

# **Introduction**

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# I INTRODUCTION

India is at the threshold of far reaching changes and is poised to join the ranks of the developed nations. With its urbanization trend and economic development, the country is also experiencing an 'epidemiologic transition'.

Infectious diseases, which were the bane of India, are making way for a new crop of 'life style diseases' called non-communicable diseases (NCD's). The World Health Report (2006) cautions that in all the continents except Africa, more people die of non-communicable diseases than communicable diseases. It also puts forth that by 2020, 73 percent of all deaths will be caused by NCD's.

Non communicable diseases such as diabetes mellitus, cardio vascular disease, mental and neurological disease are gradually becoming the leading cause of disability and death in the developing countries while the incidence of communicable diseases has come down (World Health Organisation, 2007). Increased scientific advances, adoption of western culture and sedentary lifestyle changes have shown the consequences by altering the health status of the individual.

Diabetes mellitus, a chronic metabolic disorder affecting humankind has reached epidemic proportions worldwide. The developing countries, which were often associated with hunger and inadequate nutrition for children is now experiencing an epidemic increase in type II diabetes mellitus, a disease related to wealth and unhealthy lifestyle. Type II diabetes mellitus, is due to the high degree of urbanization, great changes in diet, lifestyle and genetic predisposition. Diabetes has been known for centuries as a disease of prosperity (Gupta, 2007).

It is a silent chronic disorder characterized by hyperglycemia due to defective insulin secretion or defective insulin action or both which leads to abnormalities in the metabolism of carbohydrate, proteins and fats and is associated with an increased

incidence of long term micro and macro vascular complications and a myriad of disorders (Canadian Diabetes Association Clinical Practice Guidelines Expert Committee, 2003).

Globally the number of people with diabetes mellitus is expected to be at least 220 million in 2010 rising to 324 million by 2025. In most countries, 10 percent of the health budget is spent on diabetes mellitus (Jayakumar and Nisha 2005).

WHO report (2006) has shown that, worldwide the number of diabetics was 124.7 million in 1995, 153.9 million in 2000 and this trend is scheduled to grow in geometric proportions by 2025 affecting 299.1 million people. It is estimated that in India the rate of increase in diabetic population is 151 percent, whereas the same globally would be 115 percent. It is observed that India has the largest number of diabetics than any other country and is predicted that by 2025 India will harbour more than 60 million diabetic patients, i.e., one out of four individuals will be an Indian diabetic in the world while three out of four will be from other developing countries (diabetesindia.com 2005).

International Diabetes Federation (2006) reports that India has 40.9 million people with diabetes and China follows right behind with 39.8 million diabetics. About one-sixth of the total worldwide deaths due to this disorder are in India, the maximum in any single country. Indians are genetically predisposed to the disease and 1.6 million cases are diagnosed every year in India – one in every 20 seconds and tens of millions of Indians are walking around undiagnosed (Pillai, 2006). Makol and Elizabeth (2005) put forth that, diabetes is scary because it is related to other threatening diseases. Diabetes lowers life expectancy by a decade, biggest cause of kidney failure, and excluding accidents, the biggest cause of lower-limb amputations. It is a major cause for blindness and triples the risk of heart attack. In India the disease tends to affect younger individuals, implying that most Indian diabetics belong to the productive age group with grave repercussions to the family and the country.

In India the prevalence rate of diabetes in urban areas is 12 percent and in rural areas is around seven percent of the total population. Taking an urban – rural population distribution of 70:30 and an overall crude prevalence rate of around four percent, India is home to around 40 million diabetics. Screening has also shown that the unknown to known diabetes ratio is about 1.8:1 in urban areas, whilst it is as high as 3.3:1 in rural places (diabetesindia.com.2005). World Health Organisation (2006) reports that the prevalence of diabetes in India is predominantly more among urban population. It is around six percent in 30 to 39 years of age and 13 percent in 40 to 49 years of age and one-fifth of the population 70 years and above. Datta (2006) states that in Indian cities diabetes has become such a fact of life with eight percent to 14 percent falling prey.

Shanthirani *et al.*, (2006) say that in urban India mortality rates are twofold higher in people with diabetes compared to non-diabetic subjects. Cardiovascular and renal diseases are the commonest cause of death among diabetic subjects.

Mohan (2005) had declared that the major risk factors are decreased physical activity and increased energy consumption. Diabetes risk was half in those who exercised regularly. Physical inactivity as opined by Chandaraju (2005) is mainly because of increased mechanization and computerization, use of elevators, automobiles/public transport, sedentary life style and promotion of household gadgets including remote controls. Changes in lifestyle and rising consumption of sugar and animal fat account for the rising global rates of diabetes. The most widespread eating habit is characterized by the reduced intake of dietary fiber, increased intake of simple sugars, high intake of refined grain products, altered fat composition of the diet and the dietary pattern characterized by a high glycemic load, an increased body weight and reduced physical activity (Suter, 2005).

**Rationale for the present study could be well understood from the following :** Transport facilities are indispensable for the development of a country.

For tour and travel, mode of transport has an important and a vital role to play. Developing countries like India have a great scope for revenue yield, because of the population and of the vast area in the tourism industry. A good transport system in a country reflects directly on its growth and hence this corporate sector personnel, have to be given their due importance in terms of health and well being. A comparison of the health condition between transport workers and the general population in USA by Neri *et al.*, (2005) had shown high risk of diabetes and cardiovascular diseases among transport workers than normal people.

