



RESEARCH ARTICLE

PREVALENCE OF MICROVASCULAR COMPLICATIONS IN NEWLY DIAGNOSED
TYPE 2 DIABETES PATIENTS

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ABSTRACT

Background: Microvascular complications are a major cause of morbidity and mortality in diabetic patients and currently their prevalence is increasing in newly diagnosed diabetics^{1,2,3,4}. These complications develop after a long period of asymptomatic hyperglycemia^{5,6} but are also being diagnosed in newly diagnosed T2DM with varying prevalence. This higher prevalence may be because of delayed diagnosis or earlier development of complications^{5,6,7}, and at present there is limited nationwide data regarding prevalence of microvascular complications in newly diagnosed diabetes patients.

Aim: To study the prevalence of microvascular complications in newly diagnosed T2DM patients. **Methods:** This cross sectional observational study of 150 newly diagnosed type 2 diabetics (<6 months duration) was conducted in department of medicine of BRD Medical College Gorakhpur. Every patient was screened for microvascular complications following standard protocol and detailed clinical evaluation was also done.

Results: In the study of total 150 patients with mean age 57.9±11.4 years, prevalence of nephropathy, neuropathy and retinopathy was 41.3%, 31.3%, and 14.7% and these complications were associated with risk factors such as hypertension, positive family history, higher HbA1c level and illiteracy.

Conclusion: Our study showed high prevalence of microvascular complications in type 2 diabetics at the time of diagnosis in Indian population. In this view, screening must be done in all diabetics for microvascular complications at the time of diagnosis.

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INTRODUCTION

Complications due to diabetes mellitus have become a global burden in terms of health of population as well as economic growth of country. 90% of all diabetic patients are type 2 diabetics⁸ and microvascular complications are a significant cause of mortality and morbidity in these patients (International diabetes Federation Diabetes Accessed, 2003; Vishwanath and Mc Gavin, 2003). According to WHO report, prevalence of complications in T2DM is dramatically rising in middle and low income countries like ours. A high prevalence of microvascular complications (5-45%) (Harris et al., 1992; Kohner et al., 1998; Engelgau et al., 2000, American Diabetes Association, 2000) has been reported even in newly diagnosed T2DM patients. Such high prevalence may suggest the presence of delay between the onset of diabetes and the time of its diagnosis. This delay can be attributed to illiteracy of the population, low socioeconomic status and poor access to healthcare system.

In developing countries like India access to diabetic care is poor especially in rural population. There are very limited studies regarding prevalence of micro vascular complications in newly diagnosed diabetics in rural population. This study has been conducted in BRD Medical College Gorakhpur UP which renders care to majority of population belonging to poor socioeconomic status and a low literacy level. We have also studied risk factors associated with complications at the time of diagnosis, mainly identified as hypertension, family history of DM, dyslipidemia, obesity (BMI >35), increased age and high level of HbA1c. Hence early screening and patient education becomes more important in those having associated risk factors.

MATERIALS AND METHODS

A total of 150 patients newly diagnosed as diabetes mellitus who attended the opd or admitted in wards of medicine department of BRD Medical College Gorakhpur, were included in the study. Patients were diagnosed as type 2 diabetes mellitus as per ADA criteria of either a random blood glucose level of 200 mg/dl or higher with classical features of

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DM such as polyuria, polydipsia, polyphagia and weight loss or a fasting blood sugar >126 mg/dl or higher or HbA1c level of >6.5% or higher. Patients who presented to us within 6 months of their diagnosis were considered as newly diagnosed. The duration of the study was one year from December 2015 to November 2016. Age, sex, height and body weight of each patient was recorded. Blood pressure was measured by using mercury sphygmomanometer. Duration of diabetes of each patient was recorded. BMI was calculated as weight (kg) divided by height in (m²). A detailed physical examination of all systems was carried out, personal history of smoking or alcoholism was taken. Past and family history of diabetes and hypertension was recorded. Diabetic patients suffering from other medical disorders were excluded from the study. All relevant blood investigations were done.

Microvascular Complications

Retinopathy: Retinopathy was assessed by direct ophthalmoscopy that was done after pupillary dilatation by tropicamide 1% eye drops. It is defined as the presence of at least one micro aneurysm or hemorrhage or exudates in either of the eye.

Neuropathy: Neuropathy was diagnosed by history of numbness, paraesthesias, tingling sensations, burning sensation and confirmed by touch sensation using 10gm monofilament, vibration sense by tuning fork (128 Hz) and ankle reflex. Nerve conduction studies were performed. Reduced amplitude and velocity was noted.

Nephropathy: Morning midstream urine sample was used to calculate micro albumin: creatinine ratio in mg/g. If the ratio was <30mg/g it is termed as normoalbuminuria, ratios between 30-300mg/g were indicative of microalbuminuria and above 300mg/g revealed macroalbuminuria.

