Research Article

PREVALENCE OF COMPLICATIONS IN TYPE II DIABETES MELLITUS PATIENTS IN HYDERABAD, SOUTH INDIA

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A R T I C L E   I N F O

A B S T R A C T

Background: India is one of the epicentres of the global diabetes mellitus pandemic. Rapid socioeconomic development and demographic changes, along with increased susceptibility for Indian individuals, have led to the explosive increase in the prevalence of diabetes mellitus in India over the past four decades. Available data also suggest that the susceptibility of Asian Indian people to the complications of diabetes mellitus differs from that of white populations.

Objective: The objectives of this study are to evaluate the patients with type II diabetes mellitus clinically as well as with relevant investigations to see spectrum of various complications of the disease.

Design: A prospective cross sectional study carried out in 200 patients diagnosed of diabetes mellitus admitted into the wards of the medicine department, Osmania General Hospital, Hyderabad.

Duration: September 2016 to November 2017.

Setting: Department of Medicine, Osmania General Hospital, Hyderabad.

Participants: 200 patients diagnosed of diabetes mellitus admitted in Osmania General Hospital, Hyderabad.

Methods: All subjects were interviewed, examined and investigated according to the proforma which was predesigned and pretested. Waist circumference was measured using a non stretchable fibre measure tape. Blood pressure measurement: It was recorded with the subject in lying down position in the right arm with a mercury manometer to nearest of 2 mmHg. Weight was measured by platform scale. Body mass index was calculated using the formula: BMI= weight (kg)/height (m^2). Examination of diabetic peripheral neuropathy was done by foot sensitivity testing with Semmes Weinstein monofilament, deep tendon reflex. For diabetic autonomic neuropathy, parasympathetic tests and sympathetic test were performed. Nerve conduction study, CT, MRI and carotid Doppler if required were done accordingly. Examination of diabetic retinopathy was done by direct opthalmoscopic examination of the fundus. Ischemic heart disease was assessed by electrocardiogram and echocardiography. Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean ± SD and median. Qualitative variables were correlated using Chi-Square test /Fisher's exact test.

Results: Peak incidence of complications was seen in the age group of 63 - 70 years. Most (69%) of the patients presenting with complications of diabetes mellitus had the disease for 1- 10 years. 19% of the patients had a positive family history of the disease. 11% patients presented with acute complications of diabetes mellitus, 56% had macrovascular complications while 58% had microvascular complications. 32% patients had more than 1 complication. Microvascular and macrovascular complications coexisted in 20% patients. Ischemic heart disease was the most common complication followed by retinopathy. Retinopathy (60%) and ischemic heart disease (99%) were seen even patients who were newly diagnosed. Neuropathy was most common (37%) when duration of diabetes was greater than 10 years.

Conclusion: The microvascular and macrovascular complications of diabetes mellitus account for most of the morbidity and mortality associated with the disease. All the associated diabetic complications observed need to be addressed with appropriate prevention and control strategies.

INTRODUCTION

Diabetes mellitus is a major public health problem depicting a rising prevalence worldwide. It is currently estimated that 190 million people around the world suffer from DM, with over 330 million predicted to have the condition by 2025, and 366 million by the year 2030. In fact, diabetes is a growing cause of disability and premature death, mainly through cardiovascular disease and other chronic complications. A substantial body of evidence suggests that it could reach epidemic proportions particularly in developing and newly industrialized countries. In prediction, India along with China account for nearly a third of the estimated 300 million adult diabetics by the year 2025. Recent surveys indicate that diabetes now affects a staggering 10-16% of urban population and 5-8% of rural population in India, while the actual epidemic is believed to be transpiring in the rural areas. Indians are susceptible to premature onset of DM which in turn leads to rapid progression of chronic vascular complications, incurring heavy burden on health care

