CHAPTER I

INTRODUCTION

1.1 Background

Diabetes Mellitus is a group of metabolic disorders that present the phenotype of hyperglycemia. The etiologies of diabetes mellitus are a complex interaction of genetics, environmental factors and life-style choices. The pathogenesis of diabetes include reduce insulin secretion, decrease glucose usage and increase glucose production. Diabetes is classified into type 1 diabetes (insulin-dependent diabetes mellitus or IDDM) due to islet B- cell destruction, type 2 diabetes (non-insulin dependent diabetes mellitus or NIDDM) with varying degrees of insulin resistance and/or insulin secretary defects, other specific types of diabetes and gestational diabetes (where diabetes is diagnosed for the first time in pregnancy). (Pickup & Williams, 2003)

Diabetes Mellitus is a serious disease with significant impact on health, quality of life, and life expectancy of individuals, as well as health care system. The prevalence of DM has increased markedly in the last 10 years and markedly wildly between populations. Between 1995 and 2025 the number of the adult population affected by diabetes mellitus in developing countries is projected to grow by 170%, from 84 to 228 million people. By 2025, these countries will be home to 76% of all persons with diabetes, as compared with 62% in 1995. In the same period, the developed world will see a 41% increase, from 51 to 72 million people. Worldwide, a 122% rise is

projected, from the total of 135 to 300 million. This more than twofold global increase will occur because of population ageing and growth, as well as from overweight/obesity, unhealthy diets and sedentary lifestyle. These latter factors are closely associated with urbanization and industrialization. (King et al., 1998)

People with diabetes are at very high risk of developing a number of complications, including heart disease, blindness, kidney failure, amputations and premature death. Potential risk factors for diabetes include family history of diabetes, overweight/obesity, age $\geq$45 years, race/ethnicity (e.g. African American, Hispanic American, Native American, Asian American, Pacific Islander), previously identified impaired fasting glucose (IFG) or impaired glucose tolerance test (IGT), history of gestational diabetes mellitus (GDM) or delivery of baby over 9 lbs, hypertension, high-density lipoprotein (HDL) cholesterol level $\leq$0.90 mmol/L and/or a triglyceride level $\geq$2.82 mmol/L and polycystic ovary syndrome. (Braunwald et al., 2001)

In Thailand, the study in 1996, there were 2,000,000 diabetes but only half knew that they had diabetes and less than half had received appropriate treatment. The estimated national prevalence of diabetes in Thai adults was 9.6% (2.4 million people), which included 4.8% previously diagnosed and 4.8% newly diagnosed. The prevalence of impaired fasting glucose was 5.4% (1.4 million people). Diagnosed diabetes, undiagnosed diabetes, and impaired fasting glucose were associated with greater age, BMI, waist-to-hip ratio, systolic blood pressure, total cholesterol, and serum creatinine levels. (Aekplakorn et al., 2003) Bureau of Epidemiology, Department of disease control of Thai Ministry of Public Health suggest that Thai people aged over 40 years should be screened for fasting plasma glucose once a year.

The total population in Surat Thani Province is 947,233. The report at 31 December 2005, there are 15,284 people with known diabetes (1.6% known prevalence) in Surat Thani. In Kiriratnikom District, the total population is 39,883 and there are only 455 diabetes patients (1.1%) participating in the diabetic care program. These low prevalence strongly suggest that many diabetes cases are as yet undetected in the Province and the District.

The number of people with diabetes is increasing due to population growth, aging, and increasing prevalence of overweight/obesity and physical inactivity. Quantifying the prevalence of diabetes and identifying the individuals affected by diabetes, now and in the future, are important to allow rational planning and allocation of resources for diabetic prevention and control. In addition, the identification of risk factors for diabetes would allow better identification of people at risk for diabetes, and more effective, efficient application of preventive measures.

1.2 Purpose of the Study

The purpose of this study is to estimate the prevalence of diabetes (descriptive portion), and to identify diabetes risk factors (analytical portion), in 40 and over age group in Kiriratnikom District, Surat Thani Province.

1.3 Research Questions

1. What is the prevalence of diabetes among people aged over 40 years in Kiriratnikom District?

2. What are the risk factors related to diabetes among people aged over 40 years in Kiriratnikom District?

1.4 Significance of the Study

The data from the diabetic clinic in Kiriratnikom Hospital show that there are 455 diabetes patients registered. All of them have been admitted in diabetic care program such as medications, dietary education, and screening for diabetic complications. There is no data about undiagnosed diabetes, although the number of unknown diabetes cases may be even higher than that of known cases (see above). Undiagnosed diabetes patients do not get into the diabetic treatment program, and thus are at increased risk for harmful complications.

