Original Research Article

Prevalence of Diabetes Mellitus and its risk factors

Akula Sanjeevaiah[1], Akula Sushmitha[2*], Thota Srikanth[3]

[1]CSS Gen Medicine, [3]MD Gen Medicine, Dist. Head Quarter Hospital, Warangal Rural, India
[2]Post graduate in Internal Medicine, NIMS, Hyderabad, India
[*]Corresponding author email: **Akulasanjeev2013@gmail.com**

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Abstract

Background: The high prevalence of DM may be due to rapid urbanization of the suburban regions. India is also at an early stage of epidemiological transition from communicable to non-communicable diseases because of the gradual adoption of unhealthy lifestyles characterized by increasing intake of high calorie-dense foods and decreased physical inactivity.
Aim: To evaluate the prevalence of DM and its associated factors among individuals aged above 15 years.
Materials and methods: A cross sectional study was conducted in our hospital for a period of 4 months January-April, 2018 in Department of General Medicine. The sample size was 250 subjects. Informed verbal consent was gathered from each participant. Study done in department of general medicine in subjects identified with hypoglycemia, impaired fasting glucose (IFG), and diabetes were selected for study.
Results: A total of 250 participants were included in the study. The prevalence of DM was found to be 6.4%. About one third (32%) of the total (250) participants said that they were frequent alcohol drinkers, whereas 1.2% (3/250) of them reported that they were ex-drinkers.
Out of the total study participants, 6.4% of them had ≥126 mg/dl fasting blood glucose level.
Conclusion: Age, waist circumference, hypertension, BMI, smoking habit and total cholesterol are significant in prevalence of diabetes mellitus.

Key words

Diabetes mellitus, Modifiable risk factors, Waist circumference.

Introduction

Diabetes mellitus (or diabetes) is a chronic, lifelong condition that affects your body's ability to use the energy found in food. There are three major types of diabetes: type 1 diabetes, type 2 diabetes, and gestational diabetes. [1]. All types of diabetes mellitus have something in common. When you eat carbohydrates and sugars are converted into glucose which is a special sugar which is broken by body. The cells in body are fuelled by glucose. But the cells use glucose for energy and the cells need insulin, a hormone, in your bloodstream [2, 3]. Your body doesn't make enough insulin, it can't use the insulin it does produce, or a combination of both in diabetes mellitus. In India, 69.1 million people with DM survive and is further moving to be the second highest number of cases of DM in the world. In India, diabetes mellitus is found to be maximum in the southern part of the country and in urban areas and the prevalence of DM ranges from 5–17%. It builds up in the blood, since the cells can't take in the glucose. The tiny blood vessels in your kidneys, heart, eyes, or nervous system can be damaged by high levels of blood glucose [4]. Diabetes if left untreated can eventually cause heart disease, stroke, kidney disease, blindness, and nerve damage to nerves in the feet. Ageing populations, increasing urbanization, dietary changes, reduced physical activity and unhealthy behavior are the rapid cultural and social changes, which causes DM to increase. In India, a greater degree of insulin resistance and a stronger genetic predisposition to diabetes prevails and the trend will continue to exist in low- and middle-income countries. This study evaluated the prevalence of DM and its associated factors among individuals aged above 15 years.

