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Original Research Article

Prevalence and determinants of poor glycaemic control among adults with type 2 diabetes mellitus in a selected urban population of Mysuru district

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ABSTRACT

Background: India is referred to as the "diabetic capital of the world" and is home to the second-largest number of adults with diabetes worldwide. Urbanization is a key reason for the Indian diabetes epidemic. Poor glycaemic control in type 2 diabetes patients is a serious public health issue and a key risk factor for both progression and complication of diabetes. This study, therefore, intends to assess glycaemic control status and factors influencing poor glycaemic control among T_2DM patients.
Methods: This was a community-based cross-sectional study done over a period of four months, among T_2DM patients in urban Mysuru, using a pre-tested semi-structured questionnaire by interview method. A total of 372 T_2DM patients who had the latest reports of fasting blood sugar value were included in the study. SPSS version 23 was used to analyse the collected data and to identify the determinants and risk factors leading to poor glycaemic control.
Results: Among 372 study participants, 63.7% of patients had poor glycaemic control. The mean FBS value of the study population was 146.886±43.2700 and the mean age of the study participants was 55.50±12.238 years. Further, it was found that longer diseases durations, irregular check-ups, type of medication, non-adherence to both medication and diabetic diet were risk factors for poor glycaemic status.
Conclusions: The prevalence of poor glycaemic control among diabetics in Mysuru was found to be high; therefore, proper health education, counselling of diabetics and organizing health awareness programmes are needed to control it and hence reduce the disease burden.

Keywords: Diabetes, Epidemic, Exercise, Overweight, Risk factors, Urbanization

INTRODUCTION

Diabetes is a chronic medical condition that affects 463 million people worldwide and this number is expected to reach 578 million by 2030 and 700 million by 2045. Two-thirds of diabetes people live in urban areas and three out of four are in the working-age group. It is estimated that 136 million people over the age of 65 years have diabetes.[1]

India is widely referred to as the "diabetic capital of the world" and is home to the second largest number of adults with diabetes worldwide. Urbanization is a key reason of the Indian diabetes epidemic, but multiple studies have also shown that South Asians have increased vulnerability to diabetes relative to other populations.[2] Therefore, if proper corrective steps are not implemented by the year 2045, the number of individuals with diabetes will be around 134 million.[3]

Type 2 diabetes is often considered a 'silent disease' and the patient remains asymptomatic for many years. However, the longer the impaired glucose metabolism remains undetected and untreated, the more serious the

chronic organ complications become. Therefore, it is important to detect diabetes during its early stages so that we can take appropriate actions and hence prevent fatal organ complications.[4]

Diabetes has numerous possible long-term complications of vascular system that are traditionally categorized as microvascular and macrovascular complications.[5] Macrovascular diabetes complications, including coronary heart disease, stroke and peripheral vascular disease, and microvascular complications such as end-stage renal disease (ESRD), retinopathy, and neuropathy, along with lower-extremity amputations (LEA), are responsible for much of the diabetes-related burden. A diversifying set of causally associated conditions, including cancers, ageing-related outcomes (e.g., dementia), infections, and liver disease, are also increasingly recognized in patients with diabetes.[6,7] The treatment of diabetes hence seeks to postpone the onset of complications of the disease and prevent its progression, primarily by improving glycaemic status and controlling the risk of cardiovascular disease.[8]

Good glycaemic control can restrict the microvascular and macrovascular complications of diabetes, but still more than half of the patients worldwide have poor glycaemic control. Previous studies have shown that many factors can contribute to poor glycaemic control like their age, gender, education, socio economic status, marital status, duration of diabetes, type of medication, smoking and alcohol status. However, it is difficult to confirm which factors are most directed associated with poor glycaemic control and these factors vary across countries and between different ethnic groups.[9]

The present study aims at assessing the glycaemic status of type 2 diabetes mellitus patients and to determine the risk factors influencing poor glycaemic status in Mysuru city.

METHODS

This was a community-based cross across sectional study done under the urban field practice area of Department of Community Medicine, JSS medical college, Mysuru (Urban Primary Health Centre Bannimantap, Medhar Block Urban health Centre) from August 2020 to December 2020.

Study was done including patients with type 2 diabetes mellitus aged more than 18 years and have undergone fasting blood glucose check using glucometer and the exclusion criteria were patients with gestational diabetes and those suffering from mental or physical disability. The study was approved by the Institutional Ethics Committee and informed consent was obtained from the participants after explaining the purpose and procedure of the study.