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systems in India. Type 2 diabetes mellitus (also known as type 2 diabetes) is a long-term metabolic disorder that is characterized by high blood sugar, insulin resistance, and relative lack of insulin. The classic symptoms of diabetes are polyuria (frequent urination), polydipsia (increased thirst), polyphagia (increased hunger), and weight loss. Other symptoms that are commonly present at diagnosis include a history of blurred vision, itchiness, peripheral neuropathy, recurrent vaginal infections, and fatigue. The development of type 2 diabetes is caused by a combination of lifestyle and genetic factors. While some of these factors are under personal control, such as diet and obesity, other factors are not, such as increasing age, female gender, and genetics. The World Health Organization definition of diabetes (both type 1 and type 2) is for a single raised glucose reading with symptoms, otherwise raised values on two occasions, of either fasting plasma glucose ≥ 7.0 mmol/l (126 mg/dl) or with a glucose tolerance test, two hours after the oral dose a plasma glucose ≥ 11.1 mmol/l (200 mg/dl). Management of type 2 diabetes focuses on lifestyle interventions, lowering other cardiovascular risk factors, and maintaining blood glucose levels in the normal range. Type 2 diabetes mellitus is typically a chronic disease associated with a ten-year-shorter life expectancy. Type 2 diabetes is characterized by asymptomatic phase between actual onset of diabetic hyperglycemia and clinical diagnosis. This phase has been estimated to last at least 4-7 yrs, and 30-50% cases of type 2 diabetes patients remain undiagnosed. This leads to chronic complications of diabetes mellitus which remain chief problem in diabetic care and which causes lack of fitness to work, disability and premature death. Hence, this study was undertaken in an attempt to study the prevalence of DM and its associated complications.

MATERIALS AND METHODS

The present study is a cross sectional study, carried out in 200 patients diagnosed of diabetes mellitus admitted Osmania General Hospital, Hyderabad.

Inclusion criteria

1. Patients diagnosed with DM on basis of Fasting Plasma Glucose ≥ 126 mg/dl (7.0 mmol/dl) and Post Prandial Plasma Glucose ≥ 200 mg/dl.
2. Patients who gave written consent to participate in the study.

Exclusion criteria

1. Patients with Fasting Plasma Glucose ≤ 126mg/dl (7.0mmol/dl) and Post Prandial Plasma Glucose ≤ 200mg/dl were excluded.
2. Patients of type I Diabetes Mellitus were excluded.

All subjects were interviewed, examined and investigated according to the proforma which was predesigned and pretested. Waist circumference was measured using a non stretchable fibre measure tape. Blood pressure measurement: it was recorded with the subject in lying down position in the right arm with a mercury manometer to nearest of 2 mmHg. Weight was measured by platform scale. Body mass index was calculated using the formula: BMI= weight (kg)/height (m²). Examination of diabetic peripheral neuropathy was done by foot sensitivity testing with Semmes Weinstein monofilament, deep tendon reflex. For diabetic autonomic neuropathy, parasympathetic tests and sympathetic test were performed. Nerve conduction study, CT, MRI and carotid Doppler if

required were done accordingly. Examination of diabetic retinopathy was done by direct ophthalmoscopic examination of the fundus. Ischemic heart disease was assessed by electrocardiogram and echocardiography. Statistical Analysis: Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean ± SD and median. Qualitative variables were correlated using Chi-Square test /Fisher's exact test. A p value of <0.05 was considered statistically significant. The data was entered in MS EXCEL spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 23.0.

OBSERVATIONS AND RESULTS

Table 1 Socio-demographic and behavioural characteristics of the study population

Characteristics	N(%)
Age group	
40 – 50 years	64(32%)
50 – 60 years	112(56%)
60 – 70 years	24(12%)
Sex	
Male	133(66.5%)
Female	67(33.5%)
Residence	
Urban	167(83.5%)
Rural	33(16.5%)
Religion	
Hinduism	106(53%)
Islam	84(42%)
Christianity	8(4%)
Other	2(%)
Educational Status	
Illiterate	60(30%)
Primary	64(32%)
Secondary	70(35%)
College	6(3%)
Marital Status	
Never married	34(17%)
Currently married	150(75%)
Separated/divorced	2(1%)
Widowed and cohabitating	14(7%)
Currently Smoking	
Yes	11(5.5%)
No	189(94.5%)
Current Alcohol Use	
Yes	38(19%)
No	162(81%)
Hypertension	
Yes	76(38%)
No	124(62%)

Table 2 Body mass index: waist hip ratio distribution

BMI	Waist-Hip Ratio	N (%)
Normal	0.78±0.11	17(8.5%)
Overweight	0.71±0.23	23(11.5%)
Pre-Obese	0.92±0.15	98(49%)
Obese	0.23	62(31%)

Majority of the study subjects were pre-obese(49%). 17 subjects(8.5%) had normal Body mass Index. 31% (62) study subjects were obese.

Table 3 Percentage distribution of people with diabetes mellitus according to the time of disease and insulin usage

Variables	N (%)
Time At Diagnosis(Years)	
< 5 years	56(28%)
≥ 5 and ≤ 10 years	70(35%)
> 10 years	74(37%)
Using Insulin	
Yes	76(38%)
No	124(62%)

Majority of the study subjects, 74(37%) had been diagnosed with diabetes ten years ago and 38%(76) of the study subjects were taking insulin.

