PREVALENCE OF COMPLICATIONS IN NEWLY DIAGNOSED DIABETES MELLITUS VISITING NEPAL MEDICAL COLLEGE & TEACHING HOSPITAL

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ABSTRACT

The number of people with diabetes is increasing due to population growth, aging, urbanization and increasing prevalence of obesity and physical inactivity. Diabetes is characterized by an asymptomatic phase between the actual onset of diabetic hyperglycemia and clinical diagnosis. This phase has been estimated to last at least 4 to 7 years, and 30–50% cases of type 2 diabetic patients remained undiagnosed. This leads to the development of chronic complications of diabetes, which remain the chief problems in diabetic care, and which cause a lack of fitness to work, disability and premature death. Thus, the aim of the study was to find out the prevalence of chronic complications of diabetes especially microvascular and correlate with lipid and Blood pressure. Total of 121 newly diagnosed diabetes mellitus patients coming to hospital were included. Prevalence of neuropathy, retinopathy and nephropathy were 10.74%, 27.27% and 27.27% respectively. Diabetes with hypertension was associated with nephropathy. Hence, early diagnosis and prevention of the complications is the right approach for the management of diabetes and its complications.

KEYWORDS

Complications, diabetes, hypertension

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INTRODUCTION

The number of people with diabetes is increasing due to population growth, aging, urbanization and increasing prevalence of obesity and physical inactivity. The number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014. The global prevalence of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014.[1] Total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030. 1.4 million Americans are diagnosed with diabetes every year. The prevalence of type 2 diabetes in Nepal for a 14-year period (2000-2014) was found to be 8.4%.[2]

Diabetes is characterized by an asymptomatic phase between the actual onset of diabetic hyperglycemia and clinical diagnosis. This phase has been estimated to last at least 4–7 years, and 30–50% cases of type 2 diabetic patients remained undiagnosed. This leads to the development of chronic complications of diabetes, which remain the chief problem in diabetic care, and which cause a lack of fitness to work, disability, and premature death.[3,4] This lead to relatively high prevalence of complications at initial presentation.[5]

MATERIALS AND METHODS

This is a prospective cross sectional study conducted in the Internal Medicine department of Nepal Medical College & Teaching Hospital (NMCTH). Total of 121 newly diagnosed diabetes mellitus were included.

INCLUSION CRITERIA

1. Newly diagnosed Diabetes Mellitus of age ≥ 20 years

EXCLUSION CRITERIA

1. Under Oral Antidiabetics or Insulin
2. Drug Induced Hyperglycemia
3. Not giving consent
4. Gestational Diabetes
5. Patient with Ketonuria
6. Previously diagnosed diabetes under conservative management

Fasting plasma glucose was measured from venous sample after an overnight fast from 2300 h. Post prandial glucose was measured from venous sample 2hrs after a proper meal.

Diabetes was confirmed according to **WHO criteria**[6]

- Fasting Plasma Glucose: ≥ 126mg/dl
- 2hr Plasma Glucose: ≥ 200mg/dl
- HbA1C: ≥ 6.5%

Lipid Profile was measured at the fasting state after the diagnosis of diabetes. These were all measured at NMCTH by Vitrous 250 machine.

HbA1C was measured at the time of diagnosis in NMCTH by Nicocard machine.

RETINOPATHY

Fundus examination was performed by consultant ophthalmologist in ophthalmology department of NMCTH and graded according to criteria used for the WHO multinational study on diabetes.

Classified into: [7]

1. Non-Proliferative Diabetic Retinopathy
   a. Mild NPDR
   b. Moderate NPDR
   c. Severe NPDR
2. Proliferative Diabetic Retinopathy

According to the presence or absence of Retinopathy, was classified as present or absent respectively.

NEUROPATHY

First of all, Patients were asked if they experienced feelings of pins and needles, abnormal cold or warm sensations in their feet, sharp pain, aching pain, burning pain or irritation in feet or legs at night.

Small fibre function: Pinprick & Temperature sensation was examined

Large fibre function: Vibration perception (using 128 Hz tuning fork), 10 gram monofilament, ankle reflexes were examined

Autonomic dysfunction in the form of resting tachycardia, orthostatic hypotension, gastroparesis/diarrhea or abnormal sweating was noted.[8]

Patient with absent ankle reflexes alone would not be classified as neuropathy, but absent ankle reflexes with inability to feel at least one of the sensations tested would constitute neuropathy. Result was interpreted as present or absent according to the findings.

