Original Article

To Correlate Socio-Demographic Factors with Glycemic Control and Awareness of Complications among Diabetes Mellitus Patients

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Abstract

Background: Diabetes currently affects more than 62 million Indians, which is more than 7.2% of the adult population. The average age on onset is 42.5 years. Nearly 1 million Indians die due to diabetes and its complications every year. Education is one of the key components in ensuring better treatment and control of diabetes. There is also evidence to show that increasing knowledge regarding diabetes and its complications has significant benefits including increase in compliance to treatment, thereby decreasing the complications associated with diabetes. **Subjects and Methods:** It is a cross sectional study, which included 430 diabetic patients attending general medicine OPD of Subbaiah institute of medical science and hospital, who met the inclusion and exclusion criteria. Data was collected using self-designed questionnaire and entered in excel sheet and compared using SPSS Ver 21. The aim is to study the association between glycemic control and socio-demographic variables in our study population, to study the association between awareness of complication in diabetes with socio-demographic variables. **Results:** Our study included 430 diabetic patients who attended medicine OPD of Subbaiah institute of medical science and hospital. Of which 206 (47.6%) were male and 227 (52.4%) were females. We had 254 (58.7%) of rural patients and 179 (47.3%) of patients from urban side. In our study we found that coronary vascular disease (47%) was most known complication, followed by retinopathy (39.9%) then by nephropathy (37%), and by neuropathy (30%). Awareness about peripheral vascular disease was least among our study population. Hypoglycaemia symptoms were reported more in the rural population than urban population. Regarding glycaemic control 44% of patients had their sugars between 200 to 300 mg/ dl. There was no statistical significant difference in blood sugar levels between urban and rural population. **Conclusion :** Awareness of complication of diabetes was low in our study group. There was no significant difference in awareness of diabetic complication and glycaemic control between the urban and rural population. Hence irrespective of place of residence people needs to be educated regarding diabetes, its chronicity and need for regular monitoring of blood sugars to avoid its complication from developing.

Keywords: Diabetes Mellitus, complication, Glycaemic status, urban and rural population.

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Introduction

Urbanisation influences lifestyle and socioeconomic position and is one of the drivers of a country's health transition. The advantages of urbanisation include better access to healthcare services, education and social services. On the other hand, adverse changes such as nutrition transition with an increase in the consumption of saturated fats and sugar and a more sedentary lifestyle are reported worldwide. The net effect of urbanisation is an epidemiological transition towards increasing rates of obesity and non-communicable diseases (NCDs), including diabetes mellitus (DM) type II.[1,2]

According to the WHO, DM was the sixth most important cause of global deaths in 2015.[3] In 2017, there were 146 million people with DM in rural areas, while 274 million people lived with DM in urban areas.[4] The global prevalence of DM is estimated to increase from 8.8% in 2015 to 10.4% in 2040, equalling 642 million people.[4]

Diabetes currently affects more than 62 million Indians, which is more than 7.2% of the adult population. The average age on onset is 42.5 years. Nearly 1 million Indians die due to diabetes and its complications every year.

Pathogenesis of diabetes is complex, which includes various nonmodifiable and modifiable risk factors. Modifiable or

lifestyle risk factors include increased body mass index (BMI), physical inactivity, poor nutrition, hypertension, smoking, and alcohol use, among others. High BMI is considered to be one of the greatest risk factors for development of diabetes. Others like, distribution of body fat, and specifically an increased waist-to-hip ratio, increase a person's risk for diabetes. [5]

Diabetes complications are seen both in patients with type 1 or type 2 diabetes. There are acute as well as chronic complications in diabetes. It's the chronic complication that are mainly responsible for the major mortality as well as morbidity. The chronic complications of diabetes are broadly divided into microvascular and macrovascular, with the former having much higher prevalence than the latter. [5] Microvascular complications include neuropathy, nephropathy, and retinopathy, whereas macrovascular complications consist of cardiovascular disease, stroke, and peripheral artery disease (PAD). Diabetic foot syndrome has been defined as the presence of foot ulcer associated with neuropathy, PAD, and infection, and it is a major cause of lower limb amputation. [6]

In the present era of corona pandemic, significance of diagnosis of diabetes and its adequate control has increased, as diabetes is proven to be a major risk factor for development of severe Covid pneumonia.