Statistical analysis: Fisher exact test and Pearsons Chi-square test.

RESULTS

Total 150 patients were included in the study. Mean age of patients in our study was 59.2±12.4 years. 87 patients (58%) were male and 63(42%) were female with a male female ratio of 1.4:1. Males were slightly older (60±12.7) than females (57.9±11.9). Nephropathy was present in 41.3%. Majority of patients had microalbuminuria (36%) and only 6% had macroalbuminuria. 31.3% patients had neuropathy and 14.7% had retinopathy. 14% patients had non proliferative retinopathy while only 0.7% had evidence of proliferative retinopathy. No patient had features of clinically significant macular edema. Table 1 shows percentage of microvascular complications and risk factors in our study.

Table 1. Complications and risk factors

Nephropathy	41.3%
Neuropathy	31.1%
Retinopathy	14.7%
Hypertension	42.7%
Dyslipidemia	38%
Higher BMI	38%
HbA1c>7	56.7%
Family history	50%
Illiteracy	44.7%

Hypertension was significantly associated with development of all three complications (p value=0.00). 93.4% of all nephropathy, 86.4% of retinopathy and 84.4% of all neuropathy patients were hypertensive (Table 2). Positive family history was another risk factor which was found statistically significant in our study (p value=0.00). 50% patients had positive family history of T2DM. 86.4% of all retinopathy, 82% of nephropathy and 75.6% of all neuropathy patients had positive family history. There was no statistical difference between prevalence of complications amongst patients with HbA1c <7 versus >7. Out of 150 patients 17% had high triglycerides, 50% had increased LDL and 40% had decreased HDL. 32% patients were overweight and 6% were obese. Total 44.7% patients were illiterate and 22.7% had only primary level educational qualification.

Table 2.

complications	Hypertension		P value
	present	absent	
Retinopathy	86.4%	13.6%	0.00
Nephropathy	93.4%	6.6%	0.00
Neuropathy	84.4%	15.6%	0.00

Table 3.

Complications	HbA1c		P value
	<7	>7	
Nephropathy	49.2%	50.8%	0.15
Neuropathy	42.2%	57.8%	0.50
Retinopathy	40.9%	59.1%	0.40

DISCUSSION

In our study we found that a high percentage of newly diagnosed T2DM patients had microvascular complications at the time of their diagnosis. Most common complication found in our study was nephropathy (41.3%), followed by neuropathy (31.3%) and retinopathy (14.7%). We found nephropathy as the most common complication by using single reading UACR similar to other hospital based studies such as by Fayaz Ahmad Wani *et al.* (2016),(50%) and Deepa DV *et al* (nephropathy 37%) who found near similar results. Most of the western countries have found retinopathy to be invariably present in patients with nephropathy (Abu *et al.*, 2001; Al-Rubeaan *et al.*, 2014; da Silva Correa *et al.*, 2003). This was not so in our study. It may be due to the fact that we over diagnosed nephropathy by using a more sensitive but less specific single reading UACR method. Also most of our patients were hypertensive so this increase in UACR may have been related to hypertension. Prevalence of neuropathy in our study was 31.1% which was similar to Yash *et al.* (2014) (36%) and Nambuya (1996) (46%). In our study, we found retinopathy as the least common micro vascular complication (14.7%). Other small hospital based studies have found a 19-26% prevalence of retinopathy in newly diagnosed diabetics. Xu *et al.* (1997) (19.6%), Yash *et al.* (2014) (24%) and other larger Indian studies such as Chennai Urban Rural Epidemiology Study (CURES) (Rema *et al.*, 2005) has also found lower prevalence (5.1%) than larger studies like United Kingdom Prospective Diabetes Study (UKPDS) where the prevalence was 35% (UK Prospective Diabetes Study, 1998). This low prevalence may be attributed to Indian diet rich in antioxidants and anti inflammatory agents like curcumin. Various risk factors in association with increased blood glucose level have been postulated to affect the onset and the course of various microvascular complications (Sosale *et al.*,

2014; Raman *et al.*, 2012). All three complications were more common in patients with higher HbA1c level (>7 %). We also found hypertension and positive family history as significant risk factors for the development of complications. Other risk factors associated with complications are illiteracy, dyslipidemia and higher BMI. The onset of T2DM is often silent and insidious, characterized by long asymptomatic period of hyperglycemia (estimated to last about 4-7 years) and this asymptomatic phase accounts for the relatively higher prevalence of complications at the time of diagnosis.

Conclusion

Our study shows a high prevalence of microvascular complications at the time of diagnosis of type 2 DM. Hence assessment for these complications must be done in all patients at the time of diagnosis of diabetes. Screening for early detection and identification of risk factors for neuropathy, nephropathy, and retinopathy may prevent or delay the progression of microvascular complications. Education of high-risk group regarding diabetes and its complications by electronic and print media is required so that they seek medical consultation at the earliest.

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