed the patients' reasons for medication adherence as explained by one of them that “I must keep reminding myself to take the medication. If I stop, I'll become sick again. I don't want those symptoms to come back.” It also associated with strict self-management consisting of various views. Self-management on medication adherence when presented with a life-threatening disease is one such view.

The analysis showed that timeline perception as well as concern and belief about medications are associated with medication adherence. This corresponds with researches conducted on persons with diabetes through the dimensions within the Self-Regulatory Model namely emotional response, timeline and identity.

A qualitative study by Keeratiyutawong and colleagues (2003) on self-care experiences of eight persons with type 2 diabetes with glycemic control difficulties found that all participants recognized the necessity of medications to adherence and its health benefits. However, there were certain irregularities in each individual's medication management method. Some participants used traditional medications following their folk belief and evaluated its efficacy towards their illness. This result demonstrated that beliefs about medications were associated with medication adherence, in line with the Self-Regulatory Model.

A review of descriptive in-depth interview case studies and qualitative studies of diabetic and hypertensive patients in Thailand found that despite the variety of approaches used, the results could be explained by the emotional and thought processes that the patients based their medication adherence on – in line with the Self-Regulatory Model. However, a quantitative study is yet to be conducted in Thailand to examine the relationships between the variables of the Self-Regulatory Model and medication adherence.

Several quantitative studies elsewhere examined the relationship between beliefs about medications and medication adherence. In a cross-sectional study at a social-security hospital in León, Mexico, Garay-Sevilla et al. (1998) surveyed the role of

belief in conventional medications, type of medical care, familiar and socioeconomic factors on the treatment adherence in 156 with type-2 diabetes patients who were without pregnancy, underlying diseases, severe metabolic alterations or complications which required additional treatments. Adherence to drug and dietary regimen was tested with multiple regression analysis. It was found that belief in conventional medication significantly correlated with medication adherence. ($\beta = .458$, $r = .473$, $p < .001$) The result of this study show that personal perception which conformed with prescribed treatment plans increased medication adherence can be explained by the treatment control dimension of the Self-Regulatory Model.

In a cross-sectional study, Iihara and colleagues (2004) examined the belief of chronically ill Japanese patients that led to intentional nonadherence to medications. The 154 patients were admitted to a university hospital from January 1997 to January 2000 with chronic, primarily liver, gastrointestinal or nervous system diseases. They had been prescribed oral medications for regular use and were interviewed on admission. Using logistic multivariate regression analyses, factors associated with intentional nonadherence were identified as follows: the patients' beliefs with respect to taking medications without anxiety, especially putting no value on mutual reliance on the patient-doctor relationship ($p < .001$) and putting great value on knowing the medication's side effects ($p < .001$) and poor comprehension of general aspects of medication (p for trend $< .001$). These results can be explained with the treatment control dimension of the Self-Regulatory Model that patients who did not believe in the treatment's efficacy to counter the threats from the disease would not adhere to the treatment.

Farmer, Kinmonth and Sutton (2005) categorized personal beliefs about oral hypoglycemic medications and examined their relationships with medication adherence in 679 persons with type 2 diabetes of 40 years old or older who had been prescribed oral hypoglycemic medications in three general practices in Beckinghamshire. Two hundred patients were randomly selected and sent questionnaires. The study found two beliefs which were significantly associated with the decrease in medication adherence: "To change my daily routines is a difficult thing to do in order to adhere to my hypoglycemic medications" ($r = -.33$, $p < .001$) and "Adhering to hypoglycemic medications made me gain weight." ($r = -.25$, $p < .05$) The

patients' beliefs that diabetes affected their quality of life and concern about medications can be explained by the 'consequence' dimension of the Self-Regulatory Model.

These quantitative studies on medication adherence and nonadherence demonstrate the illness representations as well as emotional responses to the disease and treatments among patients, which may coincide or differ from those of the health-care team. The decision to adherence to medication is based on the consideration of available information, emotion responses to illness and beliefs about medications. This corresponds with the dimension in the Self-Regulatory Model whereby treatment control, consequences and beliefs about medications are used as the basis to explain medication adherence or nonadherence as methods to reduce health threats.

VI. Theoretical Frameworks and Theories for Medication Adherence Studies

Most studies conducted in Thailand on medication adherence of patients with chronic diseases were based on the Health Belief Model or Health Promotion Model.

Paungpayom Ganpinyo (B.E. 2526) examined the relationship between health-related belief and treatment compliance of 126 persons with diabetes aged 20-65 at Siriraj Hospital, Phra Monkutklao Hospital and Vajiraphayabaan Hospital who have been prescribed oral hypoglycemic medications. Point bi-serial analysis was used to analyze the questionnaire data for relationships between various aspects of health-related belief and treatment cooperation. It was found that medication compliance was positively associated with general health incentives ($p < .01$) but did not correlate with other variables.

In a cross sectional study with questionnaire-based, interviews are based on the Health Belief Model, Naewbood (2005) examined the medication adherence of 187 patients with hypertension at Don Mod Daeng District Hospital and Don Mod Daeng community health center in Ubonratchathani Province. It was found that factors significantly associated with medication adherence in patients with hypertension were female ($r = .163$, $p < .05$), side effects ($r = .149$, $p < .05$), knowledge of hypertension ($r = .422$, $p < .01$) and social support ($r = .235$, $p < .01$). It was also found that high blood

pressure, medication and level of education together could explain 19.7% of the variance in medication adherence among the patients.

Wongyou (2005) examined the relationships between medication adherence and personal factors, medication-related factors, knowledge of tuberculosis and social support in 111 tuberculosis (TB) patients at the Thoracic Disease Institute selected by specific criteria. This cross sectional questionnaire study based on the Health Belief Model found that knowledge of side effects and management of the side effects significantly correlated with medication adherence in TB patients ($r = .20, p < .05$).

Chenjit (2005) examined the relationships between medication adherence and patient-related factors, medication, disease severity and access to health care facilities among 231 patients with Human Immunodeficiency Virus (HIV) who were prescribed a cocktail of three antiviral medications at HIV/AIDS clinics in 10 hospitals (Ratburi, Photaram, Baanpong, Damnoensaduak, Paaktor, Bangphae, Chetsamian, Watpleng, Suanphueng and Somdetyuparat Chombueng). The data from questionnaire-based interviews was analyzed with logistic multivariate regression analysis. It was found that factors associated with medication adherence were good comprehension of treatment ($OR_{adj} = 4.32, 95\% CI 2.23-8.38$), good level of family support ($OR_{adj} = 2.33, 95\% CI 1.06-5.09$) and good awareness of personal potentials ($OR_{adj} = 17.47, 95\% CI 3.28-134.04$).

Based on Pender's Health Promotion Model, Limpattanasiri's study (2004) examined the effects of benefit perception, obstacle perception, self-agency perception and social support on medication adherence of 100 schizophrenic patients at the outpatient department of Chao Phraya Psychiatric Institute who were selected by specific criteria and interviewed with questionnaires. It was found that obstacle perception could explain 5.8% of adherence variance ($\beta = -.240, p < .05$).

Studies on medication adherence in patients with chronic diseases have shown that the Health Belief Model or Health Promotion Model facilitate the understanding about treatment compliance which is determined by the knowledge and attitude of them. Patients need to believe that they are at risk of the disease severity or threats to their wellbeing, before they follow health recommendations. Many studies also confirm that the illness perceptions and belief are variables that can explain adherence behaviors. However, the results from these theoretical frameworks to identify factors

associated with medication adherence are still limited and unclear. Some factors were found with low degrees of correlations. Therefore, this study will be conducted based on the Self-Regulatory Model, taking into consideration personal perception and belief about illness and treatment.

Studies on medication adherence based on the Self-Regulatory Model

Many qualitative and quantitative studies have been conducted to explain medication adherence of patients with chronic diseases with the variables within Self-Regulatory Model. Tools have been continuously developed and refined to measure the perception dimensions within the model. Several studies have confirmed that these dimensions correlate with medication adherence.

Jessop and Rutter (2003) examined the predictive power of cognitive and emotional representation of asthma on adherence to inhaled preventative asthma medication among 737 participants, aged 16 or older, were selected with specific criteria from patients in a basic health care center in Kent, Southern England. The data was collected by completed questionnaires and, using multiple regression analysis, was tested for variables according to the Self-Regulatory Model. It was found that age significantly associated with medication adherence ($r = .41$, $p < .001$) and that age, duration of asthma, gender, symptom and treatment efficacy account for 28.7% of the variance in adherence.

Haugbolle, Sorensen, and Henriksen (2002) examined medication- and illness-related factual knowledge, perceptions and behaviors in patients with angina pectoris. Seventy fourth-year pharmacy interns interviewed 123 patients with angina pectoris about medication and illness in relations to factual knowledge and perceptions, as well as drug adherence, confrontation with illness-related problems, drug usage and compliance. The questionnaire structure was developed based on the theoretical framework of the Self-Regulatory Model. It was found that medication- and illness-related factual knowledge and perception greatly varied and affected treatment methods and adherence.

Byrne, Walsh, and Murphy (2005) evaluated the benefit of illness perception and belief in predicting secondary preventive behaviors of coronary heart disease, using the Self-Regulatory Model as theoretical framework. Self-reported data of 1084

patients' lifestyles and information on illness and medication beliefs were collected by a postal questionnaire. It was found that illness perception approach was not helpful in predicting secondary preventive behaviors such as smoking, exercise, dietary control, alcohol consumption and medication adherence. However, 7% of adherence variance can be predicted by beliefs about medications as follows: necessity of medications ($\beta = -.23, p < .001$) and concern about medications ($\beta = .11, p < .01$).

Horne and Weinman (1999) examined patients' personal beliefs about necessity of medications and concern about medications, as well as evaluate the relationships between beliefs about medications and medication adherence in patients with chronic diseases, using the Self-Regulatory Model as theoretical framework. The 324 participants with chronic diseases consisted of 78 from the asthma clinic, 47 from the renal dialysis clinic, 116 from the cardiac clinic and 83 from the oncology clinic of the London Medical School. Coefficient correlation was used to test the relationship between illness belief and medication adherence. It was found that both necessity of medications ($r = .21, p < .01$) and concern about medications ($r = -.33, p < .01$) were associated with medication adherence. However, the difference between concern about medications and necessity of medications is associated with medication adherence in a significantly low level ($t = 4.28, p < .001$). Using multiple regression analysis, it was found that the difference between concern about medications and necessity of medications is the best predictor of variance in medication adherence, accounting for 19% of variance ($\beta = .35, p < .001$).

Barnes, Moss-Morris and Kaufusi (2004) surveyed the cultural differences between Tongan persons with type-2 diabetes and European counterparts. Analyzing the illness and treatment based on the Self-Regulatory Model and evaluating their adherence to medications and dietary controls, it was found that the A1C levels of Tongan patients were significantly higher than those of their European counterparts ($t = 2.77, p < .001$). Illness representation and beliefs about medications also differed significantly between the two groups. For example, Tongans appeared to display higher levels of grief, but lower levels of perception of necessity of medications. In addition, the relationships between medication adherence and illness perception were shown to be significantly associated as follows: timeline ($r = -.27, p < .05$),

consequences ($r = -.28$), cause (poor medical care in the past) ($r = -.29, p < .05$), cause (environment pollution) ($r = -.33, p < .01$), and cause (God's will) ($r = -.40, p < .001$).

Horne and colleagues (2004) examined the cultural backgrounds for belief of modern medications and personal perception of side effects in Asian and European undergraduate students and found a correlation between cultural backgrounds and belief about the benefits and harms of medications. Those with Asian backgrounds appeared to show more negative attitudes towards modern medications than those with European backgrounds. Students with Asian backgrounds appeared to have more perception of medication danger, addictive tendency and cautions. This study indicated the importance of understanding specific cultural influences on medication adherence.

The review of these studies confirms the relationship between illness representation and medication adherence, as well as cultural differences in relation to illness perception and medication-related belief which also can explain medication adherence in patients with chronic diseases. A study to examine the illness representation of diabetes and belief about hypoglycemic drugs based on the Self-Regulatory Model will help explain medication adherence and enable health care providers to understand the patients' perspectives, as well as giving the patients an opportunity to take an active part in the decision for treatment plans, leading to the promotion of medication adherence.

CHAPTER III

MATERIALS AND METHODS

This is a descriptive correlational research to examine the relationships between adherence to oral hypoglycemic medications in persons with type 2 diabetes and variables within Leventhal and colleagues' Self-Regulatory Model consisting of identity, consequences, timeline, personal control of diabetic, treatment control, emotional response, concern about illness, necessity of medications, and concern about medications.

Population and Sampling

The population of this study was persons with type 2 diabetes at the Outpatient Department: (OPD) of King Chulalongkorn Memorial Hospital. The sample was persons with type 2 diabetes at the Endocrinology Department (Diabetic Clinic) and Internal Medicine Department of King Chulalongkorn Memorial Hospital. The random sampling without replacement was used to recruit the sample. Each participant was given the number of ballot and the researcher randomly drew ballots from the pool.

Inclusion criteria:

1. Being diagnosed with type 2 diabetes, aged 25 or older;
2. Receiving any kind of oral hypoglycemic medications;
3. Having good consciousness and being able to communicate in Thai; and
4. Being willing to participate in the study.

This study focuses particularly on persons with type 2 diabetes who received only oral hypoglycemic medications in order to reduce extraneous variables associated with the medication adherence. Different kinds of regimens, such as insulin injections as compared to oral hypoglycemic medications, may be associated with different perceptions of burden (Vijan, Hayward, Ronis, & Hofer, 2005).

Exclusion criteria:

1. Having acute diabetic symptoms (such as hypoglycemia or diabetic ketoacidosis and so on) at the point of screening; and
2. Persons who wish to quit the study.

Sample Size

Cohen's table power analysis (1988) was used to identify the appropriate size of the sample group. From a literature review, Byrne, Walsh, and Murphy (2005) study, found that the relationship between variables in the Self-Regulatory Model and medication ranged from .27 to .33. Therefore, the researcher selected the effect size of .30 to calculate the sample size. According to the two tailed table, the significance level of study (α) was set as .05, power of .80 and the effect size as medium (.30). Therefore, at least 85 participants were required for this study.

Research Setting

The research was conducted at the Endocrinology and Internal Medical Department, King Chulalongkorn Memorial Hospital under the Thai Red Cross Society. This hospital is a public and tertiary hospitals, which is affiliated with the school of medicine and school of nursing and including with the most complicated patients caring The Endocrinology Department Clinic provides services for patients with endocrine disorders (such as diabetes, thyroid disease, etc.). At here, there are many endocrinology specialists who work for and instruct to the endocrinologist trainee. Advanced practice nurse in diabetes is in a unique position to implement strategies for the prevention of serious and debilitating complications from diabetes. In addition, there are demonstration space for diabetic self-caring by nurse educators on Monday to Friday from 8.00 a.m.-12.00 p.m..

Instruments

The research instruments consisted of 4 questionnaires as follows:

1. The Demographic Data Questionnaire

The Demographic Data Questionnaire assessed age, gender, marital status, level education, occupation, healthcare expenditure and welfare, personal monthly income, income sufficiency, religion, duration of diabetes, co-morbidity of diabetes, types of co-morbidity, duration of using oral hypoglycemic medications, using complementary treatment, types of complementary treatment, stopping and reasoning of oral hypoglycemic medications taking, daily dose, current medications for other disease, history of side effects of oral hypoglycemic medications including data records of height, weight, laboratory testing, oral hypoglycemic drug's name in current use. The questionnaire was designed as a checklist with some open-ended questions.

2. The Brief Illness Perception Questionnaire (Brief IPQ)

The Brief Illness Perception Questionnaire was developed by Broadbent, Petrie, Main, and Weinman (2006) and translated into Thai by Sowattanagoon (2006), which has been published on a web site in Thai language. This questionnaire was developed for the quick evaluation of variables within the cognitive representation of illness and emotional representation of illness, based on Self-Regulatory Model. There are nine questions; however, eight of them were used in this study to inquire persons with diabetes' belief and perception of: 1) consequence illness, 2) identity, 3) timeline, 4) personal control, 5) treatment control, 6) emotional response, 7) concern about illness and 8) cause of illness. The first seven questions were assessed with a numerical scale of 0 to 10. A high score corresponds to a high perception in that particular dimension. There is one open-ended question on the cause of illness, which allows the participants to specify three answers as the perceived cause of their diabetes. The researcher omitted the question on understanding of illness because this variable is not included in this study.

Psychometric properties of the Brief Illness Perception Questionnaire

Validity of the Brief IPQ

1) Construct validity

The discriminant validity of Brief IPQ was tested, based on the ability to discriminate five groups of illnesses: asthma, diabetes, colds, myocardial infarction (MI) prior to discharge and pre-diagnosis chest pains. The testing method was a

statistic analysis of one-way ANOVA with Scheffe post hoc test. The researcher found that the Brief IPQ could discriminate persons' belief in each illness. For example, asthmatic and persons with diabetes had longer perception of illness than other study groups and the illness perception of MI persons was longer than among those with colds and pre-diagnosis chest pains. The statistical analysis also indicates the discriminant validity of the Brief-IPQ.

2) Criterion-related validity

Three evaluation methods below were used to assess the criterion-related validity of the Brief IPQ as follows:

a) The instrument quality was tested by comparing variables in each dimension between the Brief-IPQ (2006) and the Revised Illness Perception Questionnaire (IPQ-R, 2002). With regard to patients with asthma, kidney disease, and diabetes, each dimension was significantly associated with each other: illness identity: $r = .45$, $p < .001$; timeline: $r = .53$, $p < .001$; consequences $r = .62$, $p < .001$; personal control: $r = .33$, $p < .001$; treatment control: $r = .32$, $p < .001$; and emotional response: $r = .63$, $p < .001$.

b) When comparing the Brief-IPQ to the Revised Illness Perception Questionnaire (IPQ-R), the developers found that the perception of personal control and treatment control of the two instruments were weakly correlated. Therefore, the validity test was repeated with self-efficacy dimension. As previous studies illustrated a correlation between the controllability and self-efficacy of persons with type 1 diabetes, the test was conducted to identify the relationship between the personal control in the Brief-IPQ and self-efficacy among persons with diabetes and asthma. The developers found a significant relationship between personal control in the Brief-IPQ and self-efficacy among persons with diabetes ($r = .61$, $p < .001$) and among persons with asthma ($r = .47$, $p < .001$). However, when compared the IPQ-R to the self-efficacy in persons with diabetes, no relation was found ($r = .26$, $p = .09$). This finding suggests that personal control assessment in the Brief-IPQ has better criterion-related validity than the IPQ-R.

c) According to previous studies, the controllability and self-efficacy dimensions were correlated with regular self-care in respects of nutrition, medication, exercise and metabolic control. For example, a high degree of controllability was

correlated with a low degree of glycosylated hemoglobin (which is an indication of good metabolic control) at $r = -.30$, $p < .01$; a high level of illness identity was associated with a high glycosylated hemoglobin (poor metabolic control) at $r = .25$, $p < .05$) evaluated by the Brief-IPQ. On the contrary, when measured by the IPQ-R, the HbA1c level had no relation to identity, treatment control, or personal control.