NEPHROPATHY

Urine for Microalbumin was measured in an early morning urine sample by Nicocard machine in NMCTH.

The result was interpreted as present if urine for microalbumin value was more or equal to 30mg or absent if less than 30mg.

HYPERTENSION

For diagnosis of hypertension patients were allowed to seat for at least 5 minutes then Blood pressure was measured using aneroid sphygmomanometer on both arms. Blood Pressure was recorded twice on separate days.

Patients were classified as hypertensive according to ACC/AHA guideline 2017[9]:

- Normal: Less than 120/80 mm Hg;

- Elevated: Systolic between 120-129 *and* diastolic less than 80;
- Stage 1: Systolic between 130-139 *or* diastolic between 80-89;
- Stage 2: Systolic at least 140 *or* diastolic at least 90 mm Hg;

All the patients with systolic blood pressure ≥ 130 mmHg and diastolic ≥ 90 mmHg were considered Hypertensive. Also patients already diagnosed Hypertension previously under treatment was also considered to have Hypertension.

These were all collected then entered and analyzed using Epi Info version 7.

Informed consent was taken from each patient. Ethical clearance was taken from Institutional Review Committee (IRC) at NMCTH.

RESULTS

A total of 121 patients were enrolled in the study. Out of which 63 (52.07%) were males and 58 (47.93%) were females. The mean age of the patients enrolled was 58.04 years. Highest numbers of patients were between the ages ranges of 61 years to 70 years of age i.e. 43 patients (35.54%).

Mean HbA1C among the patients was 10.20%. With the cut off value of Low Density Lipoprotein (LDL) of 100mg/dl, all patients were measured fasting LDL level which showed 60 patients (52.17%) had LDL level less than 100mg/dl whereas 55 patients (47.83%) had LDL level more than 100mg/dl. Six (4.95%) patient's LDL level couldn't be evaluated due to very high level of Triglyceride. Similarly, fasting Triglyceride level were also measured among these patients. Putting a cut off value of 150mg/dl, result showed out of 121 patients, 63 patients (52.07%) had triglyceride level up to 150mg/dl whereas 58 patients (47.93%) had triglyceride level more than 150mg/dl. Fasting HDL level was also measured where 40mg/dl was taken cut off value. Sixty Four patients (52.89%) had HDL level less than 40mg/dl and 57 Patients (47.11%) had level more than 40 mg/dl. Mean Triglyceride level was 185.71mg/dl and HDL was 39.95mg/dl.

Blood pressure was measured among the newly diagnosed patients. Thirtyfour (28.09%) patients had concurrent hypertension either previously or newly diagnosed. Among them eight (23.52%) patients were newly diagnosed hypertension and remaining 26 (76.47%) patients were already on anti-hypertensive medications.

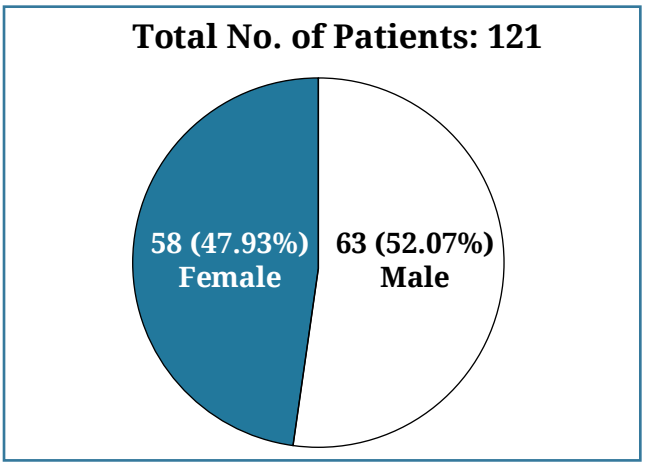

Fig. 1: Sex wise distribution

Microvascular complications were also observed among the enrolled patients. Among the patients, enrolled 13 (10.74%) patients had some peripheral neuropathy at the time of diagnosis of diabetes mellitus. Out of 13 patients six patients (9.52%) were male and seven (12.07%) patients were female.

Retinopathy was present in 33 patients (27.27%) of newly diagnosed diabetes mellitus. Out of which 20 patients (31.75%) were male and 13 (22.41%) patients were female.

Nephropathy was present in 33 patients (27.27%) which were diagnosed by high level of microalbumin in urine. Out of 33 patients who had high urine for microalbumin level, 19 patients (30.16%) were male and 14 (24.14%) patients were female.

