Chapter 1
Introduction

Diabetes mellitus is a public health burden on the basis of its increased morbidity, mortality, and economic costs. The number of adults with type 2 diabetes mellitus is growing and will continue to grow in the future. Globally, the number of adults with diabetes in 2010 was estimated to be 285 million, with a prevalence of 6.4%. By 2030, the estimated number will increase to 439 million with a prevalence of 7.7%\(^1\). An increase in the prevalence of diabetes is mainly driven by the changes in diet and levels of physical activity\(^2\). The number of deaths among adults due to diabetes is estimated to be 3.96 million per year and mortality rate of diabetes in all ages is 6.8% at global level\(^3\).

In India, currently there are 62 million people diagnosed with diabetes. By 2030, this number is estimated to rise to 100 million\(^4\). This means, every fifth diabetic in the world would be an Indian. The number of people with diabetes is increasing due to population growth, ageing, urbanization, and increase in the prevalence of obesity and physical activity\(^5\). Type 2 diabetes mellitus is one of the growing causes of disability and premature death, mainly due to cardiovascular diseases and other chronic complications\(^5\). Lifestyle, nutritional status, family history of diabetes etc. influences the prevalence of glucose intolerance and diabetes complications\(^6\). Glycemic control can reduce the risk of long-term complications, mortality and vascular diseases among the diabetics\(^7\). Hence care of diabetics became most important.
With advancements in medical services and treatment strategies, the life span of subjects with diabetes mellitus has increased. Thus, the problems of complications resulting from disease, treatment, medical histories, glycemic control, and psychological aspects may all have adverse effects on many aspects of the diabetic’s life, including the quality of life and the physical and social wellbeing. Quality of life in people with diabetes mellitus is mainly undermined by the complications of the disease. The disease and its complications cause a heavy economic burden for diabetics themselves, their families and society. Poor and inadequate glycemic control among the subjects with type 2 diabetes constitutes severe health problems. Hence controlling the disease is a major issue to prevent complications, increase the life expectancy, and improve the quality of life.

1.1. Statement of the problem

Prevention, early identification and systematic follow up of the treatment are the basic strategies for controlling the disease. There is a well-defined standard treatment for type 2 diabetes. However in majority of the subjects, the disease gets poorly controlled with existing therapies and life style modifications. Good glycemic control could delay the onset and progress of diabetic complications, and mortality.

In spite of the clear importance about the glycemic control among type 2 diabetics, little is known about the predictors that influence changes in glycemic control among poorly controlled diabetics. Therefore it is very important to identify the factors that influence glycemic control of type 2 diabetics.
The reasons, consequences, risk factors associated with diabetes, and standard treatment for the disease are well known\textsuperscript{13}. Usually the disease can be controlled with standard management and lifestyle modifications, however a category of subject’s, response to the treatment is not good and disease does not get controlled\textsuperscript{11}.

The factors which determine poor glycemic control are not well defined and as yet there is no statistical model to predict poor control of diabetes\textsuperscript{12}. Also, presently treating physicians finds it difficult to predict the expected outcome of the treatment at the initial stage of the disease\textsuperscript{9}. This derivation of a statistical model is very important to predict poor control of diabetes. So that aggressive lifestyle modification and therapy can be initiated at the time of presentation to the physician.

During the initial period of treatment itself, if we are able to identify the factors which facilitate the disease not being controlled, then there is a possibility to predict the diabetic’s probability of response to specific management strategy. This would be a breakthrough in the management of diabetes.

1.2. Significance of the study

By carefully studying the initial variables and behavior of the subjects using statistical modeling technique, this study is trying to derive a probabilistic model to predict the crucial questions “who might not respond to the treatment for diabetes?” One of the important advantages of having such a statistical model is that, at the initial stage of the disease itself we can predict the likelihood of that individual’s disease getting poorly controlled.
Objectives

1) To find out the factors associated with poor control of type 2 diabetes mellitus

2) Derive a statistical model to predict poor control of type 2 diabetes mellitus
1.3. Structure of the thesis

This thesis is organized into five chapters including the introduction chapter.

Chapter 2 captures the existing body of knowledge and research that have been carried out in the field of glycemic control and diabetes management.

Chapter 3 comprises five sections: Section 3.1 deals with the materials and methods adopted for conducting a systematic review. Section 3.2 explains the methodology used to understand physician’s perception about the determinants. Section 3.3 is database development. Section 3.4 elaborates the methods employed to derive a statistical model for predicting poor control of diabetes. Section 3.5 is calculator development.

Chapter 4 presents the results of the study in five sections, and Chapter 5 is discussion.