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Research Article

Chronic complications in newly diagnosed patients with type 2 diabetes mellitus in rural area of western Uttar Pradesh, India

Manoj Kumar*, Ramakant Rawat, Vijay Kumar Verma, Khwaja Saifullah Zafar, Granth Kumar

Department of Medicine, U.P. Rural Institute of Medical Sciences and Research, Saifai, Etawah, Uttar Pradesh, India

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***Correspondence:**
Dr. Manoj Kumar,
E-mail: mkumarrims@gmail.com

ABSTRACT

Background: Diabetes is a serious public health problem that threatens the quality of life. Studies have shown that its prevalence is rapidly increasing. In India many studies have been done on diabetes and its complications but most of the studies have been done in urban area. There is limited data on diabetes from rural area. Our study is an attempt to provide data on diabetes in rural area that will guide health care professionals in managing the disease appropriately. The aim of the study was to determine the prevalence of chronic complications in newly diagnosed type 2 diabetes mellitus (T2DM) patients from rural area of western Uttar Pradesh, India.
Methods: The study was conducted on 306 newly diagnosed type 2 diabetes mellitus patients. Each patient was screened for diabetic complications, hypertension, dyslipidemia, and body mass index. Standard protocols were used to make the diagnosis of retinopathy, neuropathy and nephropathy.
Results: There were 174 males and 132 females. Majority were less than 60 years of age. 20.26% of patients had neuropathy 15.36%, retinopathy and 5.56%, nephropathy. Risk factors of macro-vascular complication such as hypertension, obesity, and dyslipidemia were observed in 38.9, 55.9%, and 54.6% of patients respectively. Coronary artery disease was noticed in 9.15%.
Conclusions: Present study shows that high prevalence of micro vascular complications was present at diagnosis along with cardiovascular risk factors among T2DM patient from rural area of western Uttar Pradesh, India.

Keywords: Retinopathy, Neuropathy, Nephropathy, Microvascular, Dyslipidemia

INTRODUCTION

Diabetes mellitus (DM) is a chronic condition that occurs when the body cannot produce enough or effectively use of insulin, and are induced by a genetic predisposition coupled with environmental factors.[1] Type 2 diabetes mellitus (T2DM) is the most common form of diabetes constituting 90% of the diabetic population.[2] The prevalence of type 2 diabetes mellitus is increasing worldwide and it is projected that the total number of people with diabetes will rise from 366 million in 2011 to 552 million by 2030.[3] The Indian council of medical research-india diabetes (ICMR-INDIAB) study estimates that 62.4 million persons with diabetes lived in India in 2011.[4] The international diabetes federation projects that an estimated 101 million will have diabetes in India in 2030.[5]

The so-called "Asian Indian phenotype" refers to certain unique clinical and biochemical abnormalities in Indians which include increased insulin resistance, higher waist circumference despite lower body mass index (BMI), lower adiponectin and higher levels of highly sensitive C-reactive protein levels. This phenotype makes Asians

more prone to diabetes and premature coronary artery disease.[6]

Chronic complications of diabetes, the major cause of morbidity and mortality, are often present at the time of diagnosis. The problem is further worsened as the diagnosis of diabetes is often delayed from months to years due to lack of symptoms, lack of awareness and the fear of unknown in spite of awareness.[7]

In large metropolitan cities in India (Mumbai, Delhi, Calcutta, Chennai, Bangalore, and Hyderabad), the prevalence of diabetes among adults (aged ≥20 years) ranges from 8-18%.[7-16] The prevalence of type 2 diabetes mellitus is 3-9% in rural areas.[17] Few studies have shown prevalence as high as 13.2% in rural areas.[18] Many studies suggest that it is rapidly increasing even in rural areas.[4,18,19]

Unfortunately, more than half the people with diabetes remain undiagnosed and even among known diabetes patients, less than one third have their diabetes under good control.[20,21] There is also evidence to show that poverty and poor access to health care, coupled with low education, are linked to a high rate of diabetes related complications.[22,23] Unfortunately, the vast majority of India's population (70%) lives in rural areas.[24] Screening for diabetes is seldom done in rural areas, resulting in a much greater burden of undiagnosed diabetes in rural areas.[3] This could potentially lead to higher rates of diabetes related complications due to delayed diagnosis and/or improper treatment.