In conclusion, according to a comparison test of the Brief-IPQ and three methods of the IPQ-R used to evaluate the illness belief, the developers found that the Brief-IPQ provided higher criterion-related validity than the IPQ-R.

3) Predictive validity

The Brief-IPQ was used to predict the consequences of persons with myocardial infarction three months after discharge from hospital. Using multivariate analysis of variance, it was found that those who attended rehabilitation classes obtained a higher identity score than non attendees ($F(39.1) = 5.11$, $p = .03$). Longer delays to resume work was also correlated with high concern about illness ($r = .43$, $p = .03$). In brief, the test indicated that the Brief-IPQ could predict the results and provided a predictive validity. Therefore, this instrument should be appropriate to apply in this research.

Reliability of the Brief IPQ

The test-retest reliability of the Brief-IPQ was used to evaluate the stability. Patients with renal diseases attending outpatient clinics and willing to join the research were requested to answer two questionnaires. All 309 attendees were asked to complete the first questionnaire at the clinic. Then half of them would receive the second questionnaire to complete three weeks later, while the other half would receive it in the sixth week. Correlation coefficients of the participants tested for the second time in the third week and in the sixth week were nearly the same in each variable. For example, correlation of coefficient of illness identity of the third week group was $r = .70$, $p < .001$, while that of the sixth week group was $r = .71$, $p < .001$.

These has been continuous development of instruments to measure illness representation according to the Self-Regulatory Model such as the Illness Perception Questionnaire (IPQ) by Weinman, Moss-Morris, and Horne (1996), the Revised Illness Perception Questionnaire (IPQ-R) by Moss-Morris, Weinman, Petrie, Horne, Cameron, and Brick (2002) and the Brief Illness Perception Questionnaire (Brief-IPQ)

by Broadbent, Petrie, Main, and Weinman (2006). They have been tested, developed, and calibrated in order to qualify as research instruments. The Brief-IPQ demonstrated its superior validity and reliability in every dimension over the IPQ-R, which was developed from the IPQ. Even though the IPQ-R affords higher sensitivity, the Brief-IPQ provides more simplicity and efficiency—major characteristics to be considered for a suitable instrument. Thus, the researcher chose the Brief-IPQ for this research.

Test of the psychometric properties of the Brief Illness Perception Questionnaire in this study

In this present study, the test-retest reliability of the Brief Illness Perception Questionnaire was conducted by the researcher in thirty participants with the interview method and one month later, the interview was conducted again, but the sample remained ten out of thirty. The test-retest reliability of each variable in the Brief Illness Perception Questionnaire was presented as follows:

- Consequence ($r = .98, p < .01$)
- Timeline ($r = .67, p < .05$)
- Personal control ($r = .97, p < .01$)
- Treatment control ($r = .99, p < .01$)
- Identity ($r = .97, p < .01$)
- Emotional response ($r = .99, p < .01$)
- Concern about illness ($r = .99, p < .01$)

3. The Beliefs about Medicines Questionnaire-Specific (BMQ-Specific)

The Beliefs about Medicines Questionnaire-Specific (BMQ-Specific) was developed by Horne, Weinman, and Hankins (1999) based on the Self-Regulatory Model. This questionnaire has two parts: the Beliefs about Medicines Questionnaire-Necessity (BMQ-Necessity) and Beliefs about Medicines Questionnaire-Concerns (BMQ-Concerns). The Beliefs about Medicines Questionnaire-Specific consists of 10 questions including 1) five questions on the Beliefs about Medicines Questionnaire-Necessity (BMQ-Necessity) section, for example, “My medicine protects me from becoming worse.” to measure the ‘necessity of medications’ dimension, and 2) five questions on the Beliefs about Medicines Questionnaire-Concerns (BMQ-Concerns)

section, for example, “Having to take medicine worries me” to measure the ‘concern about medications’ dimension.

This questionnaire has five choices with the Likert scale from one to five, with 5 = entirely agreed, 4 = agreed, 3 = uncertain, 2 = disagreed, and 1 = entirely disagreed. The score of the BMQ-Necessity ranges from 5 to 25; the higher score, the higher level of belief of necessity of medications. Similarly, the score of the BMQ-Concerns ranges from 5 to 25, the higher the score, the higher the level of concern about oral hypoglycemic medications taking.

Psychometric properties of the BMQ-Specific

The validity of the BMQ-Specific (BMQ-Necessity & BMQ-Concerns)

1) Construct validity

a) Factor analysis was done by Principal Component Analysis (PCA) and Confirmatory Factor Analysis in persons with chronic diseases i.e. heart disease, asthma, kidney disease, general medicine diseases, psychiatric disorders and diabetes. The analysis indicated that both the BMQ-Necessity and the BMQ-Concerns of the sample groups are the dimensions of the beliefs about medications congruent with the Self-Regulatory Model.

b) Discriminant validity of the BMQ-Necessity and the BMQ-Concerns were tested by examining the ability to discriminate 6 groups of illnesses: asthma, diabetes, kidney disease, heart disease, psychiatric disorders, and general medical diseases. The testing method used was a statistic analysis of one-way ANOVA with Tukey post hoc test. The researcher found that the sample in different diseases differed in the BMQ-Necessity scores. For example, persons with diabetes had higher scores in necessity of medications than persons with asthma. Also differences of the BMQ-Concerns were found between different sample groups. For example, scores of persons with asthma and psychiatric disorders were higher than those of others. Thus, the BMQ-Necessity and the BMQ-Concerns reveal the discriminant validity.

2) Criterion-related validity

Regarding the BMQ-Necessity of medicines and perception about illness, Horne, Weinman, and Hankins (1999) found that necessity of medications

was correlated with timeline ($r=.49$, $p < .001$). Examining the relationship between necessity of medications, concern about medications and the Reported Adherence to Medication Scale (RAM), the researcher found that necessity of medications was correlated with the Reported Adherence to Medication Scale ($r = .19$, $p < .001$) and concern about medications was correlated with the Reported Adherence to Medication Scale ($r = .19$, $p < .001$).

Reliability of BMQ-Specific

1) Internal consistency

Cronbach's alpha coefficient was used to analyze the internal consistency of the BMQ-Necessity and the BMQ-Concerns in six sample groups: asthma, diabetes, kidney disease, heart disease, psychiatric disorders and general medical diseases. Results showed that the internal consistency of the BMQ-Necessity of hypoglycemic medications was .74 and of the BMQ-Concerns was .80.

2) Stability

The test-retest method was used to analyze stability in 78 cases in persons with asthma. Correlation Coefficient of the BMQ-Necessity was $r = .77$, $p < .001$ and of the BMQ-Concerns was $r = .76$, $p < .001$. This implies that the stability of the BMQ-Necessity and the BMQ-Concerns are moderate.

Test of the psychometric properties of the BMQ-Necessity in this Study

1. Content validity was checked by three experts: a nurse instructor, who specializes in the Self-Regulatory Model, an advanced practice nurse (APN) in diabetes, and an endocrinologist. The opinions/suggestions of the experts are as follows:

1) the language used in the BMQ-Specific was appropriate to the content accuracy.

2) the correspondence between the instrument's objective and questions covered the areas to evaluate according to the operational definitions and concepts.

2. After checking for content validity, the reliability was checked by testing in 30 persons with diabetes with the same characteristics of the sample and analyzed using Cronbach's alpha coefficient. In this study, Cronbach's alpha coefficient for the BMQ-Necessity was .72 and for the BMQ-Concerns was .80.

4. The Medication Adherence Report Scale (MARS)

The researcher has translated the MARS developed by Horne (1996) into the Thai language. The questionnaire was developed to evaluate drug-related behaviors in respects to five irregular behaviors (i.e. decision to quit medication, forgetting to take medicine). The questionnaire consists of five questions with 5 rating scores (5 = never, 4 = seldom, 3 = sometimes, 2 = usually, 1 = always). Total scores range from 5 to 25; the higher score, the higher level of medication adherence.

Psychometric properties of the Medication Adherence Report Scale

Validity of the MARS

1) Construct validity

a) Factor analysis was done by Principal Component Analysis (PCA) and shown that there was a construct with 5 questions.

b) Convergent validity was tested. The result demonstrated that a high score of the MARS predicted clinical consequences (normal blood pressure) ($p < .05$) and found that the BMQ-Concerns scores were correlated negatively with medication adherence ($p < .001$) in all sample groups i.e., HIV, asthma in community, asthma in hospital, ulcerative colitis, Crohn's disease, and diabetes (tablet treated and warfarin).

2) Criterion-related validity

Horne (2003a) found the relationship between the MARS and Morisky's questionnaire, which is also used to evaluate the medication adherence. There were four items scale to be tested in four sample groups. It was found that the MARS and Morisky's questionnaire were positively associated in all sample groups: in hypertension group ($r = .62$, $p < .001$), in diabetes group with tablet treated ($r = .47$, $p < .001$), in asthma group living in community ($r = .23$, $p < .02$) and in warfarin group ($r = .50$, $p < .001$).

Reliability of the MARS

1) Internal consistency

Cronbach's alpha coefficient was used to analyze the internal consistency of the MARS in persons with diabetes who received medications. The analysis showed Cronbach's alpha coefficient to be at .86.

2) Stability

The test-retest method was used to analyze the stability in the hypertensive group. The correlation coefficient was $r = .97$, $p < .001$. Thus, the MARS was considered to be a highly stable instrument.

Test of the psychometric properties of the MARS in this Study

1. Content validity was checked by three experts: a nurse instructor, who specializes in the Self-Regulatory Model, an advanced practice nurse (APN) in diabetes, and an endocrinologist. The opinions/suggestions of the experts are as follows:

- 1) The language used in the MARS was appropriate to the content accuracy.
- 2) The correspondence between the instrument's objective and questions covered the areas to evaluate according to the operational definitions and concepts.

2. After checking for content validity, reliability was checked by testing in 30 persons with diabetes with the same characteristics of the sample. It was found that Cronbach's alpha coefficient of the MARS in this study was .71.

Protection of Human Subjects

The researcher applied for an approval from the Ethical Committees of King Chulalongkorn Memorial Hospital. After the approval, the researcher made acquaintance with the sample group and explained the objectives of the interview and asked for their cooperation. The researcher also explained about the protection of human subjects to the sample group as below:

1. Answers would be treated as confidential and used specifically for this research only and participants' names would be concealed.
2. The answers would not be judged as correct or incorrect, nor would they affect the participant's treatment in any way.
3. The sample group could make inquiry on the interview to their satisfaction before participating in this study.
4. The participants could cancel their participation at any time, and it would not affect their treatments in any way.

If the sample group agrees to be interviewed, the researcher asked them to sign an informed consent form before the data collection.

Data Collection

The researcher submitted the recommendation letter from Faculty of Graduate Studies, Mahidol University to the Director of King Chulalongkorn Memorial Hospital in order to get an approval letter from the Ethical Committee of King Chulalongkorn Memorial Hospital. Once approved, the data collection was carried out as follows:

- 1) The researcher selected the sample groups whom were considered beneath the selection criteria had type 2 diabetes with oral hypoglycemic medications receiving and appointed to get a physical checkup at the Endocrinology Clinic on the data-collecting day. However the researcher can search the name of them on 3 p.m before 1 day of appointment date from their delivered list with medical records. Then the researcher randomly selected prospective participants in the study group by drawing the ballot method on the data-collecting day. The selected patients' medical records were then tagged for the concerned personnel who would collaborate with the researcher to notify the patients about the research and follow the next procedures.

- 2) The researcher collected the data and ensured that the data were correctly gathered from the selected sample groups before they saw the doctor. The researcher provided the name list of selected patients to a hospital officer who would invite the sample group into a separate room where they could take part in the research without feeling the anxiety of fearing that they would miss their turns to see the doctor. Before data collection, the researcher explained about the purpose of data collection and confidentiality, and reassured them that the research's result would not affect their treatments and then asked the participants to sign the consent forms. The data collection via questionnaire would take about 15-20 minutes per person, conducted at the rate of 6 persons per day. The participants administered the questionnaires by interview method.

- 3) The researcher checked every answer in the questionnaires to ensure that all questionnaires have been filled out.

4) The researcher repeated the process until the required sample size was reached.

Data Analysis

The eighty-five sets of questionnaires completed by the patients at the Outpatient of the Diabetic Clinic and Internal Medical Clinic, King Chulalongkorn Memorial Hospital, were analyzed by Statistical Package for Social Science 13.5 application for Windows operating system (SPSS/FW) as follows:

1. Descriptive statistics such as frequency distribution, percentage, and means.

- 1.1 Demographic characteristics

- 1.2 Frequency of the variable “perceived cause of illness”

2. Analytical statistics

As the data of the sample was non normal distribution, Spearman’s rho correlation was used to examine the association between medication adherence to oral hypoglycemic medications in persons with type 2 diabetes and Self-Regulatory Model dimensions, namely: identity, consequences, timeline, personal control, treatment control, emotional response, concern about illness, necessity of medications, and concern about medications.

CHAPTER IV

RESULT

The purpose of this study was to explore the relationship of illness representations, beliefs about medications, to adherence to oral hypoglycemic medications in persons with type 2 diabetes. The results of this study are presented in two parts as followings: 1) descriptions of the sample, which include demographic characteristics, clinical data, medication use, type of oral hypoglycemic medications, adherence to oral hypoglycemic medications, illness representation variables, the rank-order of belief what caused diabetes perceived, and beliefs about medications, and 2) the relationships of selected factors of illness representations (except the 'causes' variable) and beliefs about medications to adherence to oral hypoglycemic medications.

Part I. Descriptions of the Sample

Demographic characteristics

Initially, the potential participants were 105 persons with type 2 diabetes who received oral hypoglycaemic medications recruited by drawing a ballot from a name list at Medical Outpatient Department, King Chulalongkorn Memorial Hospital. However, only 85 of them accepted to participate in this study. But the others denied to do so because of their reason of running other errands, some thought that they were too old to respond to the questionnaire. Their ages ranged from 27 to 84 years with a mean of 61.25 years (SD = 10.59). Almost half of the sample (49.4%, n = 42) were young-old age. Almost two-thirds (62.4%, n = 53) were female.

Most of the sample (89.4%, n = 76) were married and 58.8% lived with their spouse. Almost half of the sample (45.9%, n = 39) finished primary school, and almost two-thirds of them (63.5%, n = 54) were housekeeper or unemployed. Regarding hospital expenditure and welfare, more than half of the sample were supported from the government welfare (56.5%, n = 48); few received social security insurance (5.9%, n = 5), and universal health care coverage (namely, Golden Card) (3.5%, n = 3) More

than half of the sample (61.2%, n = 52) had personal monthly income lower than 10,000 Baht, while 38.8% had more than 10,000 Baht. Almost all of the sample (91.8%, n = 78) had adequate income, and 41.2% (n = 35) had enough money for saving. The majority of them were Buddhist (92.9%, n = 79), while few were Islamic (5.9%, n = 5).

Table 4. Descriptive Statistics of Demographic Characteristics in Persons with Type 2 Diabetes (N=85)

Characteristics	Min-Max	Mean	SD	Number	Percentage
Age (year)	27-84	61.25	10.59		
25 – 39				4	4.7
40 – 59				32	37.7
60 – 74				42	49.4
≥ 75				7	8.2
Gender					
Female				53	62.4
Male				32	37.6
Marital Status					
Married				50	58.8
Widowed/ Divorced				26	30.6
Single				9	10.6
Education					
No formal education				12	14.1
Primary school				39	45.9
Secondary school				8	9.4
High school				13	15.3
Diploma				2	2.4
Bachelor and higher				11	13
Housekeeper/Unemployed				54	63.5
Government officer/State enterprise officer/ Officiary officer/ Merchant				20	23.6
General laborer				7	8.2
Farmer				2	2.4
Monk				2	2.4

Table 4. Descriptive Statistics of Demographic Characteristics in Persons with Type 2 Diabetes (N=85) (Continued)

Characteristics	Min-Max	Mean	SD	Number	Percentage
Personal monthly income (Baht)	1,000-200,000	16,638	25,030		
< 5,000				23	27.1
5,000 – 10,000				29	34.1
> 10,000 -15,000				7	8.2
> 15,000 - 20,000				5	5.9
> 20,000 – 25,000				8	9.4
> 25,000				13	15.3
Personal monthly income (Baht)	1,000-200,000	16,638	25,030		
< 5,000				23	27.1
5,000 – 10,000				29	34.1
> 10,000 -15,000				7	8.2
> 15,000 - 20,000				5	5.9
> 20,000 – 25,000				8	9.4
> 25,000				13	15.3
Income adequacy					
Adequate, but no saving				43	50.6
Adequate and saving				35	41.2
Inadequate with debt				4	4.7
Inadequate without debt				3	3.5
Religion					
Buddhist				79	92.9
Islamic				5	5.9
Christian				1	1.2

Clinical data

Table 5 shows clinical data of the sample, including body weight (BW), body mass index (BMI), duration of diabetes, having co-morbidity, and testing type. Their body weight ranged from 42 to 104 kilograms (kgs) with a mean of 67.40 kgs (SD = 12.17) and body mass index ranged from 18.91 to 36.89 kg/m² with a mean of 27.15 kg/m² (SD = 4.03). More than half of the sample (54.1%, n = 36) had BMI in the

overweight and obesity category. Male participants had body weight higher than female participants (73.52 and 63.70 kg respectively), but body mass index was contrary (26.81 and 27.38 kg/m² respectively).

The duration of diabetes ranged from .5 months to 30.47 years with a mean of 8.98 years (SD = 6.95). Fifty-eight participants (68.2%, n=58) were diagnosed as type 2 diabetes with co-morbidity. The most common co-morbidity was cardiovascular disease by which 63.5% of the sample (n = 54) had hypertension and 14.1 % of the sample (n = 12) had ischemic heart disease. However, other co-morbidities (retinopathy, nephropathy, and neuropathy) were few.

