

# Prevalence of Type-2 Diabetes and Associated Risk Factors in Batticaloa District, Sri Lanka

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**ABSTRACT:** Diabetes and its associated complications have been increasing dramatically worldwide. Prevalence of diabetes is higher in developed than in developing countries, however past two decades diabetes mellitus was reported higher in developing countries. Diabetes and its associated complication awareness are lacking, adequate baseline information is mandatory to the public to overcome this problem. Hence the present study was undertaken to assess the prevalence of diabetes. The aim of the study was to assess the risk factors associated with type 2 diabetes mellitus in Batticaloa district, Sri Lanka. The study included 100 type 2 diabetes cases randomly selected among patients with diabetes. A questionnaire that contained sociodemographic characteristics and risk factors was used for data collection. ANOVA was performed to find the significance of more than two means. A  $p$  value  $< 0.05$  was considered statistically significant. Study results showed those above 50 years of age to have more chance to get diabetes when compared with the other age groups. Gender and religion did not show any statistically significant association with diabetes. Physical activity was observed as a protective factor for the development of type 2 diabetes. Hypertension emerged as a strong risk factor for diabetes. In conclusion, results of the present study will be a use in planning primordial, primary and secondary measures of prevention at the community level.

**KEYWORDS:** Diabetes mellitus, prevalence, patients, risk factors, measures

## I. INTRODUCTION

Type 2 diabetes mellitus is the commonest form of diabetes affecting more than 90% of the diabetic population worldwide. There is a rapid upsurge in the number of diabetic patients and this explosive growth is noted in both urban and rural area. The estimated number of type 2 diabetes patients in the year 2000 at 174 million and predicted to increase to 336 million in 2030 [1].

The majority of the patients with diabetes in developed countries are above age 64. It is predicted that by 2030, the number of people aged above 64 with diabetes will be around 82million, of which about 48 million in developing countries. Several surveys on risk factors conducted across South Asian countries have shown high and rising rates of overweight, central obesity, high blood glucose levels and high blood pressure in urban populations [2]. Such trends also exist in rural populations but are lower in magnitude and less steep in the slope of change [3].

Sri Lanka is a middle income country with a population of 20.7 million people [4] and the population comprises of two broadly different socio-demographic groups, namely urban and rural. The urban population has higher income and leads a more westernized lifestyle compared to the rural population, where the majority is engaged in agriculture and related occupations, with lower income levels and a more physically active lifestyle. According to the WHO criteria, the prevalence of known diabetes was 5.6% and 2.7% among urban and rural areas respectively [5]. Studies in rural areas have shown an increase in the prevalence of diabetes from 2.5% in 1990 to 8.5% in 2000 [6]. In the sub-urban populations, the prevalence has been reported as 5.0% in 1994 and 6.6% in 2002 [7]. In a mixed urban and rural population, the prevalence was reported as 5.8% in 2004. In 2005, a study carried out in adults between 35 and 65 year

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of age in four provinces (North, Central, Uva, and Western,) in Sri Lanka reported that diabetes prevalence of 14.2% in men and 13.5% in women [8].

Several investigators have estimate the prevalence of Diabetes Mellitus (DM) in Sri Lanka over the past 15 years [9].The criteria used to diagnose Diabetes Mellitus were different between studies. Fasting blood sugar was used in some studies, and the oral glucose tolerance test in others. The Sri Lanka Diabetes and Cardiovascular Study (SLDCS) was carried out in 2005 to bridge the gap of data and have previously reported that national prevalence of Diabetes Mellitus in Sri Lanka as 10.3%. According to the 2008 World Health Organization estimations and projections on diabetes prevalence of its member countries for the years 1995, 2000, and 2025 the estimated and projected figures for Sri Lanka were 2.5%, 2.6% and 3.5% respectively. The available studies show a definite upward trend in the prevalence of Diabetes Mellitus in Sri Lanka.

Adequate baseline information about the prevalence and awareness regarding diabetes activities is not available in Batticaloa district, Sri Lanka. Hence, this study was taken up to assess the level of the diabetic awareness, knowledge about diabetic complications and alternative treatment practices through investigative and assessor research in Batticaloa district. Such data are tremendously important to an understanding of the level of public awareness and helpful to health educators to plan for national diabetic control program.

## II. MATERIALS AND METHODS

This study was conducted at different places of Batticaloa district such as market, hospital, park, food city, etc. Hundred cases with type 2 diabetes were recruited for the study. Cases were randomly selected among patients with diabetes.