A very high prevalence of complications at diagnosis has been reported from various studies across the globe and from parts of India. Most of study in India has been done in cities where people are more educated and aware about the disease. Very few data is available about diabetes and its complication from rural area in India. A high prevalence of such complications, if documented, will help convince the physicians of the importance of screening for these complications in all type 2 diabetics (T2DM) at presentation in rural area, for appropriate implementation of treatment without delay.

The present study was designed to determine the prevalence of complications in newly-diagnosed T2DM patients in rural area of western Uttar Pradesh, India.

METHODS

Present study is a cross sectional study done at U.P. rural institute of Medical Sciences and Research which is located in rural area of western Uttar Pradesh 20 km away from city head quarter, India. Due to location of hospital and lack of medical specialist in nearby districts most of patient of rural area of this region come to this hospital. The study was started after taking permission from institute ethical committee. In this study, recently diagnosed (less than three month duration), type 2 diabetic patients of age 18 years and above from OPD and indoor of the hospital were included. American diabetes association criteria were used for diagnosis of diabetes. Patients who have been diagnosed with diabetes for more than 3 months, patients on any drug therapy, gestational diabetics, and steroid-induced diabetics or those with co-morbid conditions that require prolonged steroid therapy were excluded. After written consent, all patient were subjected to detailed history and thorough clinical examination. Diagnosis of neuropathy was made on the basis of clinical examination for sense of touch, pain and vibration and reflexes. 128 Hz tuning fork was used to examine vibration sense and 10 g monofilament was used to evaluate light touch perception. Non diabetic causes of neuropathy were ruled out. Michigan neuropathy screening score was used in all cases. Combination of more than one test has >87% sensitivity in detecting diabetic polyneuropathy.[25,26] Diagnosis of retinopathy was done by fundus examination. Ophthalmologist did fundus examination after full dilatation of pupil. 24 hour urinary albumin estimation was done to diagnose diabetic nephropathy. A value of >300 mg/dl was taken as confirmed nephropathy. Urinary collection for albumin estimation was done taking care of factors that interfere with proteinuria like hypertension and urinary tract infections etc. Blood pressure was recorded twice 10 min apart in both arms in supine as well as standing position. Hypertension was defined as blood pressure ≥140/90 mmHg. Diagnosis of dyslipidemia was made on the basis of fasting lipid profile. Coronary artery disease (CAD) was diagnosed on the basis of electrocardiograph (ECG) changes, treadmill test and response to nitrates in case of exertional chest pain.[27] Height and weight of patients were taken to calculate body mass index (BMI). BMI cut off value of 25 kg/m^2 for male and 23 kg/m^2 for female was used for making diagnosis of obesity as recommended for Asian phenotype.[28]

Patient's data were collected from January 2012 to December 2015. Quantitative variables were described as mean and standard deviation. Qualitative variables were described by percentages.

RESULTS

The study comprised of 306 patients out of which 174 were male and 132 were female. Majority of patients were less than 60 year of age. Age and anthropometric data are shown in Table 1.

Neuropathy was found in 62 (20.26%) of patient. Distal symmetrical peripheral neuropathy was most common variety of neuropathy. 6 patients also had evidence of autonomic neuropathy. Retinopathy was observed in 47 (15.36%) patients.

Non proliferative retinopathy was most common variety of retinopathy. Most common abnormality was microaneurysm. Nephropathy was observed in 17

(5.56%) patients 28 (9.15%) patients had evidence of coronary artery disease. 18 (10.35%) males and 10(7.58%) females had evidence of coronary artery disease. One or combination of lipid abnormalities was noted in 167 (54.6%). 146 (47.7%) patient had serum triglycerides (TG) >150 mg/dl. 42 (13.7%) patients had LDL level >130 mg/dl. 56 (18.3%) patient had total cholesterol level >200 mg/dl. Table 2 shows blood sugar and lipid profile of patients.

Table 1: Age and anthropometric data of patients.

	Male	Female	Overall
Age	51.16±7.13	50.64±7.67	50.94±7.36
Weight (kg)	65.64±8.83	59.61±10.73	63.04±10.13
Height (cm)	164.11±4.10	154.69±12.10	160.06±9.71
BMI (kg/m^2)	24.42±3.50	25.32±5.81	24.81±4.65

Table 2: Blood sugar and lipid profile of patients.