Materials and methods

A cross sectional study was conducted from January-April, 2018. The subjects included were 15 years above and permanently living in the town. The sample size was 250 subjects. Informed verbal consent was gathered from each participant. Study was done in Department of General Medicine in subjects identified with hypoglycemia, impaired fasting glucose (IFG), and diabetes were selected for study. Following data was collected from patients in this stepwise manner as demographic and behavioral risk factors were collected. Each participant was questioned for age, sex, educational status, marital status, occupation type, physical activity, history of raised blood pressure and diabetes, fruit and vegetable intake, alcohol consumption, and smoking habit. Subjects were selected based on following criteria. Inclusion criteria was age greater than 15 years of both genders who are identified with impaired fasting glucose (IFG), and diabetes. Pregnant women were excluded and patients who were on drugs which possibly impact the glucose metabolism (steroids, β-blockers, thiazide diuretics) were excluded from the study. To calculate body mass index, waist circumference and blood pressure measurements of height and weight were needed. Blood pressure was measured by using sphygmomanometer. Every 5 minutes, two readings were taken and the mean was considered as the final BP result. Systolic BP of 120-139 and diastolic BP of 80-89 mmHg was considered as Pre-hypertension. Systolic BP of ≥140 mmHg or diastolic BP of ≥90 mmHg were considered as hypertension. Body mass index was calculated by weight in kilograms divided by height in meters squared. Patients were considered to be underweight if BMI is less than 18.5 kg/m^2, patients were considered normal if BMI was between 18.5 to 24.9 kg/m^2 and patients were considered over weight if BMI was between 25 to 29.9 kg/m^2 and Patients were considered to be obese if BMI was greater than 30 kg/m^2. The approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest, using a flexible plastic tape was calculated as waist circumference. According to World Health Organization, WC values > 94 and >80 cm for men and women, respectively, were considered high. Measurements of all biochemical parameters such as fasting blood glucose and lipid profile (total cholesterol (TC), HDL and triglyceride (TG) were taken. Plasma glucose was determined using the glucose meter

after overnight fasting (≥8 h). From a single study participant, fasting capillary blood samples were collected three times at different occasions and glucose measurement was carried out, then, their average was taken. Semiauto analyser was used for estimation of lipid profile. The diagnosis of DM was based on the American Diabetes Association diabetes mellitus classification criteria with fasting blood glucose of ≥126 mg/dl being considered as positive for DM; impaired fasting glucose, FBG: ≤110 mg/dl to <126 mg/dl; normoglycemic, FBG: ≤61 mg/dl to <110 mg/dl), and hypoglycemic, <61 mg/dl . Using SPSS version 20.0 software package, the data was calculated. To summarize the characteristics of study participants, descriptive statistics were used. P Value less than 0.05 was considered to be statistically significant.

Results

A total of 250 participants were included in study. The age of the participants ranged from 15 to 78 years with a mean of 31 (SD = ±6.4).

Table - 1 shows the socio-demographic characteristics namely gender, males were 32.4% and females were 67.6%. Age group in years was highest in the age group 25-34 years which was 32.4%. Level of education was highest in elementary school which was seen in 30.4%.

Patients who were house wives were suffering from diabetes mellitus which constituted 32.4%. The family monthly income was highest in the range of 301-600 which was 28.4%.

About one third (32%) of the total (250) participants said that they were frequent alcohol drinkers, whereas 1.2% (3/250) of them reported that they were ex-drinkers (**Table – 2**).

Out of the total study participants, 6.4% of them had ≥126 mg/dl fasting blood glucose level (**Table – 3**).

Age, waist circumference, hypertension, BMI, smoking habit and total cholesterol were significant in comparison between diabetic and non-diabetic subjects (**Table – 4**).

Table - 1: Socio-demographic characteristics of the variables.

Variable	Frequency	%
Sex		
Male	81	32.4
Female	169	67.6
Age group (years)		
15–24	79	31.6
25–34	81	32.4
35–44	42	16.8
45–54	25	10
≥55	23	9.2
Level of education		
Illiterate	52	20.8
Able to read and write	20	8
Elementary school	76	30.4
High school	63	25.2
Diploma and above	39	15.6
Occupation		
Government employee	65	26
Non-government employee	4	1.6
Merchant	30	12
Daily labourer	10	4
Student	37	14.8
Housewife	81	32.4
House servant	9	3.6
Retired	6	2.4
Other	8	3.2
Family monthly income		
<300	46	18.4
301–600	71	28.4
601–900	34	13.6
901–1200	43	17.2
>1201	56	22.4
Family history of diabetes mellitus		
Yes	14	5.6
No	236	94.4
Family history of hypertension		
Yes	49	19.6
No	201	80.4

Table - 2: Behavioral characteristics.