Testing type of the sampling regarding: 1) fasting blood sugar (FBS), 2) glycosylated hemoglobin (A1C), 3) triglyceride, 4) cholesterol, 5) high-density lipoprotein, 6) low-density lipoprotein, 7) serum creatinine, and 8) blood urea nitrogen. Fasting blood sugar (FBS) ranged from 41 to 242 mg/dl with a mean of 136.4 (SD = 33.94, n = 85). Glycosylated hemoglobin (A1C) ranged from 5.80 to 11.60% with a mean of 7.60 (SD = 1.27, n = 79). Almost two third of the participants had range of A1C more than 7% Triglyceride ranged from 50 to 279 mg/dl with a mean of 140 (SD = 60.56, n = 37). Cholesterol ranged from 143 to 221 mg/dl with a mean of 173.67 (SD = 20.37, n = 36). High-density lipoprotein (HDL) ranged from 30 to 94 mg/dl with a mean of 51.42 (SD = 13.14, n = 36). Low-density lipoprotein (LDL) ranged from 74 to 190 mg/dl with a mean of 116.33 (SD = 34.65, n = 12). Serum creatinine ranged from 0.52 to 2 mg/dl with a mean of 0.88 (SD = 0.35, n = 33) and blood urea nitrogen (BUN) ranged from 9 to 22 mg/dl with a mean of 12.63 (SD = 4.27, n = 8).

Although, all of the testing type were slightly positively skewed, most of their variables (fasting blood sugar, triglyceride, cholesterol, high-density lipoprotein, low-density lipoprotein, and serum creatinine) were normally distributed, while two variables (glycosylated hemoglobin and blood urea nitrogen) were not normally distributed.

Table 5. Descriptive Statistics of Clinical Data in Persons with Type 2 Diabetes (N=85)

Clinical data	Min-Max	Mean	SD	Number	Percentage
Body weight (Kg)	42-104	67.4	12.17		
Body weight of female		63.70	1.40		
Body weight of male		73.52	2.27		
Body mass index (kg/m²)	18.96-36.89	27.15	4.03	68	80.0
Normal (18.5 - 24.9)				22	25.9
Overweight (25 - 29.9)				29	34.1
Obesity (≥ 30)				17	20.0
Body mass index of female		27.38	.6		
Body mass index of male		26.81	.8		
Duration of Diabetes (year)	.4-30.5	9.0	6.9		
< 5				32	37.6
5 – 10				19	22.4
> 10 – 15				22	25.9
> 15 – 20				7	8.2
> 20				5	5.9
Having Co-morbidity					
No				29	41.2
Yes				58	68.2
Co-morbidity*					
Cardiovascular disease				57	67.1
- Ischemic heart disease/Myocardial Infarction				12	14.1
- Hypertension				54	63.5
Retinopathy				7	8.2
Nephropathy				1	1.2
Neuropathy				1	1.2

Table 5. Descriptive Statistics of Clinical Data in Persons with Type 2 Diabetes (N=85) (Continued)

Clinical data	Min-Max	Mean	SD	Number	Percentage
Testing type					
Fasting blood sugar (mg/dl)	41-242	136.40	33.94	85	100
Glycosylated hemoglobin (A1C) (%)	5.80-11.6	7.60	1.27	79	92.9
≤ 7				30	35.3
> 7-8				30	35.3
> 8-9				10	11.8
> 9-10				4	4.7
> 10-11				1	1.2
> 11				4	4.7
Triglyceride (mg/dl)	50-279	140	60.56	37	43.5
Cholesterol (mg/dl)	143-221	173.67	20.37	36	42.4
High- density lipoprotein (mg/dl)	30-94	51.42	13.14	36	42.4
Low-density lipoprotein (mg/dl)	74-190	116.33	34.65	12	14.1
Serum creatinine	0.52-2	0.88	0.35	33	38.8
Blood urea nitrogen (mg/dl)	9-22	12.63	4.27	8	9.4

*Note: One participant may have more than 1 health problem

Medication use

Table 6 presents data about medication use of the sample. The duration of oral hypoglycemic medications use ranged from .42 years (5 months) to 30.42 years (365 months) with a mean of 8.75 years (SD = 6.85). Almost two-thirds of the sample (61.2%, n = 52) used oral hypoglycemic medications longer than five years, while few participants of the sample (8.2%, n = 7) used the medications shorter than one year. Nevertheless, most of the sample (87.1%, n = 74) used oral hypoglycemic medications prescribed by the physician only, while eleven participants (12.9%) used both prescribed and non-prescribed medications. Non-prescribed medications included herbs, acupuncture, and nutriment. Ten participants (11.8%) used herb, while few used acupuncture and nutriment. Most of the sample (87.1%, n = 74) never stopped

medication use, while even participants (12.9%) stopped using oral hypoglycemic medications because of: 1) having upset symptoms (e.g. palpitation, dizziness, and nausea), 2) trying other medications (e.g. herb, acupuncture, and nutriment) 3) inadequate medication until the next follow-up, 4) financial problem, and 5) boredom of medication use.

Regarding the number of daily dose of oral hypoglycemic medication use, almost all of sample (92.2%, $n = 79$) took more than one medications; about one-third (34.1%, $n = 29$) took four times per day and one-fourth (23.5%, $n=20$) took twice per day. Which each time of dose taking, they would be taking other medications for other diseases (84.7%): hypertension (69.4%), dyslipidemia (68.2%), heart disease (17.7%), hyperthyroidism (3.5%), Gout (2.4%), renal disease (2.4%), breast cancer (1.2%), and cirrhosis (1.2%). Additionally, they had side-effect symptoms that were associated with the medications in 12 participants (14.1%).

Table 6. Frequency and Percentage of Medication Use in Persons with Type 2 Diabetes (N=85)

Data	Min-Max	Mean	SD	Number	Percentage
Duration of medication use (year)	.42-30.42	8.76	6.85		
< 1				7	8.2
1-5				26	30.6
> 5 – 10				23	27.1
> 10				29	34.1
Using prescribed medications					
Prescribed medications only				74	87.1
Use a combination of prescribed and non prescribed medications				11	12.9
Using complementary treatment					
Herb				10	11.8
Acupuncture				2	2.4
Nutriment				1	1.2
Experience of stopping taking medications					
No				74	87.1
Yes				11	12.9

Table 6. Frequency and Percentage of Medication Use in Persons with Type 2 Diabetes (N=85) (Continued)

Data	Min-Max	Mean	SD	Number	Percentage
Reason of stopping taking medications				11	12.9
Having upset symptoms (palpitation, dizziness, and nausea)				3	3.5
Trying other medications				3	3.5
Inadequate medications until the next follow-up				3	3.5
Financial problem				1	1.2
Boredom of medication use				1	1.2
Daily dose of oral hypoglycemic medications					
Once per day				6	7.1
Twice per day				20	23.5
Three times per day				14	16.5
Four times per day				29	34.1
More than four times per day				16	18.1
Medication use for other diseases					
No				13	15.3
Yes**				72	84.7
Hypertension				59	69.4
Dyslipidemia				58	68.2
Heart disease				15	17.7
Hyperthyroidism				3	3.5
Gout				2	2.4
Renal disease				2	2.4
Breast cancer				1	1.2
Cirrhosis				1	1.2
Side effect symptoms associated with medication use					
No				73	85.9
Yes				12	14.1

Table 6. Frequency and Percentage of Medication Use of Persons with Type 2 Diabetes (N=85) (Continued)

Data	Min-Max	Mean	SD	Number	Percentage
Symptoms and self-management				12	14.1
Diarrhea				5	5.9
Ask physician to change the medications				2	2.4
Skip some doses of medications				2	2.4
Did nothing; let stool until stop				1	1.2
Heart palpitation and sweating				3	3.5
Stopping medications				2	2.4
Taking syrup				1	1.2
Syncope/ Going to hospital				2	2.4
Nausea and vomit/ Stopping medications				1	1.2
Heavy cough / Ask physician to change the medications				1	1.2

**Note: one participant might take medications for more than 1 disease condition

Type of oral hypoglycemic medications

Table 7 presents type of oral hypoglycemic medications which physician have prescribed to control diabetes in the sample. The physician prescribed for most of them (80%, n = 68) used sulfonylureas (short acting; glipizide) and (84.7%, n = 72) biguanide (metformin) while for a few of them (2.4%, n = 2) used sulfonylureas (long acting; glibenclamide) and (1.2%, n = 1) non-sulfonylureas (repaglinide). Some of them (10.6%, n = 9) was prescribed to use thiazolidinediones (pioglitazone) and (7.1%, n = 6) alpha-glucosidase inhibitors (acarbose).

Regarding to daily dose prescription, once time per day was prescribed only 2 drugs (glipizide and metformin). Usually, four time per day was mostly prescribed with (n = 29) biguanide (metformin), (n = 27) short acting of sulfonylureas (glipizide) and (n = 2) long acting of sulfonylureas (glibenclamide) and once per day was rarely with (n = 2) short acting of sulfonylureas (glipizide) and (n = 2) biguanide (metformin).

Table 7. Frequency and Percentage of Type of Oral Hypoglycemic Medications in Persons with Type 2 Diabetes (N = 85)

Type	Generic name	Total		Daily Dose* (number of participant)				
		Number	Percentage	Once	Twice	3 times	4 times	> 4 times
1. Insulin secretagogue								
1.1 Sulfonylureas								
(2 nd generation)								
-Short acting	Glipizide	68	80	4	8	13	27	16
-Long acting	Glibenclamide	2	2.4	0	0	0	2	0
1.2.Non-Sulfonylurea	Repaglinide	1	1.2	0	1	0	0	0
2. Biguanide	Metformin	72	84.7	2	14	12	29	15
3. Thiazolididones	Pioglitazone	9	10.6	0	3	1	3	2
4. Alpha-glucosidase inhibitors	Acarbose	6	7.1	0	1	0	1	4

* Note: one participant might take more than one type/dose of medications

Adherence to oral hypoglycemic medications

Table 8 presents frequency of adherence behavior to oral hypoglycemic medications in five aspects of medication-taking behavior. The scores of the Medication Adherence Report Scale of the sample ranged from 8 to 25 with a mean of 21.46 (SD = 4.06). The sample always take their oral hypoglycemic medications because of “I stop taking them for a while” (89.4%, n=76), “I alter the dose” (88.2%, n=75), and “I decide to miss out the dose” (83.5%, n=71) was high frequency range on “Rarely-Never” of Frequency adherence behavior.

Table 8. Descriptive Statistics of Adherence Behavior to Oral Hypoglycemic Medications (N=85)

Item of Adherence Behavior	Number (percentage)			Mean	SD
	Always-Often	Sometime	Rarely-Never		
1. I forgot to take them	7 (8.2%)	27 (31.8%)	51 (60%)	3.93	1.03
2. I alter the dose	6 (7%)	4 (4.7%)	75 (88.2%)	4.61	0.99
3. I stop taking them for a while	4 (4.8%)	5 (5.9%)	76 (89.4%)	4.71	0.87
4. I decide to miss out a dose	6 (7%)	8 (9.4%)	71 (83.5%)	4.48	1.11
5. I take less than instruction	14 (16.5%)	23 (27.1%)	48 (45%)	3.73	1.28

Illness representation variables

Table 9 presents descriptive statistics of illness representations what patients faced and perceived. Illness representation consisted of seven quantitative variables: 1) identity, 2) consequences, 3) timeline, 4) personal control, 5) treatment control, 6) emotional response, and 7) concern about illness (see table 9); and one descriptive variable “cause of illness” (see table 10)

Seven quantitative variables are presented as follows:

1. ‘Identity’ (belief of persons with type 2 diabetes toward their experience about illness symptoms), ranged from 0 to 10 with a mean of 2.88 (SD = 3.05), indicating

that most of the sample perceived their illness as less symptoms. Almost half of them (45.9%, $n = 39$) reported that they had no symptoms of diabetes at all, while few participants (3.5%, $n = 3$) reported many severe symptoms of diabetes (a score of 10).

2. 'Consequences' (belief toward the affect of illness on their life) ranged from 0 to 10 with a mean of 2.08 ($SD = 3.12$), indicating that most of the sample perceived their illness as having a small effect on their life. Almost two-thirds of them (64.7%, $n = 55$) reported that diabetes mellitus did not affect them, while few participants (4.7%, $n = 4$) reported that diabetes mellitus severely affects them (a score of 10).

3. 'Scale of timeline' (belief toward the duration and continuity of their illness), ranged from 0 to 10 with a mean of 9.18 ($SD = 2.66$), indicating that most of the sample perceived their illness as lasting for a long time. Almost all of them (90.6%, $n = 77$) reported that it had still existed last long, while few participants reported (7.1%, $n = 6$) that they thought diabetes would absolutely be vanished in a very short time from their lives.

4. 'Personal control' (belief toward self improvement of their illness) ranged from 0 to 10 with a mean of 6.13 ($SD = 2.23$), indicating that most of the sample perceived that their illness could be controlled by themselves moderately. Approximately half of them (51.9%, $n = 44$) reported that they could control diabetes moderately (a score of 5-6), while only one participant (1.2%) reported that he could control its well (a score of 9).

5. 'Treatment control' (belief toward the effectiveness of treatment on their illness) ranged from 3 to 10 with a mean of 7.74 ($SD = 1.95$), indicating that most of the sample had high belief of the effectiveness of treatment on their illness. Almost two-thirds of them (62.2%, $n = 52$) reported that they strongly believed, that it is treatable by an effective treatment (a score of 8-10), while only one participant (1.2%, $n = 1$) reported that he thought treatment of diabetes could rarely help (a score of 3-4).

6. 'Emotional response' (perception about their affected feeling toward the illness) ranged from 0 to 10 with a mean of 1.22 ($SD = 2.23$), indicating that most of the sample perceived that their illness rarely affect their feeling. Almost three-fourths of them (75.3, $n = 64$) reported that they was not at all affected emotionally by their illness (a score of 0), while only one participant (1.2%, $n = 1$) reported that their illness extremely affected their feeling (a score of 10).

7. 'Concern of illness' (worry about their illness) ranged from 0 to 10 with a mean of 2.19 (SD = 3.24), indicating that most of the sample rarely worried about their illness. Almost two-thirds of them (63.5%, $n = 54$) reported that they were not at all concerned with their illness (a score of 0), while few participants (4.7%, $n = 4$) reported that they were extremely concerned with their illness (a score of 10).

Similarly, all of the illness representations were not normally distributed and not balance of skewness.

Table 9. Descriptive Statistics of Illness Representations Variables (N=85)

Variable	Range		Mean	SD	KS test*
	Possible	Actual			
Identity	0-10	0-10	2.88	3.05	.01
Consequences	0-10	0-10	2.08	3.12	.01
Timeline	0-10	0-10	9.18	2.66	.01
Personal control	0-10	0-10	6.13	2.23	.01
Treatment control	0-10	3-10	7.74	1.95	.01
Emotional response	0-10	0-10	1.22	2.33	.01
Concern of illness	0-10	0-10	2.19	3.24	.01

*Note: KS test = Kolmogorov-Smirnov Test

The rank-order of belief what caused diabetes perceived

Table 10 presents the cause of diabetes that was perceived by the sample. It was found that the five leading causes of their illness perceived by the sample included: 1) heredity ($n = 27$, 31.8%), 2) eating habit; eating food too much ($n = 15$, 17.6%), 3) eating sugary food ($n = 14$, 16.5%), 4) obesity ($n = 6$, 7.1%), and 5) malfunction of pancreas ($n = 5$, 5.9%). The other remaining causes of diabetes which were perceived by the sample included being aged, stress, fate/having Karma, alcohol and soda consumption, irregularity of body insulin, co-morbid jaundice, and taking monosodium glutamate in food.

Table 10 Frequency and Rank-Order of Belief What Caused Diabetes Perceived by Persons with Type 2 Diabetes. (N =85)

Perceived causes of diabetes	Number	percentage
1. Heredity	27	31.8
2. Eating habit / Eating food too much	15	17.6
3. Eating sugary food	14	16.5
4. Obesity	6	7.1
5. Malfunction of pancreas	5	5.9
6. Being aged	3	3.5
7. Stress	3	3.5
8. Fate/having karma	3	3.6
9. Alcohol consumption	2	2.4
10. Soda beverage	2	2.4
11. Irregularity of body insulin	1	1.2
12. Co-morbid jaundice	1	1.2
13. Taking monosodium glutamate in food	1	1.2

Beliefs about medications

Table 11 presents description of beliefs about medications of persons with type 2 diabetes mellitus. Accordingly, beliefs about medications were divided into two dimensions: necessity of medications and concern about medications. The score on necessity of medications ranged from 12 to 25 out of 25 with a mean of 19.49 (SD = 3.28), while concern about medications ranged from 5 to 25 out of 25 with a mean of 12.88 (SD = 3.40). These findings indicated that the majority of the sample perceived the necessity of using oral hypoglycemic medications. Approximately, half of them (56.6%, n = 23) reported that they agreed with the necessity of oral hypoglycemic for their illness (range score: 20-25) and no one strongly disagreed in each item of the questionnaire, while there were only two participants (2.4%, n = 2) who had a score of twelve (the lowest score of the sample).

In addition most of the sample rarely worried about using oral hypoglycemic medications. About half of them (58.8%, n = 50) reported that they rarely worried

about using the medications (range score: 5-12), while few participants (3.6%, $n = 3$) worried about it (range score: 21 – 22).

Table 11. Descriptive Statistics of Beliefs about Medications (N=85)

Variable	Range		Mean	SD	Skewness
	Possible	Actual			
Necessity of medications	5-25	12-25	19.49	3.28	-.13
Concern about medications	5-25	4-24	12.88	3.12	.82

Part II: The Relationships of Illness Representations and Beliefs about Medications to Adherence to Oral Hypoglycemic Medications

Table 12 shows the correlation between independent variables (cognitive representation of illness, emotional representation of illness, and beliefs about medications) and medication adherence. For cognitive representation of illness variables, identity ($r = -.32$, $p = .03$) and consequences ($r = -.36$, $p = .001$) were negatively correlated with medication adherence. These results indicated that the more number of illness symptoms the participants perceived, the less adherence to oral hypoglycemic medications they performed. In addition, the more impact of diabetes on their life they perceived, the less adherence to oral hypoglycemic medications they performed as well. However, timeline, personal control, and treatment control were not significantly correlated with medication adherence.

Regarding the relationship between emotional response and concern about illness, and medication adherence, was negatively correlated with medication adherence ($r = -.40$, $p = < .01$), indicating that the more concern about illness the participants perceived, the less adherence to oral hypoglycemic medications they performed.

Additionally, regarding the beliefs about medications variables, necessity of medications was positively correlated with medication adherence ($r = .26$, $p = .015$), indicating that those who had high perception of necessity of oral hypoglycemic medications were associated with those who had more adherence to oral hypoglycemic medications. Nonetheless, concern about medications was negatively correlated with

medication adherence ($r = -.43$, $p = .01$), indicating that persons with type 2 diabetes who had much concern of their illness were associated with the less adherence to oral hypoglycemic medications.