A pre-tested structured questionnaire was used for data collection. The questionnaire contained data pertaining to sociodemographic characteristics and various risk factors associated with the occurrence of Diabetes Mellitus. Collected data were analysed using SPSS 13 version. Frequency, percentage, mean and standard deviation were calculated and associations between variables were assessed using chi-square test. Also, t-test was used to find significant differences of two means and ANOVA was employed to find the significance of more than two mans. The 95% confidence interval was calculated to find the significance of observed data. In all cases,  $p$  value  $< 0.05$  was considered statistically significant.

## III. RESULTS AND DISCUSSION

Type 2 Diabetes Mellitus is one of the most important public health problems in the developed and developing countries. Age, gender, occupation, physical activity, obesity, family history, diet, tobacco use and hypertension were investigated in this study. Gender wise distribution of subjects showed that 63% of cases were males (Table 1).

**TABLE I. Age group and gender distributions of respondents**

Variable	Group	Percentage (%)
Age group	20-29	7
	30-39	10
	40-49	49
	50-55	34
Gender	Male	63
	Female	37

With regard to age, 83% of the case group subjects were above age 40. It was observed that those above 50 years of age had a fivefold chance to get diabetes when compared to those of the 20-30 age group. The findings of present study

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were conformity with King [10].The significance of this study is that it will help greatly in planning the screening and preventive measures in diabetes. The screening should preferably be undertaken before 35 years of age and early intervention should start at an earlier age in this region. In the present study, gender was not found to be a statistically significant risk factor.

The majority of cases belonged to Christianity religious group. When the participants were compared according to occupation, it was found that 39% of cases were homemakers, whereas 8% of cases were manual labourers. Other occupational groups included professionals, mechanics, etc. A highly significant statistical association was observed between diabetes status and occupation ( $p < 0.05$ ).

**TABLE II. Sociodemographic characteristics of respondents**

Variable	Group	Percentage (%)
Age	20-29	7
	30-39	10
	40-49	49
	50-55	34
Gender	Male	63
	Female	37
Religion	Hindu	27
	Christian	41
	Muslim	32
Occupation	Home maker	25
	Laborer	7
	Farmer	24
	Teacher	11
	Others	33
Pattern of diet	Mixed	93
	Vegetarian	7
Family history	No	45
	Yes	55
Tobacco use	No	62
	Yes	38
Hypertension	No	42
	Yes	58

Dietary pattern showed that among controls 93% were having mixed diet and 7% were vegetarians. When further analyzed with chi-square test, dietary pattern did not show any significant association. Assessment of self-reported physical activity showed that 42% of cases were involved in heavy work. 39% of cases involved in moderate physical activity and 19% of cases were involved in sedentary activity. The level of physical activity among the study population is shown below in figure 1. The association between physical activities with regard to diabetes status was found to be statistically significant ( $p < 0.05$ ). Our study showed that physical activity is a protective factor for the development of Diabetes Mellitus. Acemoglu [11] reported that physical activity alone is not a factor, but leisure time activity is also as important in the development of type 2 diabetes. Kokiwar [12] found that the prevalence of diabetes among hard working population to be lower as compared with sedentary workers. Gill and Cooper [13] also support the fact that physical activity has a protective role in the development of type 2 diabetes.

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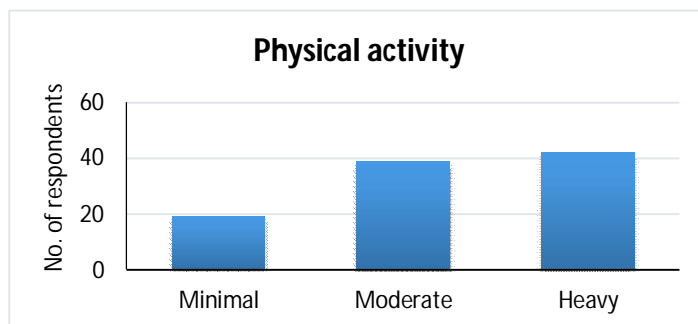


Figure 1. Mode of physical activity among the respondents

With regard to family history of Diabetes Mellitus, 55% of cases had a family history of Diabetes Mellitus. A detailed study of the family history of Diabetes Mellitus showed that in 24% cases mothers were diabetic whereas father were diabetic in 10.5%. Karter [14] report that in North California study conducted in 1999, the majority of patients had a maternal history of diabetes mellitus. Shashank and Rakesh [15] suggest that pedigree analysis is an excellent tool to study the genetic factor in diabetes. The findings of this study is very important in planning preventive strategy and will help identify the potential candidates who have a high chance to develop diabetes.

When compared according to body mass index 67% of cases had BMI in the range of 18.5 – 25 kgm-2 and 33% of the cases had BMI greater than 30 kgm-2. There was no statistically significant association between BMI and diabetic status.