Variable	Frequency	%
Alcohol consumption		
Non-drinker	167	66.8
Frequent drinker	80	32
Ex-drinker	3	1.2
Smoking habit		
Non-smoker	241	96.4
Smoker	6	2.4
Ex-smoker	3	1.2
Physical activity		
Sedentary	26	10.4
moderate	211	84.4
Vigorous	13	5.2
Frequency of eating fatty meat		
Every day	3	1.2
Every three day	6	2.4
Once a week	31	12.4
Once a month	94	37.6
Not eating	116	46.4

Table - 3: Physical and biochemical measurement characteristics of study population.

Variables	Frequency	%
Hypertension		
Yes	47	18.8
No	203	81.2
Waist circumference		
Normal	129	51.6
High	121	48.4
Body mass index		
Underweight	36	14.4
Normal	175	70
Overweight	49	19.6
Obese	12	4.8
Fasting blood glucose		
Diabetic	16	6.4
Prediabetic	39	15.6
Normoglycemic	194	77.6
Hypoglycemic	2	0.8
Total cholesterol		
<200 mg/dl	241	96.4
≥200 mg/dl	9	3.6
Triglyceride		
<150 mg/dl	223	89.2
≥150 mg/dl	27	10.8

Table - 4: Factors associated with diabetes mellitus among people.

Variable	DM status		P-Value
	Yes (%)	No (%)	
Age			
15–24	2 (2.5)	77(97.5)	<0.05
25–34	4 (4.9)	77 (95.1)	<0.05
35–44	4 (9.5)	48 (90.4)	<0.05
45–54	2 (8)	23 (92)	<0.05
≥55	4 (17.3)	19 (82.6)	<0.05
Waist circumference			
Normal	2 (1.5)	127 (98.4)	<0.05
High	13 (10.7)	108 (89.2)	<0.05
Body mass index			
Underweight	0 (0)	36 (100)	<0.05
Normal	7 (4.0)	178 (96)	<0.05
Overweight	8 (16.3)	41 (83.6)	<0.05
Obese	3 (25)	09 (75)	<0.05
Smoking habit			
Non-smoker	24 (6.2)	217 (90)	<0.05
Smoker	2 (33.3)	4 (66.7)	<0.05
Ex-smoker	0 (0)	3 (100)	<0.05
Hypertension			
Yes	10 (17.5)	37 (78.7)	<0.05
No	10 (4.9)	193 (95)	<0.05
Total cholesterol			
<200 mg/dl	13 (5.4)	228 (94.6)	<0.05
≥200 mg/dl	2 (22.2)	6 (77.7)	<0.05
Triglyceride			
<150 mg/dl	11 (4.9)	212 (95.0)	<0.05
≥150 mg/dl	6 (22.2)	21 (77.7)	<0.05

Discussion

The high prevalence of DM may be due to rapid urbanization of the suburban regions. The prevalence rates ranging from 2% to 10% have been observed among suburban populations in previous studies. The National Urban Diabetes Survey showed an age-standardized prevalence of 12.1% for diabetes and 14% for IGT in six large metropolitan cities [3]. In study conducted by Shiferaw Birhanu Aynalem, et al. [5]; 402 participants were included in the study. 6.5% (26 out of 402) had the prevalence of DM. Out of which, 88.5% had the proportion of previously undiagnosed diabetes mellitus. 15.9% had the