Table 12. Spearman's rho Correlation Coefficients of Illness Representations (except cause's variable) and Beliefs about Medications to Adherence to Oral Hypoglycemic Medications (N=85)

Variable	Medication adherence	
	r	p
Cognitive representation of illness		
Identity	-.32	.033
Consequences	-.36	.001
Timeline	-.32	.772
Personal control	-.153	.162
Treatment control	-.009	.935
Emotional representation of illness		
Emotional response	-.20	.063
Concern about illness	-.40	<.001
Beliefs about medications		
Necessity of medications	.26	.015
Concern about medications	-.43	<.001

CHAPTER V

DISCUSSION

This chapter presents discussion of the findings, which is divided into two parts: description of the sample and the relationships among the study variables, as well as an interpretation of the findings.

Part1. Description of the Sample

Demographic characteristics

The sample in this study consisted of 85 persons with type 2 diabetes. The young-old age group (60-74 years) was the majority of the sample, followed by the group of 40 to 59 years old. This finding is congruent with a survey in 5,105 people with age 35 years old and older by the International Collaborative Study of Cardiovascular Disease in Asia (Aekplakorn et al., 2003). The survey discovered an increased prevalence of diabetes in Thailand with advanced age, especially people aged over 55 years, which was accounted for 63% of the sample (Aekplakorn et al., 2003). In addition, Thiti Snabboon (B.E.2543:15) stated that type 2 diabetes was frequently found in mid-aged persons and more increasing prevalence in the older. Likewise, the survey of Health System Research Institute: Bureau of Policy and Strategy (Office of the Permanent Secretary of Ministry of Public Health, B.E.2549) found that the prevalence of diabetes is increasing in the older group, which the highest of age was range 60-69 years. Existing diabetes in the older persons is a very important issue because the increasing rate was rapid from 6.8% in 1994 to 9.4% in 2002 and up to 10.7% in 2007 (Office of the National Economic and Social Development Board, 2007 as cited in Daily News Newspaper, 2007). Especially, the high detection of the survey of diabetic prevalence is found in the age range of 60-69 years old and tends to be higher in the advanced age. Type 2 diabetes is related to insulin resistance and relative with insulin insufficiency of aging and pathophysiology mutation. The related factors of insulin resistance include obesity, lacking of exercise,

or some kinds of medicines such as diuretic drugs (DeFronzo, 2004).

This study found that females outnumbered males of having diabetes. Similarly, a study by Aekplakorn and colleagues (2003) found the diabetes prevalence in males as 9.3%, and females as 9.9%. Health System Research Institute, Bureau of Policy and Strategy, (Office of the Permanent Secretary of Ministry of Public Health, B.E. 2549) conducted a survey study during 2003-2004 in persons aged 15 years and older and found that the diabetes prevalence was 6.7% in total, but 6.4% in males and 7.3% in females and tended to increase when they were older. In addition, the study discovered the highest prevalence in people aged 60-69 years, with 13.8% in males and 18.9% in females. Probably, one of the possible explanations is that the aging population (older than 60 years) of female clearly increases more than males and tends to rise from 10.8% in 2003 to 11.6% in 2006. Occasionally, aging males rise from 9.1% in 2003 to 9.6% in 2006. (National Statistical Office, Ministry of Information and Communication Technology, B.E. 2550).

About 89.4%, of the sample in this study were married and 58.8% have still lived with their spouse. This finding is similar to a study of Chutitana Werawathanachai (B.E. 2545), which found that almost all of the sample had married (92%) and more than half (68%) still lived with their spouse. Most of the sample in this study (63.5%) were housekeeper or unemployed. This could be explained that more than half of the sample (57.6%) aged over 60 years who were old age or retired persons. Almost half of them (45.9%) finished primary school and informal education (14.1%). In the past, there was no education regulation for the people. However, in 1973, the government enacted education regulations and revised on 2003 to determine that all people have to graduate basement education at 9 grades (secondary school) (Office of the National Education Commission, B.E. 2549), and in the latest 2007, it had been revised to be at least 12 grades of education (high school) (Kumpanat Srichua, B.E. 2550).

The entire sample did not report their problem of hospital expenditure because the Thai Constitution in B.E. 2540 determines that all Thai people have the equally common right to reach deserved service of public health. In Thailand, there are several insurance/security schemes such as the Universal Coverage to access healthcare

services for poor persons, social security insurance, clinical welfare for government officers, employees, or state enterprise's employees, and ministerial welfare. However, in this study, two-thirds of the sample received welfare government (i.e., government welfare, social security insurance, Universal Healthcare Coverage (namely, Golden Card), company welfare, and ministerial welfare, while one-third paid by themselves because they denied their first line hospital in the catchments area where they had their right to use healthcare services.

More than half of the sample in this study (61.2%) had personal monthly income lower than 10,000 Baht. Nonetheless, the average income of the sample (16,638 Baht) was higher than the average income of the nation surveyed in 2006 (5,245 Baht) (National Statistical Office, Ministry of Information and Communication Technology, 2007). Almost all of the sample (91.8%) reported that they had adequate income, although almost 60% of them were older persons. The possible explanation is that their income was supported by the pension and by family for daily expenditure. Moreover, the sample can reimburse the hospital expenditure from their welfare. For persons with self-payment, they could afford the hospital expenditure because the research setting is the government hospital, which is not too expensive to afford. For the religious belief, it is not surprising that almost all of the sample (92.9%) were Buddhist, while few were Islamic. This finding is probably due to the King Chulalongkorn Memorial Hospital is located in the Buddhist residential area and basically most Thai natives are Buddhist.

Clinical data

Regarding the body mass index (BMI) in this study, females had body mass index (BMI) higher than did males. A mean of body mass index in female was 27.38 kg/m², while that of male was 26.81 kg/m², which are regarded as overweight (WHO Expert Consultation, 2004). The BMI is an acceptable proxy for thinness and fatness, and has been directly related to health risks, such as type 2 diabetes and cardiovascular disease (American Diabetes Association, 2006). On the basis of the available data in Asia, the World Health Organization (WHO) Expert Consultation concludes that Asians generally have a higher percentage of body fat than white people of the same age, gender, and BMI. Also, the proportion of Asian people with risk factors for type 2

diabetes and cardiovascular disease is substantial, although the BMI is below the existing WHO criteria of BMI cut-off point of 25 kg/m². Thus, The BMI cut-off point for observed risk in different Asian populations varies from 22 to 25 kg/m² (WHO Expert Consultation, 2004). Based on the BMI cut-off point for Asian populations, 74.1% of the sample in this study were classified as overweight/ obesity, while 54.1% of this sample were classified as such with the WHO criteria of BMI.

The duration of having diabetes of the sample in this study ranged from 5 months to 30.42 years with a mean of 8.98 years. However, the majority of the sample (60%) had duration of diabetes less than 15 years. This can be explained that persons with type 2 diabetes for longer than 15 years might be unable to follow-up at the outpatient department. The reasons may be that the disease is advancing, resulting in poor functional ability, and having a problem of limited transportation.

Almost 70% of the sample were diagnosed as type 2 diabetes with co-morbidity. The most common co-morbidity was cardiovascular disease by which two-thirds of the sample had hypertension and about 14% of the sample had ischemic heart disease. This finding is congruent with American Diabetes Association (2006), which reports that cardiovascular disease is the major contributor to morbidity of diabetes. Type 2 diabetes is an independent risk factor for macrovascular disease, and its common coexisting conditions (e.g., hypertension and dyslipidemia) are also risk factors.

Testing type of the sample in this study included fasting blood sugar (FBS), glycosylated hemoglobin (A1C), triglyceride, cholesterol, high-density lipoprotein (HDL), low-density lipoprotein (LDL), blood urea nitrogen (BUN), and creatinine. It is noticed that the average of fasting blood sugar (136.4 mg/dl) and glycosylated hemoglobin (7.6%) in this sample were slightly higher than the recommendations of American Diabetes Association (ADA, 2006). The standard of medical care in diabetes of American Diabetes Association (ADA, 2006) has determined the goal of diabetes treatment as follows: the preprandial capillary plasma glucose of 90-130 mg/dl, A1C of less than 7 %, and lipid control (triglyceride < 150 mg/dl, HDL > 40 mg/dl, and LDL < 100 mg/dl). In this study, the average of lipid profile was roughly close to the recommended values by the ADA (2006). Also, the average of renal function parameters was in the normal limit. The possible explanations are that: 1) this sample was those who came to the follow-up at the hospital, so they tended to perform

self-care (such as taking medications, controlling diet) as prescribed by doctors and nurses; 2) most participants in this sample had diabetes less than 15 years, thus, the diabetic complications tend to be less complex than those who have longer diabetes. This finding is congruent with the United Kingdom Prospective Diabetes Study (UKPDS, 1995), which found that the longer duration of having diabetes, the more difficulty in glycemic control.

According to the ADA (2006), the target goal of treatment is the A1C value of less than 7%. In this study, the participants who met this goal (35.3% of the sample) were the ones who had never stopped taking hypoglycemic medications. This finding supports the usefulness of adherence to oral hypoglycemic medication on glycemic control. In addition, the participants who had A1C higher than 10% ($n = 5$), tended to be overweight. This finding is congruent with Dilley and colleagues' (2007) study, which found that A1C showed a significant association with BMI ($\beta = 0.017$, $P < .001$). Ohnishi et al. (2006) stated that overweight people's tissue has mutation, resulting in decreasing capability of insulin, or insulin resistance, and hence, decreasing to move glucose to cells and blocking glucose metabolism within cells, leading to uncontrollable blood glucose. Thus, a choice to lower A1C is weight control in persons with diabetes. In persons with overweight/obesity, biguanide (e.g., metformin), a group of oral medications to treat diabetes, is widely used because it can reduce glucose absorption in the intestines and inhibit the liver's glucose synthesis. In addition, it can induce loss of appetite (Mensing et al., 2000; Varaphon Vongthavaravat, B.E. 2548). If persons with diabetes take their prescribed medications regularly, it should help their glycemic control.

Medication use

The duration of oral hypoglycemic medication use ranged from .42 years (5 months) to 30.42 years with a mean of 8.76 years, while the duration of diabetes was 8.99 years. With regard to the participants, the average of medication use was slightly shorter than the average of duration. It can be explained by the type 2 diabetes treatment modalities in that the treatment modalities are most commonly prescribed in a stepwise fashion, beginning with lifestyle modification and sequentially adding one or more oral hypoglycemic medications and insulin (Warren, 2004). It is possible that

this sample was tried with lifestyle modification until the glycemic control was ineffective, and then the oral hypoglycemic medications played a role.

Almost two-thirds of the participants (61.2%) used oral hypoglycemic medications longer than five years, and more than half of them (62.4%) have been diabetes for more five years. It is noticed that the participants with the diabetes were prescribed oral hypoglycemic medications since the early phase of having diabetes, indicating that almost all of them were unable to control their diabetes with only life modification modality such as diet control or exercise.

Most of the participants (87.1%) used oral hypoglycemic medications prescribed by the physician only, and almost 13% used both prescribed and non-prescribed medications. Similarly, several studies found that most of the persons with diabetes took prescribed medications regularly, but some attempted to find some other medications or other allied treatments, such as buying over-the-counter medications, seeking folk treatment, and herbal medications use etc. (Chantra Borisut, B.E. 2540; Malee Jumnonpol, B.E. 2540; Noppawan Assawarat, B.E. 2536). Kosachunhanun, Limpijarnkit, Kosachunhanun, Vashiranakorn, and Mangklabruks (2002) found that almost half of the sample of persons with diabetes (47%) took at least one dose of herbal medications for diabetes treatment.

In this study, about 13% of the sample reported many reasons to stop using oral hypoglycemic medications. These reasons included: 1) having upset symptoms; 2) trying other alternative medications; 3) inadequate medications until the next follow-up; 4) financial problem; and 5) boredom of medications use. On the other hand, most of the sample (87.1%) never stopped medications use. Findings in this study indicated that most participants had willingness to take oral hypoglycemic medications prescribed by the physician continuously and only few of them stopped using the medications with various reasons; for example, 'inadequate medications until the next follow-up' occurred when the appointment to see their physicians was interrupted by another social event, although they did not intend to stop their medications.

The reasons for stopping the medications in diabetes persons are congruent with Busara Kertpuengboonpracha's (B.E.2534) study with in-depth interviews in 20 persons from a community hospital. It was found that when symptoms changed, patients' behaviors also changed. Ten patients did not complete all of the prescribed

doses due to different reasons. Self-adjustments of dosage were found in five persons. The key reason for the self-adjustments was self-detection of irregular symptoms. In addition, this study showed that persons with diabetes decided to stop, suspend or adjust their prescribed medications, because of their belief in the efficacy of herbal medicine which they heard from their social networks. This finding is similar to Wanapa Sritanyarat's (B.E. 2540) qualitative study and Noppawan Assawarat's (B.E. 2536) case-study in that during the early-diagnosed phase of diabetes, the participants prompted to try many kinds of therapies that were advised by others and they reported their use of several treatments to manage their self care.

Regarding the number of daily dose of oral hypoglycemic medications, almost all of the sample (92.9%) took medications more than one dose per day. This could be explained that the current pharmaco-therapeutic regimens begin with the use of a single oral hypoglycemic medications, but when type 2 diabetes persons are unable to control with blood glucose levels, a combination of medications are prescribed. In addition, two thirds of the participants (62.4%) had had diabetes for more than five years. From the United Kingdom Prospective Diabetes Study (UKPDS, 1995), it was found that the longer duration of having diabetes, the more difficulty in glycemic control. This can be explained that pancreatic function in diabetes may continually deteriorate to secrete insulin. Also, persons with a longer duration of having diabetes tend to experience diabetic complications, resulting in difficulty in diabetes control.

Diabetes has been linked with morbidity and metabolic syndrome (such as diabetes, dyslipidemia, and hypertension). Similarly, at each time of dose taking, they would be taking other medications for other diseases (84.7%) such as hypertension (69.4%), dyslipidemia (68.2%), and heart disease (17.7%). These are the top three diseases, which can be found in the participants in this study.

There were symptoms that associated with the medications in 12 participants (14.1%) as well. They had different managements, and individual perceptions, to confront with happened symptoms. Self stopping or adjustment of their medications was the most selected action (n=5) when they perceived abnormality from their oral hypoglycemic medications, which was congruent with the study of Busara Kertpuengboonpracha (B.E. 2534). Principally, the reason of medications self-adjustment in participants was due to their abnormal symptoms when taking oral

hypoglycemic medications. This finding was congruent with Noppawan Asawarat's (B.E. 2536) study, which found that feeling and abnormal symptoms after medications taking of diabetes persons led them to see physicians, to medications adjustment, and avoided taking oral hypoglycemic medications.

Type of oral hypoglycemic medications

Regarding the type of oral hypoglycemic medications, almost all of the participants were prescribed to use sulfonylurea or biguanide for monotherapy or combination therapy. Basically, oral hypoglycemic medications are approved as the first line medications for the management of type 2 diabetes. Consequently, most of the prescriptions to lower blood glucose levels would begin with the use of a single oral medication, usually metformin or a sulfonylurea (Inzucchi, 2002). The most common combination therapies were a sulfonylurea plus metformin (Ohkubo, et al., 1995). In this study, the sample was prescribed with sulfonylureas, as similar as with metformin.

In the United Kingdom (UK), metformin, is widely prescribed as the first-line oral medication, because it is less associated with gain weight and causes less hypoglycemia than other medications (Mensing et al., 2000). In addition, results from the United Kingdom Prospective Diabetes Study (1995) suggested that metformin is more effective than both sulfonylureas and insulin in preventing many complications of type 2 diabetes in overweight persons, and promotes a 30-40% reduction in mortality and aggregated diabetes-related endpoints in comparison with dietary modifications alone (Warren, 2004: S4). The use of metformin is discouraged for persons with an increased risk of renal impairment (creatinine < 1.4 mg/dl) because it was almost eliminated by renal around 90%. In this study, the mean creatinine of the sample was in a normal limit (0.88 mg/dl), which is appropriate to use metformin.

However, sulfonylurea was also widely used medications in the literature. George, Myoung, and Jean's (2001) study and Inzucchi's (2002) study found that sulfonylureas were also the popular first-line oral medications for managing type 2 diabetes. Their safety and efficacy were supported by a wide body of literature, as this group of oral hypoglycemic medications had been used for more than 50 years. Glipizide, the short acting oral hypoglycemic medication in the sulfonylurea group, was more prescribed by the physician than glibenclamide, which is the long acting oral

hypoglycemic medication. In this study, 80% of the sample used glipizide, while 2.4% used glibenclamide. The possible reason is that the long acting oral hypoglycemia medication (e.g., sulfonylureas) has weakness about hypoglycemia-prone medication than the short acting medication (e.g., glipizide). In addition, the majority of the sample in this study was older adults who tend to experience hypoglycemia when using the long acting oral hypoglycemic medications. Some older persons (33%) experience nocturnal hypoglycemia with no sign (Funnell, & Kruger, 2004). The non-sulfonylurea secretagogues such as repaglinide was associated with less pronounced side effects than sulfonylureas, although these medications have yet be assessed for long-term risk/benefit analysis (Perfetti, & Ahmad, 2000 as cited in Warren, 2004). Therefore, there was less repaglinide use in this study.

Medication adherence

The possible scores of medication adherence ranged from 5 to 25, while the scores reported by the sample ranged from 8 to 25 with a mean of 21.46, which is regarded as high. This finding is not congruent with the study of Suwannee Charoenpichitnant (B.E. 2532), which used the interviewing survey and found 64.6% of non adherence in persons with diabetes. In addition, Tassanee Sornjaem (B.E.2546) found that 81.1% of the sample had non adherence behavior to hypoglycemic medications (e.g., taking wrong dose outward prescription, taking wrong time, taking wrong frequency, lacking of the dose or dose ceasing, taking medication outward prescription and self medication buying).

The result of this study showed that most participants had adherence to oral hypoglycemic medications. A possible explanation is that the research setting (the Outpatient Department of King Chulalongkorn Memorial Hospital) is a medical school; thus there are services by well-trained staffs such as endocrinologists and nurses, including staff nurses and advanced practice nurses specialized in diabetes. The provided services include promotion of self-care for diabetic control, and prevention of debilitating complications from diabetes among persons with diabetes. For example, a multidisciplinary team consisting of endocrinologists, advanced practice nurses, dietitians, and so on has been established to provide education and counseling towards glycemic control and self-care to achieve well-being. When

persons with diabetes are unable to achieve their targeted blood glucose level, the service team will help them solve their problems.