Education is one of the key components in ensuring better treatment and control of diabetes. There is also evidence to show that increasing knowledge regarding diabetes and its complications has significant benefits including increase in compliance to treatment, thereby decreasing the complications associated with diabetes. In our country like India, where diabetes incidence is increasing at high rate in both older as well as in younger population, importance of educating patient plays a pivotal role. Since the lifestyle in urban and rural population is different, understanding the level of awareness in both the population becomes an important part before planning the education programme in each set of population.

It is believed that urban population have better access to information when compared to their rural counterpart. But does this access to information really improves their understanding of disease process and its complication. The other aspect is does better understanding leads to better control in glycaemic status is also what we intend to understand from this study.

Aims and objectives

- To study the association between glycemic control and socio-demographic variables in our study population
- To study the association between awareness of complication in diabetes with socio-demographic variables

Subjects and Methods

A analytical cross sectional study was carried out over a period of 12 months from April 2020 to March 2021 among IPD or OPD patients attending department of general medicine, Subbaiah medical college, Shivamogga. Around 430 patients who met the inclusion and exclusion criteria were included in the study by convenient sampling. Patients were divided into urban and rural residence based on Govt. of India's definition in Census of India 2011 and residing in the same for more than one year. After obtaining informed consent, required data was collected from pre- designed questionnaire. Questions were explained to patients by medical professional and answer obtained were entered in our proforma. A detailed history regarding the illness, family history, food habits as well as regarding physical activity were collected from each patient. They were grouped- sex-wise, age-wise, (30-40 years, 41-50 years, 51-60 years and above 61 years), depending on BMI and depending on hypoglycaemic drugs taken. Awareness regarding the disease and its complications was assessed using questionnaire. Necessary investigations was done in our laboratory and results tabulated. Results obtained were compiled in excel sheet and analyzed statistically.

Inclusion criteria

- Patients with type 2 diabetes mellitus for more than one year
- Patients consenting for the study

Exclusion Criteria

- Patients who are physically and mentally disabled to participate in the study.

Statistical Analysis

Data collected was entered in Microsoft excel sheet. SPSS software version 21 was used for statistical analysis. Data were analyzed using Chi-square test to determine the association between the variables. A p-value of <0.05 was considered as significant.

Results

Our study included a total of 430 diabetic patients who attended either OPD or IPD service provided by department of general medicine, Subbaiah medical college and hospital, Shivamogga. Of which 206 (47.6%) were male and 227 (52.4%) were females. Since our college mainly caters for rural population, we had 254 (58.7%) of rural patients and 179 (47.3%) of patients from urban side.

Education wise distribution of the patients is depicted in the chart. Since our institution mainly focused on low to medium

economic strata most of our patients were only educated till primary or secondary education. Awareness of complication according to educational status is summarized in the table below.

While comparing the BMI of patients it was found that around 50% (215) of the patients had normal BMI. 41% (179) were overweight. On comparing with urban rural population with BMI, we did not find statistically significant difference in high BMI between the two population. There was equal distribution of patients who were overweight in both the population.

Regarding awareness of hypoglycemic symptoms like palpitation, giddiness, sweating and syncopal attacks, we found that rural population patients had more symptoms of hypoglycemia than urban patient's. Urban patients were more aware of hypoglycemia and had more knowledge regarding cause for hypoglycemia. This was attributed to urban patients timed food habbits, which was lacking in rural patients.

But we found no significant difference in hyperglycemic symptoms between urban and rural population.

In our study we found that among all the complications, people were more aware that diabetes is one of the risk factors contributing to coronary vascular disease (47%). Among the microvascular complication they were more aware that diabetes can lead to retinopathy (39.9%) followed by nephropathy (37%), followed by neuropathy (30%). There was least knowledge regarding peripheral vascular disease.