The study will identify the prevalence rate and the factors related to diabetes in Kiriratnikom District. The result of this study can be use for strategic planning about diabetic care and prevention/control programs, and for planning preventive public health interventions to reduce diabetes risk factors, and thereby reduce diabetes incidence and severity.

1.5 Definition of Terms

GENDER refers to either of the two reproductive categories of subject; male or female.

AGE refers to the length of time that subject has existed, usually expressed in years. This study has been categorized age into 5 groups; 40-49, 50-59, 60-69, 70-79 and 80 years or above.

MARITAL STATUS refers to status which relating to marriage or the marriage of a particular couple of the subject. Marital status divides into 3 groups: single, married and divorced.

EDUCATIONAL STATUS is the imparting and acquiring of knowledge through teaching and learning, especially at a school or similar institution. This study will be classified into 3 groups: prathomsuksa and lower, mathayomsuksa and bachelor's degree.

INCOME refers to money that subjects get from theirs work per year. This study divides into 4 groups: lesser than 10000 baht per year, 10000-30000 baht per year, 30000-50000 baht per year and more than 50000 baht per year.

LOCATION refers to sub-district that subjects living. In this study, there are 8 sub-distircts in Kiriratnikom district: Thakanorn, Banthumneab, Banyang, Kapaw, Thakradan, Namhak, Yanyaw and Thamsingkhorn.

BODY MASS INDEX (BMI) refers to a measure used to elevate body weight relative to a person's height. BMI calculated by weights in kilograms divide by height in meters by power of 2. This study classified into 3 groups: underweight (BMI lesser than 18.5), normal (BMI 18.5-24.9) and overweight/obesity (BMI 25.0 and over).

HYPERTENSION (HT) is defined as systolic blood pressure (SBP) of 140 mmHg or greater, and a diastolic blood pressure (DBP) of 90 mmHg or greater. In this study, HT status is condition that is diagnosed from any doctor and classified into the present and absent of HT.

HISTORY OF DIABETES AMONG FIRST DEGREE RELATIVES refers to history of parent or sibling of diabetes. In this study classified into present and absent of history of diabetes among first degree relatives.

GESTATIONAL DIABETES (GDM) refers to diabetes that diagnosed for the first time in pregnancy.

DIETARY BEHAVIOR refers to behavior of subject that prefers sweet taste diet or not.

SMOKING STATUS refers to subject behaviors to consume cigarette smoking during past week. This study presents into consume characteristics; frequency, sometimes and never consume groups.

ALCOHOLIC CONSUMPTION refers to subject behaviors to drink alcohol. This study presents into consume characteristics; mild, moderate and severe alcohol consumption.

PHYSICAL ACTIVITY STATUS In this study use international physical activity questionnaires (IPAQ): short last 7 days self-administered format. There are 3 levels of physical activity; low, moderate and severe.

FASTING PLASMA GLUCOSE TEST (FGT) A fasting plasma glucose test measures subject's blood glucose after their have gone at least 8 hours without eating. This test is used to detect diabetes or pre-diabetes.

PRE-DIABETES (IMPAIRED FASTING GLUCOSE) refers to subjects that have fasting plasma glucose at 100 to 125 mg%.

DIABETES refers to subjects that have fasting plasma glucose at 126 mg% and above and confirmed by repeating the test on a different day.

1.6 Limitations

1. The population is people aged 40 years and over in Kiriratnikom District.

2. The study does not distinguish between Type 1 and Type 2 diabetes.

3. The study does not test the lipid profile.

4. People in Kiriratnikom district are same ethnicity.

5. All sub-districts in Kiriratnikom District are rural, so evaluation of urban-rural status as a risk factor will not be possible.

1.7 Conceptual Framework

According to the Principles of Internal Medicine, risk Factors for Type 2 Diabetes Mellitus include the following:

- Family history of diabetes (i.e., parent or sibling with type 2 diabetes)

- Obesity (i.e., $\geq 20\%$ desired body weight or BMI ≥ 27 kg/ m^2)

- Increasing age, especially age ≥ 45 years

- Race/ethnicity (e.g., African Am)

- Previously identified impaired fasting glucose or impaired glucose tolerance test

- History of gestational diabetes mellitus or delivery of baby over 9lbs

- Hypertension (blood pressure $\geq 140/90$ mm Hg)

- HDL cholesterol level ≤ 0.90 mmol/L (35 mg/dL) and /or a triglyceride level $\geq$ 2.82 mmol/L (250 mg/dL)

- Polycystic ovary syndrome

As mentioned above, it will not be possible to measure all known or suspected risk factors in this study. The specific factors assessed will be family history of diabetes, obesity, age, history of GDM or delivery of baby over 9 lbs, hypertension, and location/sub-district. (All sub-districts included in this study are rural – see below. Thus, although it will be possible to assess spatial variation in diabetes prevalence, it will not be possible specifically to test the effect of urban/rural status on prevalence.)