Table 4 Distribution of people regarding onset of diabetes mellitus complications and time at diagnosis in percentages

Time At Diagnosis(Years)	Onset Of Diabetes Complication		Total
	No	Yes	
< 5 years	40(71%)	16(29%)	56(28%)
≥ 5 and ≤ 10 years	32(45%)	38(55%)	70(35%)
> 10 years	10(13%)	64(87%)	74(37%)
Total	82(41%)	118(59%)	200(100%)

Of the total 200 subjects, 118(59%) presented with complications, the onset of complications was more in subjects diagnosed with diabetes more than 10 years ago

Table 5 Prevalence of associated complications in diabetics

Complication	N (%)
Acute complications - 13(11%)	
Diabetic Ketoacidosis	5(40%)
Diabetic Coma	0(0%)
Diabetic Hyperosmolar Coma	1(10%)
Acidosis	3(20%)
Hypoglycemia	4(30%)
Chronic complications - 105(89%)	
Microvascular Complications - 68(58%)	
Retinopathy	20(30%)
Neuropathy	7(11%)
Nephropathy	12(17%)
Macrovascular Complications - 66(56%)	
Ischemic Heart Disease	30(45%)
Stroke	6(9%)
Peripheral vascular Disease	3(4%)
Microvascular Complications + Macrovascular Complications - 24(20%)	
>1 Complications	38(32%)

11% patients presented with acute complications of diabetes mellitus, 56% had macrovascular complications while 58% had microvascular complications. 32% patients had more than 1 complication. Microvascular and macrovascular complications coexisted in 20% patients. Among the microvascular complications, 30% had retinopathy, while 11% had neuropathy and 17% had nephropathy. Among macrovascular complications, 45% patients presented with ischemic heart disease or had a history of previous myocardial infarction, 9% patients presented with stroke and 4% patients had peripheral vascular disease.

DISCUSSION

We reviewed a total of two hundred cases of diabetes mellitus type II admitted in Osmania general Hsopital, Hyderabad. In our study, the patients presenting with complications of diabetes were in the age group of 41 to 79 years with the mean age of 53.20 ± 9.67. Peak incidence of complications was seen in the age group of 63- 70 years. 66.5% of the patients were males and 33.5% females. In our study, 19% of the patients had a positive family history of the disease while 81% had no family history of diabetes mellitus. In our study, a total of 11% patients presented with acute complications of diabetes mellitus, 56% had macrovascular complications while 58% had microvascular complications. 32% patients had more than 1 complication. Microvascular and macrovascular complications coexisted in 20% patients. Among the microvascular complications, 30% had retinopathy, while 11 % had neuropathy and 17% had nephropathy. Among

macrovascular complications, 45% patients presented with ischemic heart disease or had a history of previous myocardial infarction, 9% patients presented with stroke and 4% patients had peripheral vascular disease. This is comparable to study by Liu et al where the prevalence of cardiovascular and cerebrovascular complications, neuropathy, nephropathy, ocular lesions and diabetic foot disease were 30.1%, 6.8%, 17.8%, 10.7%, 14.8% and 0.8%, respectively. In our study, it was seen that microvascular complications were common (61.4%) in the younger age group while macrovascular complications were more common (83.65%) in the elderly age group. Ischemic heart disease was the most common complication irrespective of the age group. Maximum patients (19) of ischemic heart disease were in the sixth and fifth decade. The next most common complication in our study was retinopathy seen maximum in age group <50 years. Neuropathy was seen most commonly in the elderly age group i.e. >60 years. Cerebrovascular accidents were more frequent in the elderly age group i.e.>60 years.

Nephropathy was seen more commonly in the sixth decade Nephropathy was also more common when duration of diabetes was greater than 10 years. Retinopathy (45%) and ischemic heart disease (99%) were seen even patients who were newly diagnosed or where duration of diabetes was less than a year. Peripheral vascular disease and cardiovascular accidents were common when the duration of diabetes was between <5 years. Neuropathy was most common when duration of diabetes was greater than 10 years and the result is clinically significant. Microvascular complications were also seen to be maximum when duration of diabetes was greater than 10 years and this is clinically significant. This is comparable to study by Liu et al where prevalence of complications was positively associated with the duration of disease, irrespective of the patients' age.

CONCLUSIONS

The microvascular and macrovascular complications of diabetes mellitus account for most of the morbidity and mortality associated with the disease. All the associated diabetic complications observed need to be addressed with appropriate prevention and control strategies.

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