	Male	Female	Overall
Fasting blood sugar (mg/dl)	194.14±56.33	195.19±50.26	194.50±53.71
Post prandial blood sugar (mg/dl)	326.17±94.98	338.03±88.74	331.28±92.38
Total cholesterol (mg/dl)	151.77±27.24	191.05±31.12	168.71±34.88
Triglycerides (mg/dl)	139.51±39.63	162.23±49.40	149.31±45.45
LDL cholesterol (mg/dl)	88.56±26.53	111.90±28.02	98.63±29.51
HDL cholesterol (mg/dl)	35.31±7.92	46.71±9.62	40.22±10.36

Hypertension was found in 119(38.9%) of patient. 6 patients had isolated diastolic hypertension. Obesity was observed in 171 (55.9%) of patient. 87 (50%) males and 84 (63.6%) females were obese. 7 patient had non healing ulcer in foot. Prevalence of various chronic complications is shown in Figure 1.

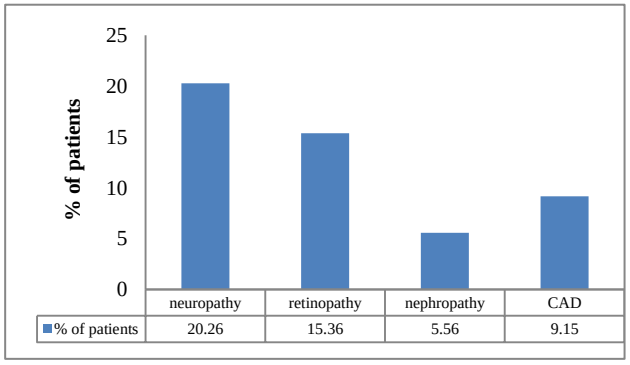

Figure 1: prevalence of various complications in study population.

DISCUSSION

In present study majority (94%) of patients were less than 60 year of age which confirms similar finding of other studies showing that in developing countries the majority of patients with diabetes are in the age range of 45-64 years.[29,30]

Most common microvascular complication was neuropathy. Prevalence of neuropathy was 20.26% which is comparable to the study conducted by Shukla et al in diabetic population of rural area near outskirts of Lucknow, India.[31] However it was higher than the studies conducted in urban area. In study done by Sosale et al prevalence of peripheral neuropathy was 13.15%.[2] Karmakar et al have shown 9% prevalence of neuropathy at diagnosis and Rani et al have also reported 13% in established cases of retinopathy having neuropathy.[32,33] Higher prevalence of neuropathy may be due to delayed diagnosis of diabetes in rural area.

In our study there was high prevalence of retinopathy (15.36%) as compared to other studies in India. In study done by Sosale et al prevalence of retinopathy was 6%.[2] In a study done by Rema et al prevalence of retinopathy in newly detected diabetes mellitus was 5.1%.[34] However prevalence of retinopathy in our study was lower as compared to UKPDS study.[35] Delay in diagnosis of diabetes in rural areas may be the reason for higher prevalence of retinopathy. Overall Prevalence of nephropathy was 5.56% in our study which is higher than various earlier studies in India. Sosale et al showed 1.03% prevalence overt of nephropathy while by Unnikrishnan et al observed 0.8% prevalence of nephropathy.[2,36] This difference may be because most of earlier study has been done in urban or mixed population. However prevalence of nephropathy in our study was comparable to UKPDS study (7%).[37]

Prevalence of hypertension (38.9%) in our study was higher than other studies in India. Shukla et al reported 30% prevalence of hypertension in diabetic patients from rural area.[31] Sosale et al reported 23% prevalence of hypertension.[2] Prevalence of dyslipidemia (54.6%) was again higher in comparison to other studies. In study conducted by Shukla et al 30% patients had serum triglyceride level >150 mg%, 20% patients had total cholesterol >200 mg%, 10% patients had LDL cholesterol >130 mg%.[31] Sosale et al reported lipid abnormalities in 23% of newly detected type 2 diabetes patient.[2]

CONCLUSION

The present study shows that there is high prevalence of diabetes specific complications in newly diagnosed type 2 diabetes mellitus patient in rural area of western Uttar Pradesh, India. There is also high prevalence of cardiovascular risk factor at diagnosis. Complication rate in our study is more than other studies done in urban and mix population in India. This may be due to poor health infrastructure, illiteracy, limited access to health care and lack of awareness about the disease in rural area. Furthermore, once complications develop, treating hyperglycemia alone usually does not suffice and complications from diabetes can be prevented only up to a certain point, beyond, which these will progress. This emphasizes more aggressive screening for both microvascular and macro vascular complications along with assessment of cardiovascular risk factors at diagnosis in all patients with T2DM so that early and more aggressive therapy can be instituted.

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