It was observed that 38% of the cases were tobacco users. When tested with chi-square test, tobacco use showed a statistically significant association ( $p < 0.05$ ). Earlier, Kawakami [16] have reported a 3.27 times higher risk for development of type 2 diabetes in those smokers who use 16-26 cigarette per day when compared to non-smokers. The present finding is also similar to this findings. In various studies conducted in the United States, where women were followed up for 8 year, 2333 cases of type 2 diabetes were confirmed, with a 1.42 fold risk reported [17]. Rimm [18] showed that tobacco use may increase the risk of developing diabetes and the relative risk for men was 1.94 fold. The findings of the present study were higher than those reported by Rimm.

Among the 100 people, 67 people being taking their treatment in government and in private hospitals are 33. Details about the places of treatments taken are clearly shown in figure 2.

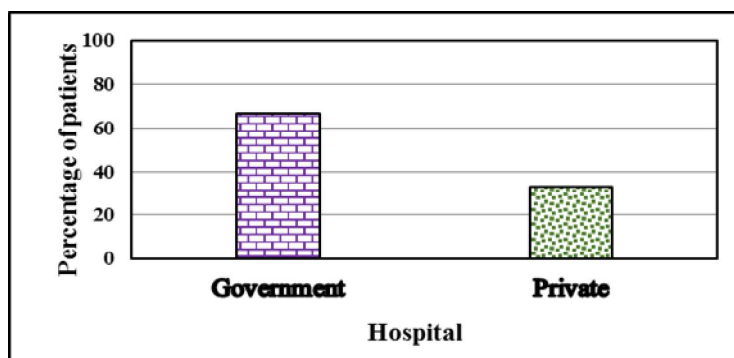


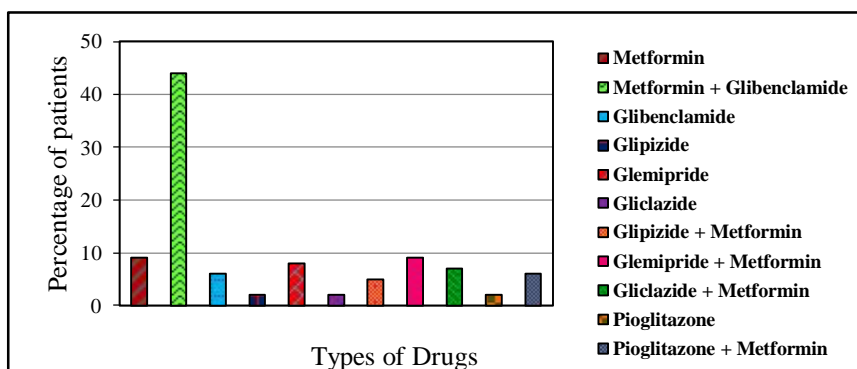
Figure 2. Place of taking treatments

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Majority of the people taking Metformin and Glibenclamide combination drug to control their diabetes, other drugs are indicated in graph. M-Metformin, GLI-Glibenclamide, GLC-Gliclazide, GLM-Glemipride, GLP-Glipizide, PIO-Pioglitazone. Figure 3 shows the types of drugs consumption drugs by the respondents in the study area.



**Figure 3. Different types of drugs used by respondents**

Mainly diabetes results in blood pressure, cardiac, and ophthalmic problems. Among 100 people, 49 people having high blood pressure and 22 people having low blood pressure, rest of them having normal blood pressure. Out of 100 people, 11 people had heart attack and 6 people underwent to bypass surgery, rest of them did not have any problems. From the 100 people, 77 people affected by cataract, 13 people having blurred vision, 10 people having both cataract and blurred vision.

In this present study, 58% of the respondents have hypertension. Hypertension, especially systolic hypertension, emerged as a strong risk factor for type 2 diabetes in the present study. According to recent JNC VII report, hypertension is twice as common among diabetics. Acemoglu, reported that hypertension increased the risk factor of diabetes and recorded a 2.05 fold risk.

### IV. CONCLUSIONS

The risk factors of type 2 diabetes have regional and ethnic variations. The results of the present study suggested a positive relationship of age with the incidence of diabetes, however, with no gender difference in the development of Diabetes Mellitus. Manual labourers are less affected compared to other occupations. Those engaged in hard work have a less chance to develop diabetes than those with sedentary habits. This also proves the protective effect of physical activity in the prevention of type 2 diabetes. Those with a family history of diabetes have three times greater chance to get type 2 diabetes compared to those without it. Dietary factors were not found to be a statistically significant risk factor in the development of type 2 diabetes. Hypertension is a significant risk factor in the development of diabetes. Many factors like obesity, diet, stress, occupation, which are considered more in the western and urban cities were not found to be significant in Batticaloa district whereas strong genetic factors, tobacco use, less physical activity and hypertension emerged as strong risk factors.

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