The Urban Primary Health centre Bannimantap and Medhar block Urban Health Centre comes under the field practice area of JSS medical college, Mysuru, under the limits of Mysuru City Corporation and has a total of 978 registered diabetic patients.

Sample size

Based on the prevalence of 59% from a previous study conducted in urban Mysuru, at a confidence interval 95% and an absolute precision of 5%, the sample size was calculated as 372.[10]

$$\text{Sample size, } n = \frac{Z^2PQ}{L^2}$$

Where, Z=1.96, P= 59, Q= (100-59) = 41.7, L=5%.

Thus, a sample size of 372 subjects were studied.

All the diabetic patients who came for check-ups in Urban Primary Health Centre Bannimantap and Medhar block Urban Health Centre were selected for the study until the required the sample size was reached. The sampling technique used was convenient sampling.

Information's like age, gender, marital status, exercise, family history of diabetes, the duration of disease and other comorbidities were collected using pre tested semi-structured questionnaire by interview method. BMI was calculated according to the Asian-Pacific cut-off points by which the patients were categorized into underweight (<18.5 kg/m^2), normal or lean BMI (18.5-22.9kg/m^2), overweight (23-24.9 kg/m^2), and obese (≥25 kg/m^2).[11]

Glycaemic status of type 2 diabetes mellitus patients was assessed by taking recent FBS as criteria. Poor glycaemic control was defined in the study as an FBS level above or equal to 130.[12]

Statistical analysis

The data collected was entered in Microsoft Excel 2019 spreadsheet followed by analysis using SPSS version 23 (Licensed to JSS AHER). The demographic characteristics such as age, gender, occupation etc. was represented using arithmetic mean, standard deviation and percentages. The associations between the selected demographic variables (age, gender, education) and diabetic status were found out using Chi-square test/ Fisher's exact test. The data distribution was represented using appropriate tables. A p value of less than 0.05 was considered statistically significant.

RESULTS

The mean FBS value of the study population was 146.886±43.2700. Out of the 372 subjects interviewed, 63.7% subjects were having poor glycaemic status while 36.3% had controlled status of diabetes.

Majority of the subjects were females (61.83%) and 14 2(38.17%) were males. The mean age of the study participants was 55.50±12.238 years with maximum age of 85 years and minimum age of 27 years respectively. Majority of the study participants belonged to the age group of 41-60 years (54.30%) while 31.7% belonged to the age group 61-80 years. 345 (92.74%) out of the 372 participants were married, 4 (1.08%) were unmarried while the rest 23 (6.18%) were widowed (Table 1).

Around 206 (55.38%) study participants were doing regular exercise of more than or equal to 150 minutes per week as recommended by WHO and 213 (57.26%) participants were following a proper diabetic diet. 225 (60.48%) out of the 372 diabetic patients had family history of T_2DM. In 215 (42.20%) study subjects, the duration of disease was more than or equal to 5 years and 203 (54.57%) patients were doing regular check-ups, once every three months. 312 diabetic patients were on oral hypoglycaemic agents (OHA), 26 of them on insulin, 27 on both OHA and insulin while 4 patients were taking Ayurvedic medications and majority of these patients (89.25%) reported to be taking the medications regularly.

Table 1: Socio-demographic characteristics of study subjects.

Variables	Category	Good glycaemic control (%)	Poor glycaemic control (%)	Total (%)
Age	20-40	20 (41.7)	28 (58.3)	48 (12.9)
	41-60	70 (34.7)	132 (65.3)	202 (54.3)
	61-80	45 (38.1)	73 (61.9)	118 (31.7)
	≥81	0 (0)	4 (100)	4 (1.1)
Gender	Male	54 (38)	88 (62)	142 (38.2)
	Female	81 (35.2)	149 (64.8)	230 (61.8)
Marital status	Married	129 (37.4)	216 (62.6)	345 (92.7)
	Unmarried	2 (50)	2 (50)	4 (1.1)
	Widowed	4 (17.4)	19 (82.6)	23 (6.2)

Table 2: Diabetic profile, associated comorbidities and risk factors of study subjects.

