CHAPTER I

INTRODUCTION

1.1 Rational and background

Diabetes Mellitus is the major public health problem in Thailand because it has continually increased in Thai population [1]. It was estimated that the number of people with diabetes in adults aged 20 years and over in Thailand will increase from 1,017,000 in 2000 to 1,923,000 in 2025 [2]. From Epidemiological Surveillance Report 2005, death rate with diabetes per 100,000 population equal 12.3 (7,665 persons), death rate with diabetes in male 9.5 per 100,000 population (2,941 persons), death rate with diabetes in female 15.0 per 100,000 population (4,724 persons) and death ratio male : female equal 1 : 1.6 [1]

American Diabetes Association (ADA) has classified the form of diabetes as Type 1, Type 2 and gestation but Type 2 diabetes was the most common form; about 90 percent to 95 percent of patients with diabetes have Type 2 [3]. Nitiyanant (1999) revealed that the goal of treatment in Type 2 diabetes patients was controlling blood glucose into the normal range, through a combination of medication, diet, exercise, and making life behavior changes [4].

Type 2 diabetes was defined as either (1) reporting being diagnosed as Type 2 diabetes by a physician, (2) taking anti-diabetic medications, or (3) having blood glucose over 200 mg/dL or Fasting Blood Glucose over 126 mg/dL [4]. Garcia et al (1974), Stamler et al (1993) Panzram (1987) and Walters et al (1994) reported that patients with diabetes had an approximately threefold risk for all cardiovascular diseases and their relative risk of death from all causes is increased by 75%. [5-8].

The risk factors for Type 2 diabetes are (1) age ($\geq$45 years), (2) family history (first degree relative with diabetes), (3) high-risk ethnic group including Aboriginal, Asian, Pacific Islander, Hispanic, African), and (4) obesity. Patricia et al (1998) reported that the nearly 14 million people in the United States who have Type 2 diabetes, approximately 80 percent were overweight before they developed the disease [9].

Regular physical activity (Exercise) is potentially the principal means of fighting overweight and obesity (before being obese, people are overweight, and afterwards, exercise is considered more strenuous) [10]. Pan et al (1997), Helmrich et al (1991), Manson et al (1991) and Burchfiel et al (1995) revealed that diet and exercise could delay the onset of Type 2 diabetes in persons at risk [11-14]. In one intervention trial 577 subjects with impaired glucose tolerance (a lesser degree of hyperglycemia) were randomized to control, diet, and exercise groups. Over a 6-year period, 67% of the control group but only 41 to 43% of the intervention groups developed Type 2 diabetes, an absolute risk reduction of approximately 25 %[11]. In several well designed, large scale cohort studies, with follow-up of 6 to 14 years, there was a relative decrease of 30 to 50% in the development of Type 2 diabetes among those who exercised regularly compared to those who were sedentary [12-14]. This result was found in both men and women, and obese and non-obese subjects.

Skarfors et al (1987) and Schneider et al (1992) revealed that exercise training was recommended as a non-pharmacological way of treating Type 2 diabetes and it reduced, even slightly, the risk of premature death and cardiovascular disease. Exercise, as an adjunct to diet, leaded to increase weight loss and prevention of weight gain among patients with Type 2 diabetes. There is some inconsistency, but most studies have demonstrated the effectiveness and feasibility of exercise over the long term in treating Type 2 diabetes [15], [16]. Correti et al (1996), Fletcher et al (2001) and Desouza et al (2000) reported that aerobic exercise was associated with a number of beneficial effects, including decreased blood pressure, enhanced insulin sensitivity, weight loss, favorable lipid and lipoprotein alterations, and improved endothelial function [17], [18], [19].

Nitiyanant (1999) and Ashenden et al (1997) recommended that lifestyle changes or non-pharmacological treatment was the choice in the treatment of patients with Type 2 diabetes [4, 20-21]. Pharmacists play an important role in counseling on lifestyle changes to reduce risk factors for cardiovascular complications and diabetes. Simply informing the patients about their possible risky style and telling them what to do to reduce the risk of diabetes or coronary disease does not produce any major style changes in these patients. Woollard et al (1995) and Laitakari (1998) revealed that using style models to understand the patient and to obtain support for a structured way of counseling patients to change style had proven to be more successful [22],[23]. Miller

(2003) found that motivating the patient to perform lifestyle changes was a demanding task, as the possible future complications in 15 or 20 years may be difficult to understand and take in, as the patient often feel fine [(24)].