With regard to urban and rural distribution we found no statistically significant difference in awareness of complications of diabetes.

Regarding glycemic control most (53 % of rural and 64.6% of urban) patients had their sugars between 200 to 400 mg/dl. Here also we did not find any statistically significant difference in blood sugar values between urban and rural population.

Discussion

According to a study done by ICMR in 2014 awareness of diabetes in general population was 43.2%. Its awareness in urban population was 58.4% and in rural population was 36.8% thus stating that urban population was more aware of diabetes prevalence when compared with their rural counterpart. Gender wise awareness showed that 46.7% of males and 39.6% of females were aware of diabetes. Regarding complications, 51.5% of the general population and 72.7% diabetic population knew that diabetes could affect other organs.[7]

In another study done by Maulee Hiromi Arambewela, Noel P. Somasundaram et al,[8] the Prevalence of CAD, stroke, and peripheral vascular disease were 10.6%, 1.1%, and 4.7% while diabetic retinopathy, neuropathy, nephropathy, diabetic foot,

and lower extremity amputation (LEA) were 26.1%, 62.6%, 50.8%, 2.6%, and 1.3%, respectively.

According to the European Diabetes Prospective Complications Study, the cumulative incidence of microalbuminuria was 12.6% over 7.3 years in patients with T1DM.[9] Similarly, in the (UKPDS), T2DM patients showed a 2.0% incidence of microalbuminuria per year, which reached up to 25% in 10 years postdiagnosis.[10] According to a study done by the Sankara Nethralaya DR Epidemiology and Molecular Genetic Study has estimated an urban prevalence of 18.0% and a rural prevalence of 10.3% of DR in South India.[11]

In India, a high prevalence (29.2%) of diabetic peripheral neuropathy was reported among the North Indian population.[12] A study conducted by Cade demonstrated a significant correlation between diabetic neuropathy and the existence of one or more macrovascular complications showing that diabetic patients with peripheral neuropathy presented with significantly higher rates of cardiac events and peripheral vascular disease (PVD) than diabetic patients without neuropathy.[13] Strokes were also numerically higher in the neuropathy group.[13] Chawla et al demonstrated an association between diabetic neuropathy and development of DR and microalbuminuria in 855 patients.[14] Diabetic cardiac autonomic neuropathy have been found to have a strong co-association with DR (22% vs. 14.3%), diabetic neuropathy (14% vs. 6.8%), and poor glycaemic control.

Even in our study we found that people were more aware about cardiac complication in diabetes, which was comparable to other studies. Least knowledge was regarding peripheral vascular disease and its complication like gangrene and amputation. People were also not aware regarding foot care in diabetes which has prime importance when we are treating people coming from rural areas, in view of bare foot walking which is rampant in rural areas.

Diabetic patients should be made aware regarding microvascular complication like retinopathy and regular monitoring through fundoscopy. Regarding nephropathy and monitoring of microalbuminuria. Regarding diabetic neuropathy, they have to be educated regarding regular foot care in view of bare foot walking which is common in our country. They have to be motivated to take medications regularly and the need to monitor blood sugars regularly, so that complications can be avoided. They should also be taught regarding importance of diet and regular exercise which are required for adequate control of blood sugars. Moreover they should be educated that diabetes is a chronic disease and diet, exercise and medication has to followed lifelong, for its adequate control and to avoid its complication from developing.