The erratic dietary pattern of transport employees coupled with the frenzied pace of work make these employees prone to getting diabetes mellitus along with many other chronic illnesses. A controlled dietary pattern along with adequate awareness of the importance of healthy lifestyle would enable them to manage the illness in a better fashion.

The current study aims at providing an insight into the importance of maintaining good dietary pattern and healthy lifestyle among transport employees. A study by Nagawa *et al.*, (2005) suggests that shift system in work is a risk factor for the onset of diabetes mellitus among transport workers in Japan. Obelenis *et al.*, (2003) state that the prevalence of diabetes is more in employees of public bus and trolley bus transport in Lithuania. Diabetes has a considerable impact on both the patients and the society because it affects individuals in their most productive years (Basu, 2005).

Managing diabetes has become easy with modern technology. But treatment comes at a price. For a low-income Indian family with a diabetic adult, a quarter of the income is devoted to diabetes care (WHO 2006). Treatment cost per person has gone up from around Rs.3000 /- in the early 1990's to Rs.14,000 /- annually. Mohan *et al.*, (2007) found out that India presently has an annual estimated treatment cost of rupees 10,000 to 12,000 crores for diabetes which is likely to witness a scaling upto as

much as rupees 1,26,000 crores by 2025. Direct cost includes cost of routine treatment, monitoring, laboratory and hospital cost. Indirect costs include lower productivity arising from absenteeism and disability. Many of the burdens of diabetes occur in the productive mid-life period and will therefore adversely affect workforce, productivity and economic development. Accurate estimation of these burdens, their risk factors, and time trends would help better to inform policy makers to monitor change in public health intervention.

An effective, culturally and socially appropriate prevention programme targeting people of all ages needs to be planned. Combined action by all sectors of the community would enlighten people about the crippling effects of diabetes and help them to keep this silent malaise at bay.

Dietary management has long been recognized as an important intervention in diabetes care. The right diet is such a powerful medicine, that for Type II diabetics, it could actually reverse the course of the disease. The dietary control of diabetes comprises of two simple principles namely to eat less (fewer calories) to maintain ideal body weight and to eat low glycemic index foods that do not turn into sugar quickly. The glycemic index represents the magnitude of the increase in blood glucose that occurs after ingestion of the food.

The glycemic index is defined as the incremental area under the blood glucose response curve of a 50 g carbohydrate portion of a test food expressed as a percent of the response to the same amount of carbohydrate from standard food taken by the same subject.

The glycemic index (GI) is a classification of the blood glucose raising potential of carbohydrate foods. It is a dietary management tool for diabetic subjects to assist them in controlling postprandial glucose through diet (Miller, 2007). The principle is that slower the rate of carbohydrate absorption, the lower the rise in blood glucose level and the lower the glycemic index value (Augustin *et al.*, 2002).

Daily incorporation of low glycemic index carbohydrates in meal planning can be an effective self-management strategy for glycemic control and weight management (Burani, 2006). People who consume approximately three servings per day of whole grain foods are less likely to develop Type II diabetes mellitus than low consumers, with a risk reduction in the order of 20 to 30 percent (Venn and Mann, 2004).

Planning and developing healthy foods suitable for diabetics is the need of the hour. A proper diabetic diet should include a balance of high proteins, low fat, complex carbohydrates and high fibre which are digested slowly without causing a rapid rise in blood sugar. Whole grains rank second to cereals in supplying calories and form an important source of protein. Quality of whole grain increases with sprouting. Legumes share several qualities with whole grains of potential benefit to glycemic control including slow release of carbohydrate and a high fibre content. A substantial increase in dietary intake of legumes as replacement food for more rapidly digested carbohydrate will improve glycemic control and thus reduce incidence of diabetes.

Lowering glycemic index may be useful in the treatment of both Type I and Type II diabetes by lowering postprandial hyperglycemia, decreasing risk for post absorptive hypoglycemia and reducing insulin demand. Incorporation of low glycemic index principles into diabetes care has substantial promise for improving management of diabetes and reducing the risk for complications without evidence of adverse effects. Diet counselling with regulated life style, produces significant increase in the awareness on foods that enhance good blood glucose control, proper selection of foods, quantity of food consumed and factors lowering the risk of complications.

Vasanthamani *et al.*, (2006) have established that diabetes can be controlled by giving organized counselling on diet. Life style modification through diet counselling could delay the onset of Type II diabetes.

Diabetes counselling programme carried out by Khadgawat *et al.* (2004) revealed a 58 percent reduction in the progression to diabetes, for individuals with glucose tolerance. The study suggested modification in lifestyle with increased physical activity, reduced calories and changes in type and amount of foods to be consumed.

Keeping all these facts in mind the investigator planned the present study to develop high fibre recipes with low glycemic index and educate the transport employees on right type of diet and lifestyle practices. The present study entitled, “Development and Promotion of Low Glycemic Foods among Employees of Tamil Nadu State Transport Corporation, Coimbatore Division” **aimed at improving the health status of the diabetics in the transport corporation of Coimbatore Division.**

The objectives of the study were to :

- A. Assess the prevalence of diabetes mellitus among employees of state transport corporation, Coimbatore division.
- B. Elicit the demographic details, dietary habits and lifestyle pattern of the selected diabetics.
- C. Evaluate the nutritional status of the diabetics through anthropometry, bio-chemical estimations and food and nutrient intake.
- D. Develop and standardize low glycemic recipes incorporating sprouted legume powders.
- E. Find out the glycemic index of the standardized recipes.
- F. Promote low glycemic recipes and impart diet and therapeutic life style counselling to the diabetics.