Variables	Category	Good glycaemic control (%)	Poor glycaemic control (%)	Chi-square value	P value
Years with diabetes	<5	66 (42)	91 (58)	6.029	0.049*
	5-10	39 (28.5)	98 (71.5)		
	>10	30 (38.5)	48 (61.5)		
Diabetic diet	Following	95 (44.6)	118 (55.4)	14.887	<0.001*
	Not following	40 (25.2)	119 (74.8)		
Check-ups	≤3 months	92 (45.3)	111 (54.7)	15.759	<0.001*
	>3 months	43 (25.4)	126 (74.6)		
Medications adherence	Regularly	127 (38.3)	205 (61.7)	5.144	0.023*
	Not regularly	8 (20)	32 (80)		
Type of medications	Insulin	0 (0)	26 (100)	25.878	<0.001#
	Oral-hypoglycaemic agents (OHA)	121 (38.8)	191 (61.2)		
	OHA+ insulin	9 (33.3)	18 (66.7)		
	Ayurvedic	3 (100)	0 (0)		
	Others	2 (50)	2 (50)		
Alcohol	Yes	5 (17.2)	24 (82.8)	4.936	0.027*
	No	130 (37.9)	213 (62.1)		

*- Significant p value, # - Fisher's exact test

History of hypertension was present in 177 (47.58%) study participants while around 45 (12.10%) of them had history of dyslipidaemia. 120 (32.26%) subjects were having normal BMI, 154 (41.40%) were obese, 90 (24.19%) were overweight while the remaining 8 (2.15%) were classified as underweight according to WHO classification of BMI for Asian population. Around 59 (15.86%) participants were still smokers while 29 (7.80%) subjects were currently drinking alcohol (Table 2).

DISCUSSION

Diabetes is a major cause of death and disability. This high rates of death and disability due to diabetes as well as its long-term complications can pose a considerable

health care issue to the individual as well as the society. The present study showed several factors influencing poor glycaemic control which are duration of disease, type of medication, follow ups, diabetic diets, adherence to medications and alcohol intake.

In this study, 63.7% of the patients with type 2 diabetes mellitus were found to have a poor diabetes status. This finding was slightly more when compared to a study conducted by Rani et al in Mysuru, Karnataka in 2017 which showed a prevalence of 59% and it was almost similar to a study done in South Chennai in 2017 by Ganesh et al which showed 65.4% prevalence for uncontrolled blood sugar levels.[10,13]Another study done by Tripathy et al in Punjab also got similar results with 65% prevalence for uncontrolled diabetes.[14]

It was observed that poor glycaemic status was seen more in patients with longer duration of disease which was similar to a study conducted in Jordan by Khattab et al in the year 2010.[15] A substantial relationship was also seen between glycaemic control and type of drug prescribed. This finding was consistent to other studies done by Haghighatpanah et al and Roy et al.[16,17] Almost all patients taking just insulin for diabetic management was found to have a poor glycaemic status. Shahad et al, in his study to find out the complications and risk factors of T_2DM patients in Saudi Arabia also got the same result.[18]

80% of the patients with non-adherence to diabetic medication had poor glycaemic status which is also comparable with a study done in Tanzania in the year 2014 by Kamuhabwa et al.[19] Around 74.8% of the patients who were not following a recommended diabetic diet and 82.8% of patients who were consuming alcohol were also found to have an uncontrolled diabetic status, similar to studies done by Yusuf et al and Valerija et al.[20,21]

In this study, no significant association was found between family history of diabetes, insufficient physical exercise and BMI which was different when compared to other studies.[22-24]

The study had few limitations. Only fasting blood glucose was used to assess the diabetic status and the measurement was done using glucometer instead of venous blood glucose estimation. Some factors like socioeconomic status, types of food, educational qualifications of the patients were not assessed in this study.

CONCLUSION

The prevalence of uncontrolled diabetes was higher among the selected urban population in Mysuru city. Poor glycaemic control was more seen is people with longer duration of diseases, longer intervals between check-ups and people not following proper diabetic diets. Apart from these alcoholics and diabetic patients who were not taking regular medications were also found to have a bad glycaemic status. This high prevalence of uncontrolled diabetics suggests that we should intensify the counselling of diabetics on both life style changes as well as the complications that could arise if the blood glucose is not well controlled. Proper health education and awareness programs should be conducted for the general public for helping them understand more about diabetes and ways to control it which will eventually help to reduce the diseases burden.

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