Bottorff (2006) and Jayendra et al (2003) reported that the cardiovascular complications were a major cause of mortality and hospitalization in Type 2 diabetic patients [(25), (26)]. Although safe and effective drugs to lower blood sugar have become available including sulfonylureas, glinides, metformin, the thiazolidinediones, and the alpha-glucosidase inhibitors but the international journal of diabetes in developing country reported that diabetic patients were non-adherent to their treatment including oral anti-diabetes therapy and only a small number of diabetic patients were found adherent or compliant with all aspects of diabetic care [(27), (28)]. Wright revealed (1993) that identification of patients whose compliance was inadequate remains a challenge. Patients often were reluctant to admit non-adherence [(29)]. Urquhart (1994, 1995) reported that pill counts and self-reports of patients tend to overestimate patient compliance and measuring metabolites of drugs in blood and urine only provides compliance information for a certain point in time [(30), (31)]. Using pharmacy data was another method that enables measurement of compliance. By evaluating whether medication prescriptions were filled in time, it was possible to calculate refill compliance. However, it was expected that only a fraction of actual non-adherers would be identified because it only allows identification of patients that simply do not obtain enough medication to be adherent. Cramer (1995) revealed that electronic monitoring systems became available as a tool for objective registration of patient compliance [(32)]. Urquhart (1997) also revealed that it was claimed which electronic monitoring is more sensitive for detecting inadequate compliance than any other method [(33)]. However, until now electronic monitoring had been used in a clinical research setting only. The costs of electronic monitored and other practical issues limit the use in routine clinical practice. Therefore, there was still a need for valid and easy-to-use tools for detecting compliance problems. It would be desirable to have a brief self-report questionnaire to enable targeting specific interventions in patients of this study. It would be desirable to have a brief self-report questionnaire or face to face or telephone interview to enable targeting specific interventions in patients of this study.

1.2 Significant of the problem

Type 2 diabetes is a major public health problem in Thailand. The most of patients are even aware that they have the disease. Often Type 2 diabetes is not diagnosed until complications arise. Type 2 diabetes is increasing mainly because Thai's lifestyles are changing. We have loss exercise, eat useless food such high cholesterol and sweetness food. Bruce et al (2005) found that Type 2 diabetes not only leaded to increase public health care cost but also directly affected the diagnosed person's activity of daily living [(34)]. Gregg et al (2002) revealed that the greatest concerned for many with Type 2 diabetes is their quality of life and this is a legitimate concern since over 50% of diabetic patients had difficulty performing typical daily tasks, such as climbing stairs [(35)]. In pharmacist role, decreasing of public health care cost and allowing people to have the greatest mobility, exercise, diet, and prevention is key.

1.3 Objective

The objectives of this study were to:

1. To compare means of calories burnt by exercise, compliance, eating behavior score, diabetes knowledge, age, BMI and Fasting Blood Glucose between gender (male and female).
2. To find correlations between calories burnt by exercise, compliance, eating behavior score, diabetes knowledge, age, BMI and Fasting Blood Glucose.
3. To estimate Hierarchical Stepwise Multiple Regression Analysis Model to predict Fasting Blood Glucose.

1.4 Expected contributions

1. The influential factors affecting Fasting Blood Glucose in Type 2 diabetic patients would be identified.
2. An accurate prediction model for Fasting Blood Glucose in Type 2 diabetic patients would be presented.

1.5 Research question

When controlling for drug:

1. Did Type 2 diabetes patients male and female have different calories burnt by exercise, compliance, eating behavior score, diabetes knowledge, age, BMI and Fasting Blood Glucose?
2. Could (calories burnt by exercise, compliance, eating behavior score, diabetes knowledge, BMI and age) individually predict Fasting Blood Glucose in Type 2 diabetes patients? In other words were there any significant correlation between (calories burnt by exercise, compliance, eating behavior score, diabetes knowledge, BMI and age) and Fasting Blood Glucose?
3. What factors significantly predicted Fasting Blood Glucose in Type 2 diabetes patients?