The frequency of adherence behavior to oral hypoglycemic medications in five aspects of medication-taking behavior how participants performed to receive oral hypoglycemic medications. Data revealed that the sample tended to rate on the scale “rarely-never” of adherence behavior on both items, “I stop taking them for a while” (89.4%) and “I decide to miss out the dose” (83.5%), indicating that they usually took their oral hypoglycemic medications as prescribed. The participants rarely intended to regulate the dose by themselves, which is congruent with Narisa Srilachai’s (B.E.2540) study and Supparat Paisantuntiwong (B.E.2540)’s study. People with chronic disease prefer treatment services with many physicians’ participation and most of them believed that diabetes was able to treat by modernized medications, principally. Also, the frequency of medication taking of participants was low on the scale “always-often” on the two items, “I take less than instruction” (16.5%) and “I forgot to take them” (8.2%).

Forgetting to take medications (unwilling to nonadherence to medications) was misusing of medication what could be found in elder persons. That was due to aging problem, thus complication of health problem was also rising and losing self-care ability. It is similar to a study of health-promoting behavior in elders with diabetes that found that about half of participants (57%) forgot to taking medication (Kanjana Kasekan, B.E. 2541) and most of them were aged over 60 (57.6%).

Illness representation

The perception based on the Self-Regulatory Model of the sample was presented as follows:

1. Regarding the variable “identity” or the perception of persons with type 2 diabetes toward a number of their experience about illness symptoms; most of the sample perceived their illness as fewer symptoms. Almost half of them (45.9%) reported that they had no symptoms of diabetes at all, while few participants (3.5%) reported many severe symptoms of diabetes. Inconsistently, Busara Kertpuengboonpracha’s (B.E. 2534) case study using in-depth interviews found that the perception and beliefs about symptoms conform their directed experiences and

they all were able to recognize the initial symptoms of diabetes although many years pass.

2. The consequences or the perception toward the effect of illness on their life; most of them perceived their illness as having a small effect on their life. Almost two-thirds of them (64.7%) reported that they were not affected by diabetes mellitus at all. The possible explanation is that the sample might adjust them well with having diabetes. Although they had co-morbidity such as cardiovascular disease or hypertension, they had no symptom distress at the present time, so they might not perceive the high impact of diabetes to their lives. In addition, almost all of the sample (91.8%) had adequate income and clinical welfare. This may function as instrumental support that buffers the effect of stressor to them. Furthermore, two-thirds of the sample (63.5%) were in old age group or retirement persons and they had a low level of concern about illness.

3. Timeline or perception toward the duration and continuity of their illness; most of the sample perceived their illness as lasting for a long time. Almost all of them (90.6%, $n = 77$) reported that it has still existed for the last, while few participants reported (7.1%, $n = 6$) that they thought diabetes will absolutely be vanished in a very short time from their life. Likewise, the study of Noppawan Asawarat (B.E. 2536) found that the majority of a sample of persons with diabetes believed that diabetes is uncurable disease, but the minority hoped it could be curable. The perception of most participants is congruent with the clinical knowledge. This might be because the participants had knowledge from healthcare personnel and they experienced having diabetes for a period of time.

4. Perception toward self improvement of their illness: personal control; the mean score on personal control indicated that the sample perceived that their illness moderately depended on their self-control. About half of them (51.9%, $n = 44$) reported that they could control diabetes by themselves moderately. Basically, diabetes is managed through intensive medical therapy with a tailored, stepwise regimen of lifestyle modifications, oral medications, and insulin (Warren, 2004). The first step toward disease management is a tailored program of diet and physical activity and this assumed hardness and difficulty to do for them. Thus, it is not surprising that the 'personal control' was scored as the moderate range.

5. Perception of their illness treatment: treatment control; most of the sample had a high perception of their illness treatment, meaning that they believed in the treatment prescribed by doctors. Almost two-thirds of them (62.2%, n = 52) reported that they rather believed that it can be treated by effective treatments, while only one participant thought that treatment of diabetes rarely helps. This finding is similar to that of Grant's (2003) study, which reported that persons are more likely to adhere to treatments that they perceive as helpful in alleviating their symptoms as compared to those they do not.

6. Perception toward their affected feeling toward the illness: emotional response; most of the sample perceived that their illness was rarely upset. Almost three-fourths of them (75.3%, n = 64) reported that their illness did not affect their emotion, while only one participant reported as 'extremely affected.' From the data, almost two-thirds of the sample (62.4%) have experienced with diabetes for five years. It might be possible that they spent their time, which is long enough, to adapt themselves to their illness, thus they might not emotionally affected by the illness.

7. Perception toward their illness concerns: concern about illness; most of the sample rarely worried about their illness, indicated by the mean score of 2.19 out of 10. Almost two-thirds of them (63.5%, n = 54) reported that they were not at all concerned, while few participants (4.7%) perceived it as extremely concerned. That is consistent with Busara Kertpuengboonpracha's (B.E.2534) study, which found that they rarely worried about diabetes. It might be that when there is no acute complication of diabetes, persons with diabetes may feel as normal. Thus, concern about illness is not obvious.

8. Perception toward 'causes' of diabetes; almost all perceptions about the 'cause' of diabetes in this sample are congruent to scientific knowledge about diabetes such as heredity, eating too much, obesity, malfunction of pancreas, and so on. These perceptions are congruent with the scientific knowledge. From the study of diabetes risk factors in Electricity Generating Authority of Thailand—EGAT, it discovered principal consequences of diabetes risk factors as follows—obesity which was measured by BMI over 27.5 (multiplied risk 3.4), parents and family members having detected diabetes (multiplied risk 2.9), hypertension (multiplied risk 1.9), age over 50 (multiplied risk 1.8), corpulence or overweight (waist circumference: female > 80 cm.,

males > 90 cm.) (multiplied risk 1.7), and gender: male (multiplied risk 1.5) (Aekplakorn et al., 2006).

From the findings in this study, the perception of the participants about timeline, treatment control, and cause of diabetes are congruent with modern medicines. The possible explanations are that: 1) knowledge about diabetes is widespread. People may know about diabetes through media such as television, radio, and newspaper; 2) almost all of the sample were not newly diagnosed with diabetes. They might be instructed by health care personnel such as physicians, nurses, and dietitians; 3) almost half of the sample (40%, n = 34) graduated from secondary school and higher, thus, they might have learned about diabetes before.

Beliefs about medications

Most of the sample perceived the necessity of oral hypoglycemic medications. Almost half of them (56.6%) reported that they agreed with the necessity of oral hypoglycemic for their illness. No one strongly disagreed in each item of the questionnaire; while there were only two participants who had a score of 12 out of 25 (the lowest score of the sample). Likewise, Noppawan Asawarat's (B.E. 2536) found that most of the sample of persons with diabetes mainly used medications from the hospital. Each one took more than one tablet and no one was bored to take medications because they perceived that the medication is necessary for their disease.

Patumphan Monokulanun (B.E. 2535) examined the perception and belief of persons with diabetes in relation to their self-care behaviors in qualitative case studies of 10 patients. This was a result of their adherence to the doctors' recommendations on dietary control and medication and the consequential improvement of their symptoms. Similarly, a qualitative study by Keeratiyutawong and colleagues (2003) on self-care experiences of persons with type 2 diabetes with difficulty in glycemic control found that all participants recognized the necessity of medication adherence and its health benefits. However, in this study, 10 participants used herbs. Similarly, in a study of Kosachunhanun, Limpijarnkit, Kosachunhanun, Vashiranakorn, and Mangklabruks, (2002), it was found that more than half of persons with diabetes (53%) perceived that herbs are useful all their glucose control.

Most of the sample rarely perceived concerns about using oral hypoglycemic medications, which is similar to findings in existing studies (Narisa Srilachai, B.E.2540; Supparat Paisantuntiwong, B.E.2540). They found that people with chronic diseases will prefer treatment service with much participation of doctors and most of them believed that diabetes is able to be treated by modernized medications.

Part2. Relationships between Independent Variables and Medication Adherence

This section discusses the relationship between variables in the Self-Regulatory Model and adherence to oral hypoglycemic medications in persons with type 2 diabetes. The independent variables consist of three groups: the cognitive representation of illness, emotional representation of illness, and beliefs about medications.

Cognitive representation of illness and adherence to oral hypoglycemic medications

The variables in dimension of cognitive representation of illness includes identity, consequence, timeline, personal control, and treatment control. The negative significant relationship was found between two variables in the cognitive representation of illness: identity ($r = -.32, p = .03$) and consequences ($r = -.36, p = .001$) and medication adherence to oral hypoglycemic medications. In other words, they indicated that the more number of illness symptoms the participants perceived, the less adherence to oral hypoglycemic medications they performed. In addition, the more impact of diabetes on their life they perceived, the less adherence to oral hypoglycemic medications they performed. However, the relationship between identity and medication adherence in this study was different from the previous study (Jessop & Rutter, 2003), which found a positive relationship between symptoms with adherence to medication ($r = .15, p \leq .001$), and consequence with adherence to medication ($r = .18, p \leq .001$). In this present study, the findings are not congruent with Jessop and colleagues' (2003) study, but it can be explained that in a cross-sectional study, the association is not interpreted as causal, but currently correlated.

Thus, it might be that the participants who had higher scores on medication adherence tend to experience fewer undesirable symptoms or adverse consequences, resulting in a negative relationship.

In addition, three variables in the dimension of cognitive representation of illness (timeline, personal control, and treatment control) had no significant relationship with medication adherence. These findings are discussed below.

In this study, timeline had no correlation with medication adherence, meaning that how persons believed about the duration of their diabetes was not associated with how well the sample adhered to medication. The sample in this study had a mean score of timeline of 9.18 out of 10, indicating highly believe that diabetes lasts long. It is possible that the sample were informed about the nature of diabetes by healthcare providers (e.g., physicians, nurses). In addition, most of the sample had been living with diabetes for several years, thus, they might be able to adjust themselves and accepted it as part of life. In addition, the timeline variable might not be as strong as other variables that affected their symptoms that drove them to take medications.

The result of this study revealed that there were no significant relationships of treatment control and personal control to medication adherence. The non-significant relationship between treatment control and medication adherence is similar to the study in persons with asthma (Jessop & Rutter, 2003). From the data in this study, the mean score of medication adherence was high. Together with this finding, it can be interpreted that no matter what perception toward treatment control or personal control is, the participants tend to adhere to oral hypoglycemic medications. A possible explanation is that the participants have known that diabetes is a chronic disease that cannot be cured completely by medications or by themselves; however, they still adhere to medications, possibly, for other reasons such as to control unpleasant symptoms, prevent complications, etc.

Emotional representation of illness with adherence to oral hypoglycemic medications

The result of Spearman's coefficient correlation testing between emotional representation of illness (i.e., emotional response and concern about illness) and medication adherence to oral glycemic control revealed that only concern about illness

was negatively correlated with medication adherence, indicating that the more concern about illness the participants perceived, the less adherence to oral hypoglycemic medications they performed.

Concern about illness had a significant negative relationship to medication adherence. This is congruent with findings in Wanapa Sritanyarat's (B.E. 2540) qualitative study (grounded theory), which explored self-care according to the perspectives of persons with diabetes. It was found that in the beginning, persons with diabetes might or might not understand their emerging symptoms and would start looking for explanations or diagnosis. Once diagnosed, they might experience depression or fears of death, which would drive them to seek treatments. When they were explained the impacts of diabetes on health and could control their fears, they and their families would become more optimistic and hopeful of a cure and would experiment different treatments in order to manage and live with diabetes, which included self-care and medication.

For the result of a negative correlation between concern about illness and medication adherence, the possible reason is that concerns or anxiety may influence implicit (subconscious) learning in making choices, such as decision to exercise or to take medications. Anxiety arousal increases preferences for choices offering short-term benefits at the expense of long-term gains (Gray, 1999 as cited in Cameron, 2003). In this study, concern about illness such as concern of the impact of uncontrolled diabetes on their health and well-being, may stimulate them to take their medication for prevention the adverse outcomes. Therefore, a negative relationship between concern about illness and medication adherence was found.

Findings in this study are consistent with previous studies. Noppawan Assawarat (B.E. 2536) found that persons with diabetes perceived the risks of diabetes complications, causing fears and efforts to take better care of themselves, particularly through medication adherence. Similarly, in persons with hypertension, which is a chronic disease, like diabetes, Orasa Panpakdee (B.E. 2542) found that the patients' reasons for medication adherence as explained by one of them that *"I must keep reminding myself to take the medications. If I stop, I'll become sick again. I don't want*

those symptoms to come back.” This reflects the strict self-management of a person with chronic diseases.

However, this present study did not find the relation between emotional response and medication adherence. It is possible that this study selected the sample in the stable phase. Most of the sample perceived their illness as less symptoms. Almost two-thirds of the sample (62.4%) have been diabetes for longer than five years. Thus, they could adjust themselves with their diabetes. Also, it was found that most of the sample perceived their illness as rarely upset and they were not at all affected emotionally. Perhaps, the sample might use cognitive coping rather than emotional coping to their situation of medication adherence.

Belief about medications and oral hypoglycemic adherence to medication

The result of Spearman’s coefficient correlation testing demonstrated the relationship between belief about medications, consisting of necessity of medications and concern about medications, and medication adherence. It was found that the necessity of medications was positively, significantly related to medication adherence ($r = .26, p < .05$) and concern about medications was negatively, significantly related to medication adherence ($r = -.43, p < .01$). This finding indicated that when necessity of medications increases, medication adherence is also better, but concern about medications increases, medication adherence is worse.

There were studies in persons with diabetes, which are congruent with the perception of necessity of medications and adherence to medication. A qualitative study by Keeratiyutawong and colleagues (2003) on self-care experiences of persons with type 2 diabetes with difficult glycemic control found that all participants recognized the necessity of medication adherence and its health benefits. Similarly, Barnes, Moss-Moris, and Kaufusi (2004) found that necessity of medications is significantly correlated with medication adherence ($r = .36, p < .01$).

The study of Garay-Sevilla and colleagues (1998) examined the role of belief in conventional medicine in persons with type 2 diabetes. Adherence to drug and dietary regimen was tested with multiple regression analysis. It was found that belief in conventional medicine was significantly correlated with medication adherence ($\beta = .46, p < .001$). The result of this study showed personal perception conformed to

prescribed treatment plans, thus a person believed and did along medication instructors. Similarly, Haugbolle, Sorensen, and Henriksen (2002) examined medication- and illness-related factual knowledge, perceptions and behaviors in angina pectoris patients. It was found that medication- and illness-related factual knowledge and perception greatly varied and affected treatment methods and adherence.

A study regarding the perception of concern about medications and medication adherence in persons with type 2 diabetes, Farmer, Kinmonth, and Sutton (2005) found that concern about medications was negatively, significantly associated with the decrease in medication adherence. A participant reported, "*Adhering to hypoglycemic medications made me gain weight,*" which was not desirable for the participant. Accordingly, it is possible to explain the relationship between concern about medications and the medication adherence issue.

In addition, there were some studies on belief and necessity of medications in chronic patients and they represented in the same direction outcome with this study. Iihara and colleagues (2004) using logistic multivariate regression analyses, factors associated with intentional nonadherence were identified as follows: the patients' beliefs with respect to taking medications without anxiety, especially putting no value on mutual reliance on the patient-doctor relationship and putting great value on knowing the drug's side effects and poor comprehension of general aspects of medications.

The outcomes in several studies described in same direction of correlation that was found in this study. Byrne, Walsh, and Murphy (2005) evaluated the benefit of illness perception and belief in predicting secondary preventive behaviors of coronary heart disease. It was found that illness perception approach was not helpful in predicting secondary preventive behaviors such as smoking, exercise, dietary control, alcohol consumption, and drug adherence. However, 7% of variance in adherence can be predicted by belief about medications as follows: necessity of medications and concern about medications.

Similarly, Horne and Weinman (1999) examined persons' personal beliefs about necessity of medications and concern about medications, as well as evaluated the relationships between belief about medications and medication adherence in persons with chronic diseases. Cronbach's coefficient correlation was used to test the

relationship between illness belief and drug adherence. It was found that both necessity of medicine and concern about medications were associated with medication adherence. When the score on concern about medications was higher than the score on necessity of medications, the medication adherence score was low. This means that the more concern about medications the participants perceive, the low medication adherence they perform. In other words, the more necessity of medications the participants perceive, the high medication adherence they perform. Using multiple regression analysis, it was found that the difference between concern about medications and necessity of medications is the best predictor of variance in medication adherence, accounting for 19% of variance.

In conclusion, the variables based on the Self-Regulatory Model including the cognitive representation of illness dimension, emotional representation of illness dimension, and beliefs about medications in this study can partly explain the phenomenon of medication adherence in persons with type 2 diabetes. Although only some variables (Identity, Consequence, Concern about illness, Necessity of medication, and Concern about medication) were significantly correlated with medication adherence behavior, it is premature to conclude that the other variables in this model do not contribute to medication adherence. Thus, further study should be explored in other populations or settings. The discussion of the findings is presented as aforementioned.

CHAPTER VI

CONCLUSION

The chapter presents summary of the study, recommendation for nursing and future study.

Summary of the Study

This cross-sectional study was conducted to examine the relationships of factors related to illness representations (except the 'causes' variable) and beliefs about medications to adherence to oral hypoglycemic medications in person type 2 diabetes who attended the Diabetic clinic and Internal medical clinic of King Chulalongkorn Memorial Hospital. Data were collected using a questionnaire: the demographic characteristics, illness representation, adherence behavior to oral hypoglycemic, and beliefs about medications.

The results were summarized as follows: A total of 85 participants agreed to participate in the study. The average age was 61.25 years old and young-old (60-74) age groups with total percentage 87.1 of the sample. The majority were female (62.4%) and about 58.8% were married. Almost half of the sample (45.9%, n = 39) finished primary school, and almost two-thirds of them (63.5%, n = 54) were housekeeper or unemployed.

The sample were supported from the government welfare (56.5%, n = 48) and more than half of the samples (61.2%, n= 52) had personal monthly income lower than 10,000 Baht. Almost all of the sample (91.8%, n = 78) had adequate income, and 41.2% (n = 35) had enough money for saving. The majority of them were Buddhist (92.9%, n= 79).

The average duration of diabetes was 8.98 years and duration of oral hypoglycemic medications use was 105.07 month. About 68.2% were diagnosed as type 2 diabetes with co-morbidity and the most common (63%) co-morbidity was cardiovascular disease. Almost two-thirds of the sample (61.2%, n = 52) used oral

hypoglycemic medications longer than five years and most of their medication (87.1%, $n = 74$) were prescribed by the physician. About 12.9% had ever stopped using oral hypoglycemic medications, while most of them (87.1%, $n = 74$) continued using and had never to stopping the medications.