Independent variables   Dependent variables

1. Personal characteristics
   - Gender
   - Age
   - Marital status
   - Education Status
   - Income
   - Location (sub-district)

2. Overweight, waist circumference

3. Hypertension

Diabetes

4. History of diabetes among first degree relatives

5. History of GDM or delivery of baby over 9 lbs

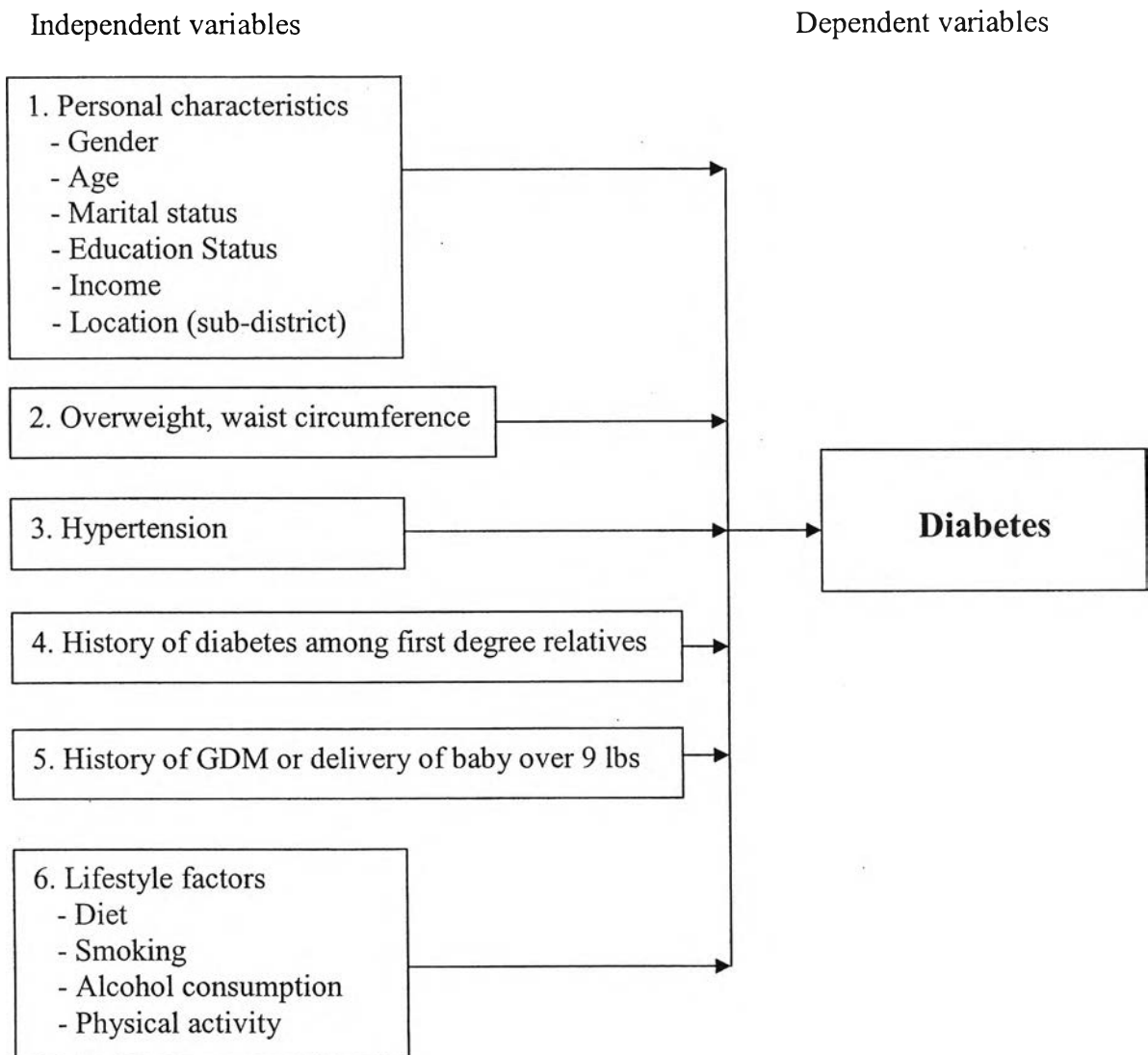6. Lifestyle factors
   - Diet
   - Smoking
   - Alcohol consumption
   - Physical activity

Figure 1: The Conceptual Framework Diagram