prevalence of prediabetes. Diabetes mellitus is significantly associated with the waist circumference (WC), body mass index, smoking habit, hypertension, and total cholesterol level whereas in the present study, it was observed that 6.4% of them had ≥126 mg/dl fasting blood glucose level and age, waist circumference, hypertension, BMI, smoking habit and total cholesterol are significant in comparison between diabetic and non-diabetic subjects. In Barik, et al. [6] study; it was reported that overall study participants were 2.95% and 3.34% who were diagnosed as individuals with diabetes and pre-diabetes or impaired, respectively. The richest have higher probability (β: 0.730; 95% CI 0.378 to 1.083) of being diagnosed with diabetes when compared with poor people. Overweight/obese people are more prone to being diagnosed with diabetes (β: 0.388; 95% CI 0.147 to 0.628) when compared with normal body mass index. People are more likely to be diagnosed with diabetes with a decreasing level of physical activity and similar observations were prevailing in the present study. In Little M, et al. [7] study; 753 participants were selected. The age and sex-standardized prevalence of IFG was 3.9 %, IGT was 5.6 %, and type 2 diabetes was 10.8 %. Physical activity (OR 0.81), rurality (OR 0.76), polyunsaturated fat intake (OR 0.94), body mass index (OR 1.85), waist to hip ratio (OR 1.62), and tobacco consumption (OR 2.82) were the factors associated with type 2 diabetes after adjusting for confounders. Anjana RM, et al. [8]; observed that 14,277 (86%) participated, of whom 13,055 gave blood samples of the total 16,607 individuals who were selected for the study. The weighted prevalence of known and newly diagnosed diabetes was 10.4% in Tamil Nadu, 8.4% in Maharashtra, 5.3% in Jharkhand, and 13.6% in Chandigarh. 8.3%, 12.8%, 8.1% and 14.6% were the prevalences of prediabetes (impaired fasting glucose and/or impaired glucose tolerance). Age, male sex, family history of diabetes, urban residence, abdominal obesity, generalised obesity, hypertension and income status were significantly associated with diabetes was shown by multiple logistic regression analysis. Age, family history of diabetes, abdominal obesity, hypertension and income status were significant risk factors for prediabetes. Ravi Kumar P, et al. [9]; reported that diabetes was observed in a total of 349 subjects (15.7%, 95% CI: 13.9-16.9), of which 210 (9.4%) were having known diabetes and 139 (6.2%) were having newly diagnosed diabetes, and 344 (15.4%, 95% CI: 14.3-17.1) subjects were prediabetic. The age standardized prevalence of diabetes and prediabetes were 11.1% (95% CI: 9.7-12.4) and 13.2% (95% CI: 11.8-14.6), respectively. Age greater than or equal to 50 years, a family history of diabetes, BMI greater than or equal to 23 kg/m^2, abdominal obesity and hypertension were significantly and positively associated with the presence of diabetes, whereas educational status was negatively associated with diabetes ($P<0.001$ for all). Chan JC, et al. [10]; conducted a study in which the prevalence of diabetes in Asian populations has increased rapidly in recent decades. More than 110 million individuals in Asia were living with diabetes in 2007, which was observed disproportionately among the young and middle aged. Driven by economic development, nutrition transition, and increasingly sedentary lifestyles, rates of overweight and obesity are increasing sharply. In Asian populations, the metabolically obese phenotype i.e. normal body weight with increased abdominal adiposity is common. Through "diabetes begetting diabetes" in Asia, the increased risk of gestational diabetes, combined with exposure to poor nutrition in utero and overnutrition in later life in some populations, may contribute to the increasing diabetes. In the present study, a similar finding was observed which was age, male sex, family history of diabetes, urban residence, abdominal obesity, generalised obesity, hypertension and income status were significantly associated with diabetes were shown by multiple logistic regression analysis.

Conclusion

This study concluded that age, waist circumference, hypertension, BMI, smoking

habit and total cholesterol are significant in comparison between diabetic and non-diabetic subjects. About one third (32%) of the total (250) participants said that they were frequent alcohol drinkers, whereas 1.2% (3/250) of them reported that they were ex-drinkers.

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