Clinical data of the sample revealed an average FBS of 136.4 mg/dl, A1C of 7.60%, Triglyceride of 140 mg/dl, and LDL of 116.33 mg/dl. Male participants had body weight than did female, but body mass index was contrary. Regarding daily dose prescription, one time per day was prescribed only 2 medications (glipizide and metformin). Most of them (80%, $n = 68$) were prescribed sulfonylureas (short acting; glipizide) and (84.7%, $n = 72$) were prescribed biguanide (metformin) by the physicians.

The mean score of medication adherence behavior ranged from 8 to 25 with a mean of 21.46 (SD = 4.06), indicating that the majority of this sample adhered to their oral hypoglycemic medications. Most of the sample perceived the necessity of medications, but rarely reported their concern with using oral hypoglycemic medications.

The perceptions of the sample base on the Self-Regulatory Model dimensions and presented as follow: The possible score of each variable in this section ranges from 0 to 10, by which 0 means 'not at all believe' and 10 means 'extremely believe' in that item.

1. Perception of persons with type 2 diabetes toward a number of their experience about illness symptoms: identity; almost half of them (45.9%) reported that they had no symptoms of diabetes at all, while few participants (3.5%) reported many severe symptoms of diabetes (a score of 10).

2. Perception toward the effect of diabetes on their life: consequences; almost two-thirds of them (64.7%) reported that diabetes mellitus did not affect them, while few participants (4.7%) reported that diabetes mellitus severely affects them (a score of 10).

3. Perception toward the time-course of the treatment: timeline; almost all of them (90.6%) reported that it had still existed last long, while few participants reported (7.1%) that they thought diabetes would absolutely be vanished in a very short time from their lives.

4. Perception toward about their own ability to control of diabetes: personal control; approximately half of them (51.9%) reported that they could control diabetes moderately (a score of 5-6), while only one participant (1.2%) reported that he could control its well (a score of 9).

5. Perception about the potential to treat: treatment control; almost two-thirds of them (62.2%) reported that they strongly believed, that it is treatable by an effective treatment (a score of 8-10), while only one participant (1.2%) reported that he thought treatment of diabetes could rarely help (a score of 3-4).

6. Personal feelings toward diabetes: emotional response; almost three-fourths of them (75.3) reported that they was not at all affected emotionally by their illness (a score of 0), while only one participant (1.2%) reported that their illness extremely affected their feeling (a score of 10).

7. Personal concerns toward diabetes: concern about illness; almost two-thirds of them (63.5%) reported that they were not at all concerned with their illness (a score of 0), while few participants (4.7%) reported that they were extremely concerned with their illness (a score of 10).

8. Perception toward the cause of type 2 diabetes: cause, almost though that heredity was the principal cause (31.8%), followed by eating habits (eating a large amount of food and sugar), obesity, malfunction of pancreas, and so forth.

Concerning the dimension of cognitive representations of illness, identity ($r = -.32$, $p = .03$) and consequences ($r = -.36$, $p = .001$), were negatively correlated with medication adherence, while timeline, personal control, and treatment control were not significantly correlated with medication adherence. Regarding the dimension of emotional representation of illness, concern about illness was negatively correlated with medication adherence ($r = -.40$, $p = < .01$), while emotional response was not significantly related to medication adherence.

For the beliefs about medications, the necessity of medications was positively correlated with medication adherence ($r = .26$, $p < 0.05$) and concern about medications was negatively correlated with medication adherence ($r = -.43$, $p < .01$).

Limitation of the Study

1. A cross-sectional design was conducted for this study to explain the relationships between selected factors and the adherence to oral hypoglycemic medications in persons with type 2 diabetes according to the framework of Self-Regulatory Model. Using this design, a conclusion about the causal relationship cannot be drawn. This design also has a limitation in making an assessment of changes over time of medication adherence.

2. This study was conducted among persons who came for follow up at the Medical Outpatient Department, King Chulalongkorn Memorial Hospital, which is a tertiary hospital and provides service by specialists in diabetic care. Therefore, the finding this study may have limitation to generalize to persons with diabetes who receive treatment from different settings. Notwithstanding, the sample was conducted in the hospital in which these participants tended to perform self-care and medication adherence, thus, this finding may not represent persons with diabetes who did not seek healthcare services at hospital.

Recommendation for Nursing Practice

From findings of this study, the variable(s) in the dimension of cognitive representation of illness, emotional representation of illness, and belief about medications were significantly correlated with medication adherence in persons with type 2 diabetes. Therefore, healthcare personnel should assess their perception prior to giving intervention to promote medication adherence. Understanding their perception toward their illness both cognitive and emotional dimensions will help the personnel tailor the intervention to fit to their cultural beliefs, religious beliefs, lifestyles, and behavior. Also, beliefs about medication (necessity of medication and concerns about medication) of persons with type 2 diabetes should be assessed so that health care personnel can provide knowledge about medications appropriate to the clients' health state.

Regarding the education method about medications for persons with type 2 diabetes, an effective interaction during the assessment or the intervention must be made to promote patients/clients participation. This way will help personnel to serve

health needs of the patients/clients physically, psychologically, and socially. The successful prescribing and medicine-taking processes should be based on the partnership between patients/clients and professionals. It is necessary that patients/clients and professionals have two-way discussions about illness and medications, which will result in medication adherence, thereby reducing complications and promoting quality of life.

Recommendations for Future Study

1. This study should be replicated at different settings where the persons with type 2 diabetes are more heterogeneous, particularly the sample who does not seek treatment in the hospital so that factors in the study model may explain more variance in medication adherence behavior.
2. A longitudinal design should be considered in further studies since medication adherence changes over time.
3. Beliefs about medications is a significant variable that is correlated with medication adherence, thus, it should be included in an intervention program to enhance medication adherence in persons with type 2 diabetes.
4. Because some variables in this study (e.g., identity, consequences, and concerns about illness) had a negative significant relationship with medication adherence, which are inconsistent with previous studies; thus, they should be re-examined in this population.

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APPENDIX A

การพิทักษ์สิทธิของผู้ให้ข้อมูลการวิจัย

เอกสารชี้แจงข้อมูล/คำแนะนำแก่ผู้เข้าร่วมการวิจัย
(Patient/Participant Information Sheet)

ชื่อโครงการ ความสัมพันธ์ของการแสดงออกต่อความเจ็บป่วยและความเชื่อเกี่ยวกับยากับความ
สม่ำเสมอในการรับประทานยาตามระดับน้ำตาลของผู้ที่เป็นเบาหวานชนิดที่ 2

ชื่อผู้วิจัย นางสาวนภาพร รุจิเสถียร

สถานที่วิจัย โรงพยาบาลจุฬาลงกรณ์

บุคคลและวิธีการติดต่อเมื่อมีเหตุฉุกเฉินหรือความผิดปกติที่เกี่ยวข้องกับการวิจัย

นางสาวนภาพร รุจิเสถียร หมายเลขโทรศัพท์ 0-2256-4261, 08-3697-0444

หรือ สำนักงานจริยธรรมการวิจัย หมายเลขโทรศัพท์ 0-2256-4455, 4493 ต่อ
14, 15

ความเป็นมาของโครงการ

ในปัจจุบัน พบว่า ประชากรไทยมีอัตราการป่วยและภาวะแทรกซ้อนจากเบาหวานจำนวน
มากขึ้น ซึ่งการเกิดภาวะแทรกซ้อนจากเบาหวานสามารถป้องกันหรือชะลอได้ โดยการจัดการดูแล
ตนเองตามแผนการรักษา ในเรื่อง การควบคุมอาหาร การออกกำลังกาย การจัดการความเครียด การ
ใช้ยา และการดูแลเพื่อป้องกันภาวะแทรกซ้อนได้อย่างถูกต้อง ซึ่งการปฏิบัติดังกล่าวเป็นเรื่องที่ต้อง
กระทำอย่างต่อเนื่อง

อย่างไรก็ตาม พบว่า บุคคลที่เป็นเบาหวานจำนวนมากประสบปัญหาไม่สามารถปฏิบัติตาม
แผนการใช้ยาได้อย่างต่อเนื่อง และการศึกษาที่ผ่านมาไม่สามารถอธิบายเหตุผลของการปฏิบัติ
พฤติกรรมเกี่ยวกับการรับประทานยาตามระดับน้ำตาลอย่างสม่ำเสมอได้ จึงนำมาสู่การศึกษาในครั้งนี้
ผลจากการศึกษาทำให้เข้าใจสถานการณ์และมุมมองของผู้รับบริการเกี่ยวกับพฤติกรรมการ
รับประทานยา รวมถึงการนำผลการศึกษาไปเป็นแนวทางปรับปรุงรูปแบบและช่วยเหลือบุคคลที่
เป็นเบาหวานในการรับประทานยาตามแผนการรักษาอย่างต่อเนื่อง ซึ่งเป็นส่วนหนึ่งที่ส่งเสริมให้
ผู้ป่วยเบาหวานสามารถควบคุมระดับน้ำตาล

วัตถุประสงค์ เพื่อศึกษาปัจจัยที่มีความเกี่ยวข้องกับความสำเร็จในการรับประทานยากระดับน้ำตาลของผู้ที่เป็นเบาหวานเบาหวานชนิดที่ 2

รายละเอียดที่จะปฏิบัติต่อผู้เข้าร่วมการวิจัย

1. ผู้เข้าร่วมโครงการทุกคนได้รับคำอธิบายทั้งอย่างเป็นทางการและไม่เป็นทางการ โดยผู้วิจัยอธิบายรายละเอียดข้อมูลของโครงการในส่วนวัตถุประสงค์ ขั้นตอนการเก็บรวบรวมข้อมูล และรายละเอียดที่เกี่ยวข้องกับผู้เข้าร่วมโครงการเพื่อขอคำยินยอมเป็นผู้ยินยอมตนในการเข้าร่วมโครงการวิจัย ผู้เข้าร่วมโครงการสามารถซักถามข้อมูลเพิ่มเติมเพื่อประกอบการตัดสินใจเข้าร่วมโครงการหรือซักถามข้อมูลเพิ่มเติมได้เมื่อต้องการ ภายหลังเข้าร่วมโครงการ

2. ผู้เข้าร่วมโครงการได้รับการชี้แจงว่าการตัดสินใจเข้าร่วมโครงการหรือไม่เข้าร่วมโครงการจะไม่มีผลต่อแผนการรักษาหรือการให้บริการและการตัดสินใจเป็นไปโดยอิสระ และหากตัดสินใจเข้าร่วมโครงการแล้ว สามารถถอนตัวออกจากโครงการ ตามต้องการได้โดยไม่ต้องแจ้งเป็นข้อบังคับหรือให้สิ้นสุดโครงการ

3. ภายหลังได้รับการอนุญาต ผู้วิจัยเชิญผู้เข้าร่วมโครงการเข้ามาในสถานที่ที่ได้จัดเตรียมไว้เพื่อขอคำยินยอมและทำการสัมภาษณ์แบบสอบถาม การสัมภาษณ์แบบสอบถามใช้เวลาประมาณ 15-20 นาที

ประโยชน์และผลข้างเคียงที่จะเกิดแก่ผู้เข้าร่วมการวิจัย

ประโยชน์

1. ผู้ป่วยได้มีโอกาสประเมินตนเองในหลายมิติของการรับรู้เกี่ยวกับความเจ็บป่วย
2. ผู้ป่วยได้รับการประเมินความรู้สึกรู้สึกของตนเองเกี่ยวกับความเจ็บป่วย และการรักษา

การเก็บข้อมูลเป็นความลับ

ชื่อและรายละเอียดข้อมูลส่วนตัวของผู้เข้าร่วมโครงการจะถูกเก็บรักษาเป็นความลับ การรายงานผลการศึกษาก็จะเป็นเพียงข้อมูลการวิเคราะห์โดยรวมเท่านั้น และไม่มีการระบุชื่อ

APPENDIX B

แบบสอบถาม

โครงการวิจัยเรื่อง

ความสัมพันธ์ของการแสดงออกต่อความเจ็บป่วยและความเชื่อเกี่ยวกับยากับการรับประทานยา

ควบคุมเบาหวานอย่างสม่ำเสมอของผู้ที่เป็นเบาหวานชนิดที่ 2

เลขที่แบบสอบถาม.....

วันที่ตอบแบบสอบถาม.....

ส่วนที่ 1 แบบบันทึกลักษณะส่วนบุคคล

คำชี้แจง โปรดเติมข้อความลงในช่อง.....หรือทำเครื่องหมาย ✓ ลงใน () ที่ตรงกับความจริงเกี่ยวกับท่าน

1. อายุ.....ปี
2. เพศ (1) ชาย (2) หญิง
3. สถานภาพสมรส (1) โสด (2) สมรส
(3) หม้าย (4) หย่า
(5) แยก
4. ท่านสำเร็จระดับการศึกษาสูงสุดในระดับใด
(1) ไม่ได้รับการศึกษา (2) ประถมศึกษา
(3) มัธยมศึกษาตอนต้น (4) มัธยมศึกษาตอนปลาย/ปวช.
(5) อนุปริญญา/ปวส. (6) ปริญญาตรี
(7) ปริญญาโท (8) ปริญญาเอก
5. อาชีพ (1) รับราชการ/รัฐวิสาหกิจ
(2) พนักงานบริษัท (3) ค้าขาย
(4) เกษตรกรรม (5) รับจ้างทั่วไป
(6) แม่บ้าน/พ่อบ้าน/อยู่บ้านเฉยๆ
(7) อื่นๆ ระบุ.....

6. สวัสดิการค่ารักษาพยาบาล (1) ข้าราชการ/รัฐวิสาหกิจ
(2) ประกันสังคม (3) บัตรทอง
(4) บริษัท / องค์กรต่างๆ (5) จ่ายเอง
7. รายได้ต่อเดือนโดยประมาณ.....บาท
8. รายได้ที่ท่านได้รับ (1) พอใช้และมีเงินเหลือเก็บ
(2) พอใช้แต่ไม่มีเงินเหลือเก็บ
(3) ไม่พอใช้แต่ไม่มีภาระหนี้สิน
(4) ไม่พอใช้ และมีหนี้สิน
9. ท่านนับถือศาสนาอะไร (1) พุทธ (2) คริสต์
(3) อิสลาม (4) อื่นๆ ระบุ.....
10. ท่านทราบว่าเป็นโรคเบาหวานมาเป็นระยะเวลา.....ปี.....เดือน
11. ปัจจุบันมีภาวะแทรกซ้อนจากโรคเบาหวานหรือไม่
(1) ไม่มี (2) มี ระบุ ☐ ตา ☐ ไต ☐ เส้นประสาท ☐ หลอดเลือดแดง ☐ หัวใจ ☐ อัมพาต ☐ อื่นๆ.....
12. ใช้ยารักษาโรคเบาหวานครั้งแรกเมื่อ.....
13. ปัจจุบันท่านรักษาโรคเบาหวานโดยวิธีอื่นด้วยหรือไม่
(1) ไม่ใช่ (2) ใช่ ระบุ.....
14. เคยหยุดใช้ยารักษาเบาหวานเป็นระยะเวลาหนึ่งหรือไม่
(1) ไม่เคย (2) เคย เพราะอะไร.....
15. ปัจจุบันท่านรับประทานยารักษาโรคเบาหวานวันละ
(1) 1 มื้อ (2) 2 มื้อ
(3) 3 มื้อ (4) 4 มื้อ
(5) มากกว่า 4 มื้อ
16. รับประทานยารักษาโรคอื่นด้วยหรือไม่
(1) ไม่ใช่ (2) ใช่ ระบุโรค.....

17. เคยมีประสบการณ์การเกิดผลข้างเคียงจากยารักษาโรคเบาหวานหรือไม่

(1) ไม่เคย

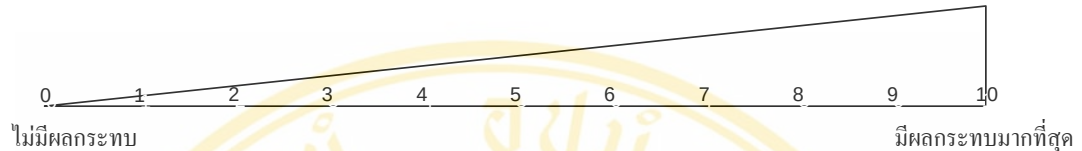
(2) เคยเกิด ระบุอาการที่เกิดและการแก้ปัญหา.....