Awareness regarding other comorbidities like hypertension which is usually associated with diabetes and is a contributing factor for development of complications should be monitored

Education		No	Yes
Nil	Can diabetes cause heart	18 (47.4%)	20 (52.6%)
Pre-primary		9 (47.4%)	10 (52.6%)
Primary		109 (58%)	79 (42%)
Secondary		69 (47.9%)	75 (52.1%)
Graduate		22 (53.7%)	19 (46.3%)
Nil	Can diabetes cause	22 (57.9%)	16 (42.1%)
Pre-primary		12 (63.2%)	7 (36.8%)
Primary		121 (64.4%)	67 (35.6%)
Secondary		88 (61.1%)	67 (35.6%)
Graduate		27 (65.9%)	14 (34.1%)
Nil	Can diabetes cause eye	21 (65.8%)	13 (34.2%)
Pre-primary		14 (73.7%)	5 (26.3%)
Primary		134 (71.3%)	54 (28.7%)
Secondary		99 (68.8%)	45 (31.2%)
Graduate		28 (68.3%)	13 (31.7%)
Nil	Can diabetes cause	24 (63.2%)	14 (36.8%)
Pre-primary		15 (79.8%)	4 (21.1%)
Primary		139 (73.9%)	49 (26.1%)
Secondary		102 (70.8%)	42 (29.2%)
Graduate		28 (68.3%)	13 (31.7%)

		<18.5	18.5-24.9	25-29	>30	p-value
Rural	BMI	9 (3.5%)	132 (52%)	103 (40.6%)	10 (3.9%)	.615
Urban		6 (3.4%)	83 (47.2%)	76 (43.2%)	11 (6.3%)	

	Parameters	No	Yes	p-value
Rural	Have you had the symptoms of low blood sugar reaction lately	147 (57.9%)	107 (42.1%)	.041
Urban		119 (67.6%)	57 (32.4%)	

and treated. Diabetic patients should be made aware regarding need to quit smoking, tobacco chewing and alcohol consumption, which forms a contributing factor for coronary as well as peripheral vascular disease. These are possible only through regular conducting of community health camps and awareness programmes. Also when patients attend OPD for follow up they have to be educated regarding need for diet, exercise and medication. Most type 2 DM patients prefer oral hypoglycaemic drugs and are reluctant to start insulin even when sugars remain uncontrolled with OHA or even in presence of complications. These patients have to be motivated and educated on regular basis for the need of injectable insulin.

Awareness regarding complications and need for good glycaemic control is steadily increasing in urban as well as rural areas. Due to better access to information through social media, as well as better accesses to health care due to improvement in connectivity, even rural population are getting educated regarding diabetes and its complication. Most of the rural patients depend on primary health care centres for initial diagnosis of diabetes and for follow up. Patients coming to our tertiary centres are usually referred from Primary health care centres in view of uncontrolled sugars or diabetic complications. Education programmes should not only focus on educating patients but also on persons working in PHC's so that they can educate these patients during follow up and timely referrals to tertiary care can be done.

	Parameters	No	Yes	p-value
Rural	Can diabetes cause	127 (50.2%)	126 (49.8%)	.271
Urban		99 (56.3%)	77 (43.8%)	
Rural	Can diabetes cause	155 (61.3%)	98 (38.7%)	.460
Urban		114 (64.8%)	62 (35.2%)	
Rural	Can diabetes cause	145 (57.3%)	108 (42.7%)	.152
Urban		113 (64.2%)	63 (35.8%)	
Rural	Can diabetes cause	182 (71.9%)	71 (28.1%)	.226
Urban		117 (66.5%)	59 (33.5%)	
Rural	Can diabetes cause	117 (70%)	76 (30%)	.378
Urban	disease	130 (73.9%)	46 (26.1%)	

		<200	201-400	>400	p-value
Rural	Recent blood sugar level	109(43.1%)	134 (53%)	10 (4%)	. 118
Urban		56 (32%)	113 (64.6%)	6 (3.4%)	

Conclusion

Awareness of complication of diabetes was low in our study group. Of all the complication coronary vascular disease was most known. Least known was peripheral vascular disease. There was no significant difference found in awareness of complication between the urban and rural population. Even in glycaemic control we found no significant difference in control of blood sugars between the two population. This can attributed to increasing availability of social media platforms which have become an important source of information propagation even in rural areas. Hence irrespective of place of residence people needs to be educated regarding diabetes, its chronicity and need for regular monitoring of blood sugars to avoid its complication from developing.

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