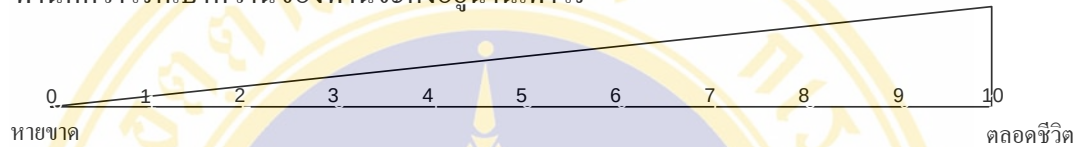
ส่วนที่ 2 แบบสอบถามวัดความคิดเห็นเกี่ยวกับเบาหวานอย่างย่อ

โปรด ☐ ล้อมรอบตัวเลขที่แสดงถึงความคิดเห็นของท่าน

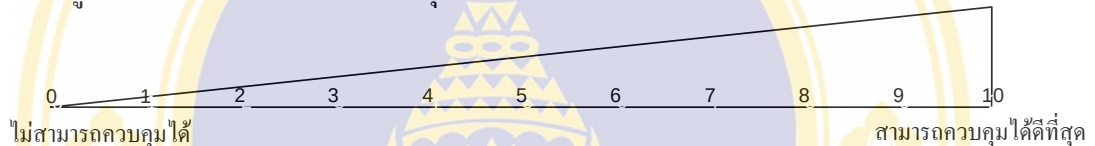
1. โรคเบาหวานมีผลกระทบต่อการดำเนินชีวิตมากน้อยเพียงใด



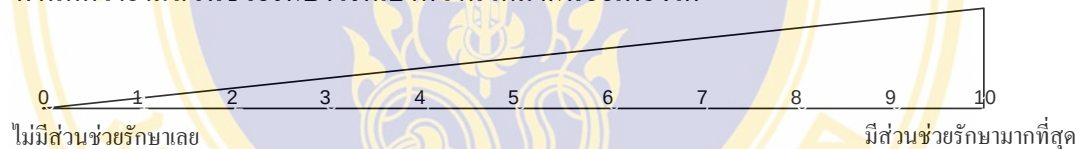
2. ท่านคิดว่าโรคเบาหวานของท่านจะคงอยู่นานเท่าไร



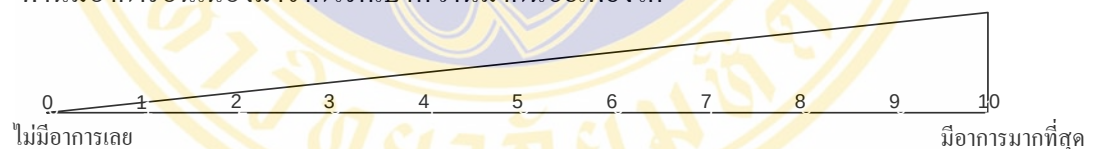
3. ท่านรู้สึกว่าคุณสามารถควบคุมโรคเบาหวานได้มากน้อยเพียงใด



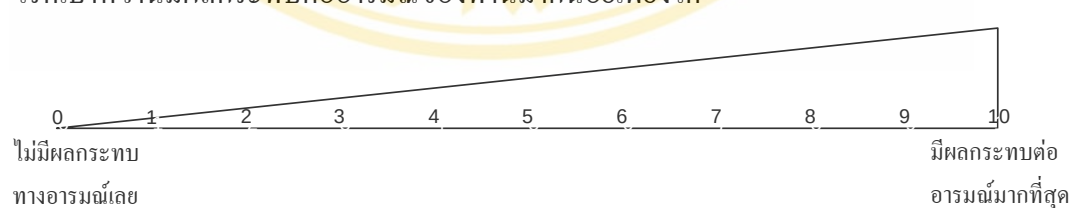
4. ท่านคิดว่ามีส่วนช่วยรักษาโรคเบาหวานได้มากน้อยเพียงใด



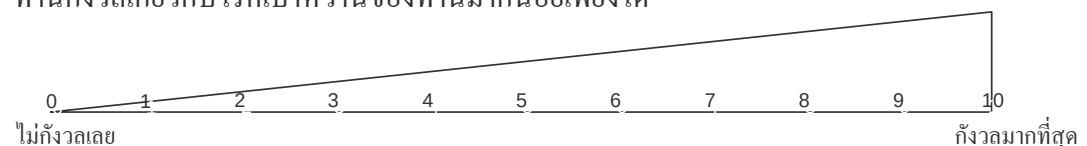
5. ท่านมีอาการอันเนื่องมาจากโรคเบาหวานมากน้อยเพียงใด



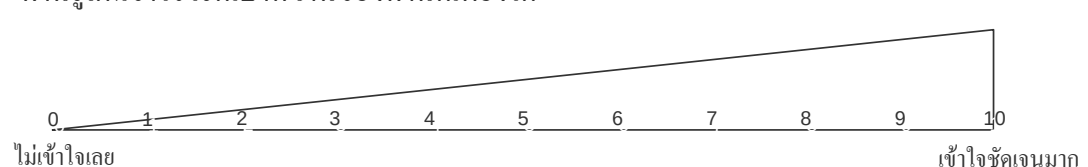
6. โรคเบาหวานมีผลกระทบต่ออารมณ์ของท่านมากน้อยเพียงใด



7. ท่านกังวลเกี่ยวกับโรคเบาหวานของท่านมากน้อยเพียงใด



8. ท่านรู้สึกเข้าใจโรคเบาหวานของท่านดีเพียงใด



9. ท่านเชื่อว่าอะไรเป็นสาเหตุของโรคเบาหวานของท่าน โปรดเรียงลำดับตามความสำคัญจาก 1- 3

1. 2.

3.



ส่วนที่ 3 แบบสอบถามวัดความเชื่อเกี่ยวกับยาลดระดับน้ำตาล

โปรดใส่เครื่องหมาย ✓ ลงในช่องว่างที่ตรงกับความคิดของท่าน

การเลือกตอบให้ถือเกณฑ์ดังนี้

ไม่เห็นด้วยอย่างยิ่ง	หมายถึงเมื่อท่านไม่เห็นด้วยกับข้อความนั้นอย่างมาก
ไม่เห็นด้วย	หมายถึงเมื่อท่านไม่เห็นด้วยกับข้อความในประโยคนั้น
ไม่แน่ใจ	หมายถึงเมื่อท่านไม่แน่ใจว่าเห็นด้วยหรือไม่เห็นด้วยกับข้อความนั้น
เห็นด้วย	หมายถึงเมื่อท่านเห็นด้วยกับข้อความในประโยคนั้น
เห็นด้วยอย่างยิ่ง	หมายถึงเมื่อท่านเห็นด้วยกับข้อความนั้นอย่างมาก

ข้อ	ข้อความ	ไม่เห็น ด้วย อย่างยิ่ง	ไม่เห็น ด้วย	ไม่ แน่ใจ	เห็น ด้วย	เห็น ด้วย อย่าง ยิ่ง
1.	ความจำเป็นเกี่ยวกับยา (1-5) สุขภาพของฉันขณะนี้ขึ้นอยู่กับยารักษาเบาหวาน					
2.	ฉันไม่สามารถมีชีวิตปกติได้ ถ้าขาดยารักษาเบาหวาน					
3.	ถ้าขาดยารักษาเบาหวาน อาการของฉันจะเลวลง					
4.	สุขภาพของฉันในอนาคตจะขึ้นอยู่กับการใช้ยารักษาเบาหวาน					
5.	ยารักษาเบาหวานช่วยทำให้อาการของฉันไม่แย่ลงไปกว่าเดิม					
6.	ความกังวลเกี่ยวกับยา (6-10) การใช้ยารักษาเบาหวานสร้างความกังวลใจให้กับฉัน					

ข้อ	ข้อความ	ไม่เห็น ด้วย อย่างยิ่ง	ไม่เห็น ด้วย	ไม่ แน่ใจ	เห็น ด้วย	เห็น ด้วย อย่าง ยิ่ง
7.	บางครั้ง ฉันกังวลกับผลที่เกิดขึ้นในระยะยาวของการใช้ยารักษาเบาหวาน					
8.	ฉันยังไม่มี ความรู้ ความเข้าใจในยารักษาเบาหวานที่ใช้อยู่					
9.	ยารักษาเบาหวานที่ฉัน ใช้อยู่ ทำให้ชีวิตฉันยุ่งยาก					
10.	บางครั้ง ฉันกังวลว่า ฉันจะพึ่งยารักษาเบาหวานมากไป					

ส่วนที่ 4 แบบสอบถามวัดความสม่ำเสมอในการรับประทานยา

โปรดใส่เครื่องหมาย ✓ ลงในช่องว่างที่ตรงกับการใช้ยาตามระดับน้ำตาลของท่าน ภายใน 1 เดือนที่ผ่านมา

การเลือกตอบให้ถี่ถ้วนดังนี้

ประจำ	หมายถึงเมื่อท่านปฏิบัติตามข้อความนั้นเป็นประจำ
บ่อยๆ	หมายถึงเมื่อท่านปฏิบัติตามข้อความนั้นบ่อยๆ
บางครั้ง	หมายถึงเมื่อท่านปฏิบัติตามข้อความนั้นบางครั้ง
นานๆครั้ง	หมายถึงเมื่อท่านปฏิบัติตามข้อความนั้นนานๆครั้ง
ไม่เคย	หมายถึงเมื่อท่านไม่เคยปฏิบัติตามข้อความนั้นเลย

ข้อ	ลักษณะการกินยาของคุณ	ประจำ	บ่อยๆ	บางครั้ง	นานๆครั้ง	ไม่เคย
1.	ฉันลืมกินยา					
2.	ฉันเปลี่ยนแปลงขนาดยา					
3.	ฉันหยุดกินยาชั่วคราว					
4.	ฉันตัดสินใจหยุดกินยาบางมื้อ					
5.	ฉันกินยาจำนวนน้อยกว่าที่แพทย์สั่ง					

APPENDIX B

Research project:

Record No.

Date :

Part I: Demographic record form

Instruction: Please answer the following questions by filling in or checking in (✓) what agree with your actuality.

1. Age.....years
2. Sex 1) Male 2) Female
3. Marital status
 - 1) Single
 - 2) Married /living together (Please answer question No.4-5)
 - 3) Widowed
 - 4) Divorced
 - 5) Separated
4. Level of education
 - 1) No formal education
 - 2) Primary school
 - 3) Secondary school
 - 4) High school
 - 5) Graduate certificate / Diploma
 - 6) Bachelor degree and higher
5. Occupation
 - 1) Government employee
 - 2) Officiary officer
 - 3) Merchant
 - 4) Farmer
 - 5) General laborer
 - 6) Housekeeper / Unemployed
 - 7) Others
6. Healthcare expenditure andwelfare.
 - 1) Government welfare
 - 2) Self payment
 - 3) Social security insurance
 - 4) Universal health care coverage (Golden card)
 - 5) Ministerial welfare

7. Personal monthly income
 - 1) Less than 5,000 baht
 - 2) 5,000 – 10,000 baht
 - 3) More than 10,000 – 15,000 baht
 - 4) More than 15,000 – 20,000 baht
 - 5) More than 20,000 – 25,000 baht
 - 6) More than 25,000 baht
8. Income adequacy
 - 1) Adequate, but no saving
 - 2) Adequate and saving
 - 3) Inadequate with debt
 - 4) Inadequate without debt
9. Religious
 - 1) Buddhist
 - 2) Islam
 - 3) Christ
 - 4) Other
10. Your duration of diabetes.....years.....months
11. Do you have any co-morbidity?
 - 1) No
 - 2) Yes ☐ Retinopathy
☐ Nephropaty
☐ Neuropathy
☐ Cardiovascular disease
☐ Heart disease
☐ Palarrysis
☐ Other
12. First time of using oral hypoglycemic medication.....
13. Do you use complementary treatmntnt?
 - 1) No
 - 2) Yes, It is
14. Have you ever stopped to taking medications?
 - 1) No
 - 2) Yes, because of
15. Please, specify your daily dose of hypoglycemic medication on each day
 - 1) Once per day
 - 2) Twice per day
 - 3) Three times per day
 - 4) Four times per day
 - 5) More than four times perday
16. Each day of daily dose, do you take another medication else?
 - 1) No
 - 2) Yes, for disease

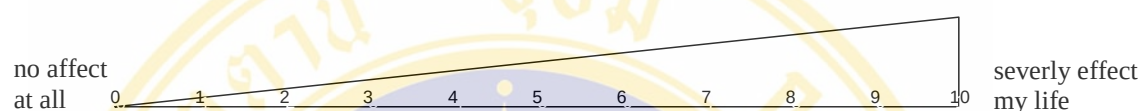
17. Do you have side effect symptoms what associated with oral hypoglycemic medication taking?

- 1) No 2) Yes, specify your symptoms and action

Part II : A brife questionnaires of diabetes attitude test.

Instruction : For the following questions, Please circle ○ the number that corresponds to your views.

1) How much does diabetes affect your life?



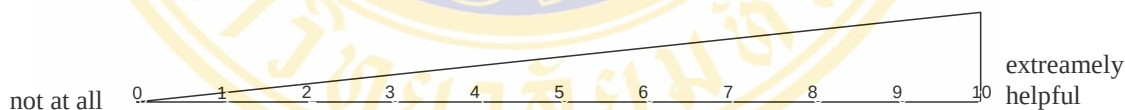
2) How long do you think diabetes will continue?



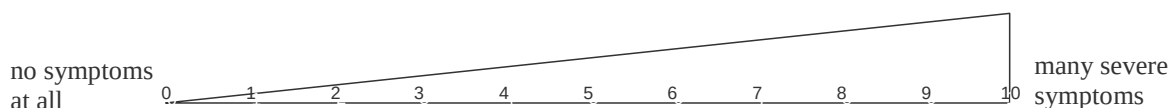
3) How much control do you feel you have over diabetes?



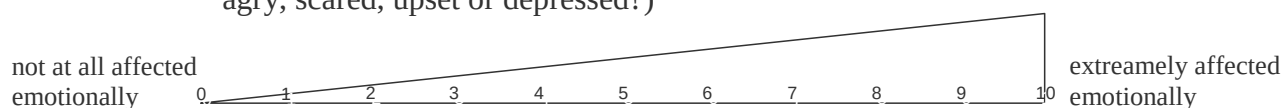
4) How much do you think your medication can help to treat diabetes?



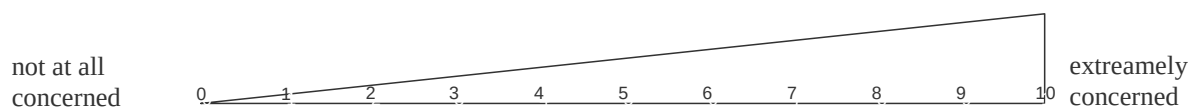
5) How much do you experience symptoms from diabetes?



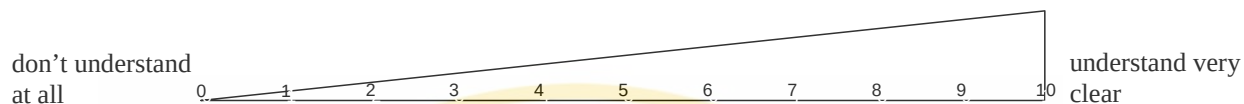
6) How much does diabetes affect your emotionally? (e.g. does it make you agry, scared, upset or depressed?)



7) How concern are you about your diabetes?



8) How well do you feel you understand your diabetes?



9) Please list in rank-order the three most important factors that you believe caused your diabetes.

The most important causes for me:-

1.
2.
3.

Part III : The beliefs about medications questionnaire.

Instruction : Please checking ✓ in to the block that corresponds to your views.

Regulation to consideration

Strongly disagree

Your view strongly disagree with the statement.

Disagree

Your view disagree with the statement.

Uncertain

Your view uncertain with the statement.

Agree

Your view agree with the statement.

Strongly agree

Your view strongly agree with the statement.

	Statement	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
Necessity about medications (1-5)						
1	My health, at present, depends on my oral hypoglycemic medications.					
2	My life would be impossible without my oral hypoglycemic medications.					
3	Without my oral hypoglycemic medications I would be very ill					
4	My health in the future will depends on my oral hypoglycemic medications					
5	My oral hypoglycemic medications protect me from becoming worse					
Concern about medications (6-10)						
6	Having to take oral hypoglycemic medications worries me					
7	I sometimes worry about becoming too dependent on my oral hypoglycemic medications					
8	My oral hypoglycemic medications are mystery to me					
9	My oral hypoglycemic medications disrupts my life					
10	I sometimes worry about becoming too dependent on my oral hypoglycemic medications					

Part IV : Medications adherence questionnaires

Instruction : Please checking ✓ in to the box which best applied to you.

Regulation to answer

Always You always perform in the same way as the statement
 Often You often perform in the same way as the statement
 Sometimes You sometimes perform in the same way as the statement
 Rarely You rarely perform in the same way as the statement
 Never You never perform in the same way as the statement

	Your own way of using oral hypoglycemic medications	Always	Often	Sometimes	Rarely	Never
1	I forgot to take them					
2	I alter the dose					
3	I stop taking them for a while					
4	I decide to miss out the dose					
5	I take less than instructed					

APPENDIX C

Asking and Permission Letter to use the Questionnaires



Conditions for using the**Medication Adherence Report Scale (MARS)**

The MARS is the property of the Principal Investigator (Professor Rob Horne University of Brighton) and may only be used under the following conditions:

1. Explicit permission of the Principal Investigator is granted.
2. The MARS is used ethically
3. The MARS is left completely intact. Items or phrases may not be removed or used in other contexts Additional items may be added at the end.
4. A contribution is made to the psychometric validation of the MARS by sharing data. Please specify the data you are willing to make available (E.g.cross sectional data can be used to test reliability (Cronbach alpha coefficient of the subscales).
5. CIICR publication rights are respected.

Publication rights of MARS

1. The MARS itself may not be published except by its constructors.
2. The MARS constructors have the right to publish their data first. If this is unfeasible publication should be negotiated on a case by case basis.
3. Collaboration should be made with the principal investigator for scoring and analysis of data from the MARS.
4. Publications, which include psychometric data of the module, should include at least one of the module's constructors as a co-author.

User's agreement for the MARS

I have read and accept the above conditions for use of the MARS

Name of user Napaporn Rujisatian

Signature of user



Title of the study: The Relationship of Illness Representations and Belief about Medication to Adherence to Oral Hypoglycemic in Persons with Type 2 Diabetes

Address for correspondence: 1873 Kulpipat Dormitory, Rama 4 Rd., Pathumwan, Bangkok 10330 Thailand (kuiuji@yahoo.com)

Date 26 June 2008

Conditions of Usage Form

Conditions for using the Beliefs about Medicines Questionnaire (BMQ)*

The BMQ is the property of the BMQ Originator (Professor Robert Horne) and may only be used under the following conditions:

1. Explicit permission of the BMQ Originator is granted.
2. The BMQ is used ethically
3. The BMQ is left completely intact. Items or phrases may not be removed or used in other contexts.
4. Modifications to the BMQ are made in collaboration with the Originator.
5. The copyright on modified version remains with the Originator.
6. The BMQ scoring and scale computation must be as specified by the Originator.
7. All copies of the BMQ will have the legend: © Robert Horne clearly indicated on them

Publication rights of the BMQ

1. The BMQ itself may not be published except by its constructors.
2. Publications, which include psychometric data of the BMQ, should include the BMQ Originator as a co-author.

User's agreement for the BMQ

I have read and agree to the above conditions for use of the BMQ

Name of user	MISS NAPAPORN RUJISATIAN
Signature of user	
Address for correspondence	1873 Kulpipat Dormitory, Rama 4 Rd., Pathumwan, Bangkok , 10330 THAILAND
E-mail	kuiruji@yahoo.com
Telephone	+66836970444
Date	14-07-2008

* BMQ validation report: Horne, R., J. Weinman, et al. (1999). "The Beliefs about Medicines Questionnaire: The development and evaluation of a new method for assessing the cognitive representation of medication." *Psychology and Health* 14: 1-24.

BMQ_conditions_03_A280408.doc



F.A.O. Miss Napaporn Rujisatian
1873 Kulpipat Domitory
Rama 4 Rd
Pathumwan
Bangkok
10330
Thailand

Dear Miss Rujisatian

BMQ and MARS permissions

Please find attached your completed forms for BMQ and MARS. Permissions have been granted by Rob Horne and we wish you luck in your studies.

Kind regards,
Amy

Amy Whitehead

Many thanks and kind regards,

Amy Whitehead
Administrator to the Centre for Behavioural Medicine
T 020 7874 1281
F 020 7387 5963
E amy.whitehead@pharmacy.ac.uk

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ส่วนราชการ งานบริการการศึกษา สำนักงานบัณฑิตวิทยาลัย สาขาสาขานามหาวิทยาลัยมหิดล i+22-311-312
 ที่ ศธ 0517.02(ศษ)/ 260 วันที่ 28 มีนาคม 2550
 เรื่อง ขอร้องเรียนเชิญตรวจสอบเครื่องมือวิจัย เพื่อประกอบการทำวิทยานิพนธ์
 เรียน อ.ฉัตรประอร งามอุโฆษ

ด้วย น.ส.นภาพร รุจิเสถียร เลขประจำตัว 4736895 RAAN/M หลักสูตรปริญญาโท สาขาวิชา
 การพยาบาลผู้ใหญ่(หลักสูตรปกติ) คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี กำลังทำวิทยานิพนธ์เรื่อง
 “ความสัมพันธ์ของการแสดงออกต่อความเจ็บป่วยและความเชื่อเกี่ยวกับยากับความสม่ำเสมอในการรับ
 ประทานยาตามระดับน้ำตาลของผู้ที่เป็นเบาหวานชนิดที่ 2” อยู่ในความควบคุมของ อ.ดร.พรทิพย์ มาลาธรรม
 ในการศึกษาวิจัยครั้งนี้ นักศึกษาได้พัฒนาแบบบันทึกลักษณะส่วนบุคคล แบบสอบถามวัดความเชื่อเกี่ยวกับ
 ความเจ็บป่วยอย่างย่อ แบบสอบถามวัดความเชื่อเกี่ยวกับยาตามระดับน้ำตาล แบบสอบถามวัดความสม่ำเสมอ
 ในการรับประทานยา เป็นเครื่องมือในการวิจัยและเพื่อให้เครื่องมือวิจัยดังกล่าวมีความถูกต้องเหมาะสม และ
 ตรงตามเนื้อหาของการวิจัย บัณฑิตวิทยาลัย จึงใคร่ขอร้องเรียนเชิญท่านเป็นผู้ทรงคุณวุฒิตรวจสอบและ
 แก้ไขปรับปรุงเครื่องมือวิจัยเพื่อให้นักศึกษานำเครื่องมือวิจัยมาพัฒนาให้เหมาะสมยิ่งขึ้นต่อไป

จึงเรียนมาเพื่อโปรดพิจารณาอนุเคราะห์ตรวจสอบและแก้ไขเครื่องมือวิจัยดังกล่าว ซึ่ง น.ส.นภาพร
 รุจิเสถียร ได้สร้างขึ้นด้วย จักขอบพระคุณยิ่ง

(ผู้ช่วยศาสตราจารย์ ดร.รวิน ระวิวงศ์)

รองคณบดีฝ่ายการคลังและพัสดุ

ปฏิบัติราชการแทนคณบดีบัณฑิตวิทยาลัย

ติดต่ออาจารย์ที่ปรึกษาวิทยานิพนธ์ อ.ดร.พรทิพย์ มาลาธรรม
 โทร. 089-893-7701



บันทึกข้อความ

ส่วนราชการ งานบริการการศึกษา สำนักงานบัณฑิตวิทยาลัย สาขาสาขามหาวิทยาลัยมหิดล i+22-311-312

ที่ ศธ 0517.02(ศษ)/ 279

วันที่ 28 มีนาคม 2550

เรื่อง ขออนุมัติให้บุคลากรในสังกัดเป็นผู้ทรงคุณวุฒิตรวจสอบเครื่องมือวิจัยเพื่อประกอบการทำวิทยานิพนธ์

เรียน หัวหน้าภาควิชาอาชีวศาสตร์ คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี มหาวิทยาลัยมหิดล

ด้วย น.ส.ภาพร รุจิเสถียร เลขประจำตัว 4736895 RAAN/M หลักสูตรปริญญาโท สาขาวิชาการพยาบาลผู้ใหญ่(หลักสูตรปกติ) คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี กำลังทำวิทยานิพนธ์เรื่อง “ความสัมพันธ์ของการแสดงออกต่อความเจ็บป่วยและความเชื่อเกี่ยวกับยากับความสม่ำเสมอในการรับประทานยาตามระดับน้ำตาลของผู้ที่เป็นเบาหวานชนิดที่ 2” อยู่ในความควบคุมของ อ.ดร.พรทิพย์ มาลาธรรม ในการศึกษาวิจัยครั้งนี้ นักศึกษาได้พัฒนาแบบบันทึกลักษณะส่วนบุคคล แบบสอบถามวัดความเชื่อเกี่ยวกับความเจ็บป่วยอย่างย่อ แบบสอบถามวัดความเชื่อเกี่ยวกับยาตามระดับน้ำตาล แบบสอบถามวัดความสม่ำเสมอในการรับประทานยา เป็นเครื่องมือในการวิจัยและเพื่อให้เครื่องมือวิจัยดังกล่าวมีความถูกต้องเหมาะสม และตรงตามเนื้อหาของกรวิจัย บัณฑิตวิทยาลัย บัณฑิตวิทยาลัย จึงใคร่ขอเรียนเชิญ อ.ฉัตรประอร งามอุโฆษ เป็นผู้ทรงคุณวุฒิตรวจสอบและแก้ไขปรับปรุงเครื่องมือวิจัยเพื่อให้นักศึกษานำเครื่องมือวิจัยมาพัฒนาให้เหมาะสมยิ่งขึ้นต่อไป

จึงเรียนมาเพื่อโปรดพิจารณาอนุมัติด้วย จักขอบพระคุณยิ่ง

(ผู้ช่วยศาสตราจารย์ ดร.รวิน ระวิวงศ์)

รองคณบดีฝ่ายการคลังและพัสดุ

ปฏิบัติราชการแทนคณบดีบัณฑิตวิทยาลัย

ติดต่ออาจารย์ที่ปรึกษาวิทยานิพนธ์ อ.ดร.พรทิพย์ มาลาธรรม

โทร. 089-893-7701



บันทึกข้อความ

ส่วนราชการ งานบริการการศึกษา สำนักงานบัณฑิตวิทยาลัย สาขาสาธิตา มหาวิทยาลัยมหิดล i+22-311-312
 ที่ ศธ 0517.02(ศษ)/ 282 วันที่ 28 มีนาคม 2550
 เรื่อง ขอเรียนเชิญตรวจสอบเครื่องมือวิจัย เพื่อประกอบการทำวิทยานิพนธ์
 เรียน อ.ดร.สิริรัตน์ ลิลาจรัส

ด้วย น.ส.นภาพร รุจิเสถียร เลขประจำตัว 4736895 RAAN/M หลักสูตรปริญญาโท สาขาวิชา
 การพยาบาลผู้ใหญ่(หลักสูตรปกติ) คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี กำลังทำวิทยานิพนธ์เรื่อง
 “ความสัมพันธ์ของการแสดงออกต่อความเจ็บป่วยและความเชื่อเกี่ยวกับยากับความสม่ำเสมอในการรับ
 ประทานยาลดระดับน้ำตาลของผู้ที่เป็นเบาหวานชนิดที่ 2” อยู่ในความควบคุมของ อ.ดร.พรทิพย์ มาลาธรรม
 ในการศึกษาวิจัยครั้งนี้ นักศึกษาได้พัฒนาแบบบันทึกลักษณะส่วนบุคคล แบบสอบถามวัดความเชื่อเกี่ยวกับ
 ความเจ็บป่วยอย่างย่อ แบบสอบถามวัดความเชื่อเกี่ยวกับยาลดระดับน้ำตาล แบบสอบถามวัดความสม่ำเสมอ
 ในการรับประทานยา เป็นเครื่องมือในการวิจัยและเพื่อให้เครื่องมือวิจัยดังกล่าวมีความถูกต้องเหมาะสม และ
 ตรงตามเนื้อหาของการวิจัย บัณฑิตวิทยาลัย จึงใคร่ขอเรียนเชิญท่านเป็นผู้ทรงคุณวุฒิตรวจสอบและ
 แก้ไขปรับปรุงเครื่องมือวิจัยเพื่อให้ นักศึกษานำเครื่องมือวิจัยมาพัฒนาให้เหมาะสมยิ่งขึ้นต่อไป

จึงเรียนมาเพื่อโปรดพิจารณาอนุเคราะห์ตรวจสอบและแก้ไขเครื่องมือวิจัยดังกล่าว ซึ่ง น.ส.นภาพร
 รุจิเสถียร ได้สร้างขึ้นด้วย จักขอบพระคุณยิ่ง

(ผู้ช่วยศาสตราจารย์ ดร.รวิน ระวิวงศ์)

รองคณบดีฝ่ายการคลังและพัสดุ

ปฏิบัติราชการแทนคณบดีบัณฑิตวิทยาลัย

ติดต่ออาจารย์ที่ปรึกษาวิทยานิพนธ์ อ.ดร.พรทิพย์ มาลาธรรม

โทร. 089-893-7701



บันทึกข้อความ

ส่วนราชการ งานบริการการศึกษา สำนักงานบัณฑิตวิทยาลัย สาขาสาธาณมหาวิทยาลัยมหิดล i+22-311-312

ที่ ศธ 0517.02(ศษ)/ 281

วันที่ 28 มีนาคม 2550

เรื่อง ขอเรียนเชิญตรวจสอบเครื่องมือวิจัย เพื่อประกอบการทำวิทยานิพนธ์

เรียน นางสาวบุญจันทร์ วงศ์สุนทรรัตน์

ด้วย น.ส.นภาพร รุจิเสถียร เลขประจำตัว 4736895 RAAN/M หลักสูตรปริญญาโท สาขาวิชา
การพยาบาลผู้ใหญ่(หลักสูตรปกติ) คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี กำลังทำวิทยานิพนธ์เรื่อง
“ความสัมพันธ์ของการแสดงออกต่อความเจ็บป่วยและความเชื่อเกี่ยวกับยากับความสม่ำเสมอในการรับ
ประทานยาลดระดับน้ำตาลของผู้ที่เป็นเบาหวานชนิดที่ 2” อยู่ในความควบคุมของ อ.ดร.พรทิพย์ มาลาธรรม
ในการศึกษาวิจัยครั้งนี้ นักศึกษาได้พัฒนาแบบบันทึกลักษณะส่วนบุคคล แบบสอบถามวัดความเชื่อเกี่ยวกับ
ความเจ็บป่วยอย่างย่อ แบบสอบถามวัดความเชื่อเกี่ยวกับยาลดระดับน้ำตาล แบบสอบถามวัดความสม่ำเสมอ
ในการรับประทานยา เป็นเครื่องมือในการวิจัยและเพื่อให้เครื่องมือวิจัยดังกล่าวมีความถูกต้องเหมาะสม และ
ตรงตามเนื้อหาของการวิจัย บัณฑิตวิทยาลัย จึงใคร่ขอเรียนเชิญท่านเป็นผู้ทรงคุณวุฒิตรวจสอบและ
แก้ไขปรับปรุงเครื่องมือวิจัยเพื่อให้นักศึกษานำเครื่องมือวิจัยมาพัฒนาให้เหมาะสมยิ่งขึ้นต่อไป

จึงเรียนมาเพื่อโปรดพิจารณาอนุเคราะห์ตรวจสอบและแก้ไขเครื่องมือวิจัยดังกล่าว ซึ่ง น.ส.นภาพร
รุจิเสถียร ได้สร้างขึ้นด้วย จักขอบพระคุณยิ่ง

(ผู้ช่วยศาสตราจารย์ ดร.รวิน ระวิวงศ์)

รองคณบดีฝ่ายการคลังและพัสดุ

ปฏิบัติราชการแทนคณบดีบัณฑิตวิทยาลัย

ติดต่ออาจารย์ที่ปรึกษาวิทยานิพนธ์ อ.ดร.พรทิพย์ มาลาธรรม

โทร. 089-893-7701

ที่ ศธ 0517.02 (ศษ)/ 283



บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล
25/25 ถ.พุทธมนต์สาย 4 ต.ศาลายา
อ.พุทธมณฑล จ.นครปฐม 73170
โทร 02-441-0177 โทรสาร 02-441-0177

28 มีนาคม พ.ศ 2550

เรื่อง ขอความอนุเคราะห์ให้นักศึกษาเก็บข้อมูล เพื่อประกอบการทำวิทยานิพนธ์
เรียน ผู้อำนวยการโรงพยาบาลจุฬาลงกรณ์

ด้วย น.ส.นภาพร รุจิเสถียร เลขประจำตัว 4736895 RAAN/M หลักสูตรปริญญาโท สาขาวิชา
การพยาบาลผู้ใหญ่(หลักสูตรปกติ) คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี กำลังทำวิทยานิพนธ์เรื่อง
“ความสัมพันธ์ของการแสดงออกต่อความเจ็บป่วยและความเชื่อเกี่ยวกับยากับความสม่ำเสมอในการรับ
ประทานยาลดระดับน้ำตาลของผู้ที่เป็นเบาหวานชนิดที่ 2” อยู่ในความควบคุมของ อ.ดร.พรทิพย์ มาลาธรรม
ในการศึกษาวิจัยครั้งนี้ นักศึกษามีความประสงค์จะเก็บข้อมูลจากผู้ที่ได้รับการวินิจฉัยว่าเป็นเบาหวานชนิดที่ 2
ที่มีอายุตั้งแต่ 25 ปีขึ้นไป รับการรักษาด้วยยาลดระดับน้ำตาลชนิดเม็ดโดยไม่จำกัดประเภท ที่แผนกผู้ป่วยนอก
คลินิกอายุรกรรม และคลินิกเบาหวาน ตึก ภ.ปร. โรงพยาบาลจุฬาลงกรณ์ โดยวิธีสัมภาษณ์แบบสอบถาม
ระหว่างวันที่ 1 พฤษภาคม 2550 ถึงวันที่ 31 ตุลาคม 2550

บัณฑิตวิทยาลัย จึงใคร่ขอความกรุณาจากท่านโปรดอนุเคราะห์ให้นักศึกษาได้เก็บข้อมูล
เพื่อประกอบการทำวิทยานิพนธ์ ตามที่เห็นสมควรด้วย จักเป็นพระคุณยิ่ง

ขอแสดงความนับถือ

(ผู้ช่วยศาสตราจารย์ ดร.รวิน ระวิวงศ์)

รองคณบดีฝ่ายการคลังและพัสดุ

ปฏิบัติราชการแทนคณบดีบัณฑิตวิทยาลัย

ติดต่ออาจารย์ที่ปรึกษาวิทยานิพนธ์ อ.ดร.พรทิพย์ มาลาธรรม

โทร. 089-893-7701



บันทึกข้อความ

ส่วนราชการ ฝ่ายวิจัย คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย โทร 4455, 4493 ต่อ 14
ที่ วจ 109/2550 วันที่ 16 พฤษภาคม พ.ศ. 2550
เรื่อง แจ้งผลการพิจารณาจริยธรรมการวิจัย
เรียน นางนภาพร รุจิเสถียร

จากการประชุมคณะกรรมการพิจารณาจริยธรรมการวิจัย ครั้งที่ 11/2550 ในวันอังคารที่ 15 พฤษภาคม พ.ศ. 2550 ได้พิจารณาโครงการวิจัย เรื่อง The Relationship of Illness Representations and Belief about Medication to Adherence to Oral Hypoglycemic Medication in Persons with Type 2 Diabetes

หัวหน้าโครงการวิจัย นางนภาพร รุจิเสถียร

คณะกรรมการมีมติให้ผ่านการพิจารณาจริยธรรมการวิจัยได้

คณะกรรมการมีความเห็นให้ ผู้วิจัยส่งรายงานความก้าวหน้าอย่างน้อย 1 ครั้ง/ปี หรือส่งรายงานฉบับสมบูรณ์หากดำเนินโครงการเสร็จสิ้นก่อน 1 ปี (ก่อนวันที่ 14 พฤษภาคม 2551)

จึงเรียนมาเพื่อทราบ

(รองศาสตราจารย์ แพทย์หญิงวิไล ชินธเนศ)

รองคณบดีฝ่ายวิจัย

ปฏิบัติราชการแทนคณบดี คณะแพทยศาสตร์

สำเนาเรียน ประธานคณะกรรมการบริหารหลักสูตรพยาบาลศาสตรมหาบัณฑิต

ติดต่อประสาน คุณสุกัญญา, คุณเพ็ญศรี

โทร 0-2256-4455 ต่อ 14, 15

REC. No 144/50



The Thai Red Cross Society

ที่ จพ.ขอ. 2893 /2550

โรงพยาบาลจุฬาลงกรณ์
1873 ถนนพระรามที่ 4
แขวงปทุมวัน เขตปทุมวัน
กรุงเทพฯ 10330

29 พฤษภาคม 2550

เรื่อง ยินดีให้ความอนุเคราะห์ข้อมูล นางสาวนภาพร วุจิเสถียร

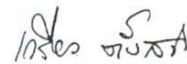
เรียน คณะบดีมหาวิทยาลัยมหิดล

อ้างอิง หนังสือ ที่ ศธ 0517.02 (ศย)/283 ลงวันที่ 28 มีนาคม 2550

บันทึกวิทยาลัย มหาวิทยาลัยมหิดล ขอความอนุเคราะห์ให้นางสาวนภาพร วุจิเสถียร หลักสูตรปริญญาโท สาขาวิชาการพยาบาลผู้ใหญ่ (หลักสูตรปกติ) คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี ดำเนินการเก็บรวบรวมข้อมูลจากผู้ที่ได้รับการวินิจฉัยว่าเป็นเบาหวานชนิดที่ 2 ที่มีอายุตั้งแต่ 25 ปีขึ้นไป รับการรักษาด้วยยาลดระดับน้ำตาลชนิดเม็ดโดยไม่จำกัดประเภท ที่แผนกผู้ป่วยนอก คลินิกอายุรกรรม และคลินิกเบาหวาน ณ ตึก กปร โรงพยาบาลจุฬาลงกรณ์ นั้น

โรงพยาบาลจุฬาลงกรณ์พิจารณาแล้ว ไม่ขัดข้อง ยินดีให้ดำเนินการตามที่ขอมา กรุณาติดต่อประสานงานกับหัวหน้าพยาบาล ตึกจักรพงษ์ชั้น 2 โดยโทรศัพท์นัดหมายล่วงหน้าก่อนเก็บข้อมูลและก่อนพบบุคคลดังกล่าว ขอให้นับัตรประจำตัวนักศึกษาหรือนับัตรประจำตัวประชาชนพร้อมจดหมายฉบับนี้มาติดต่อขอรับบัตรประจำตัวผู้เก็บข้อมูล ณ ตึกอำนวยการชั้นล่าง ห้องหมายเลข 2

ขอแสดงความนับถือ



(ศ.นพ. เกรียง ตั้งสง่า)

รองผู้อำนวยการฯ ฝ่ายยุทธศาสตร์และการจัดการสารสนเทศ
ปฏิบัติกรแทน ผู้อำนวยการ โรงพยาบาลจุฬาลงกรณ์

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