Combined complications were also present in newly diagnosed diabetes. Twelve (9.91%) patients who had retinopathy had neuropathy as well. Twentyfive (20.66%) patients had both retinopathy and nephropathy. Also 10 (8.26%) patients had both nephropathy and neuropathy combined. All complications, nephropathy, neuropathy and retinopathy, were present in 10 (8.26%) patients whereas no complications were present in 79 (65.28%) patients.

There was significant correlation between HbA1C and retinopathy. But there was no significant correlation between HbA1C and neuropathy, nephropathy and LDL level. There was also no significant correlation between

Table 1: Lipid abnormalities

LDL				HDL				TRIGLYCERIDE			
< 100 mg/dl		≥ 100 mg/dl		<40 mg/dl		≥40 mg/dl		<150 mg/dl		≥150 mg/dl	
No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
60	52.17%	55	47.83%	64	52.89%	57	47.11%	63	52.07%	58	47.93%

LDL and neuropathy, nephropathy and retinopathy. Hypertension was found to be significantly correlated to nephropathy but not neuropathy and retinopathy.

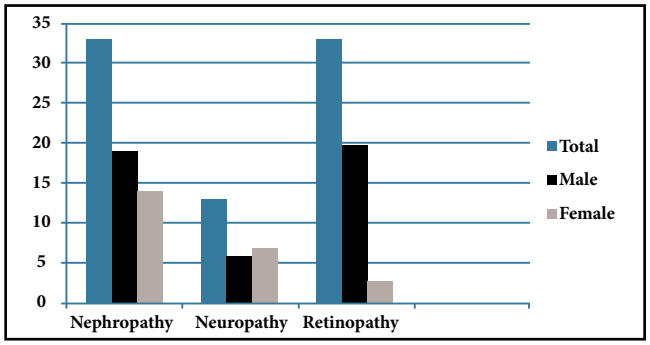

Fig. 2: Microvascular Complications

DISCUSSION

Diabetes Mellitus is an insidious illness with a preclinical asymptomatic phase of many years during which body is exposed to illeffects of asymptomatic hyperglycemia.

Lipid abnormalities are usually present in diabetic patients. It is accompanied by lower HDL levels, elevated LDL and hypertriglyceridaemia.[10] In our study, 55 (47.83%) patients had high LDL level above 100mg/dl and hypertriglyceridemia was also present in 58 (47.93%) patients. Low HDL was present in 64 (52.89%) patients.

We also evaluated the complications of diabetes especially microvascular. Nephropathy and Retinopathy were commonest microvascular complications among the patient as both accounted for 33 (27.27%) patients each. Both were present in 25 (20.66%) patients. This result is probably due to late presentation and lack of regular routine checkup among the patients. Also, both complications are asymptomatic in early phase. Neuropathy was the least common accounting for 13 (10.74%) patients this may be due to the reason that most of these patients are already symptomatic and seek medical attention early. It was almost similar to the report conducted by Weerasuriya[11] in diabetic patients in Srilanka. His study showed, neuropathy was present in 25.1 %, nephropathy in 29%, retinopathy in 15%. Considering the prevalence of these chronic complications at the time of diagnosis in different studies, appropriate screening procedures for diabetic patients is strongly recommended.

In another study conducted by Fayaz Ahmad Wani in a tertiary care hospital in India,[12] Nephropathy was the commonest microvascular complications which accounted for 50%, followed by neuropathy in 33% and finally retinopathy was present in only 6% of the patients which in comparable to our study nephropathy was commonest. Our result is also supported by a study conducted by Deepa DV *et al.*[13] at South India which showed prevalence of complications was highest for nephropathy accounting for 37%, followed by retinopathy 20% and finally neuropathy in 16%. In another study in Hongkong conducted by Kenny Kung *et al*,[14] nephropathy was the commonest complication present in 38.8%, followed by retinopathy in 12.9% of patients and least common was neuropathy which accounted for just 2.4% which is similar to our findings.

Neuropathy was the least common among the complications. Our result was comparable with Karmakar *et al*., Engelgau *et al*., and Sosale *et al*. who found neuropathy only in 9%, 14%, and 13.5% patients, respectively.[15-17]

No any microvascular complication was seen among 65.28% of patients while 8.26% of patients had all three microvascular complications present at the time of diagnosis of diabetes mellitus. In contrast to our study, Kenny Kung *et al.*[14] had only 0.3% patients, where all the three microvascular complications were present.

There was significant association of HbA1C with the development of retinopathy. In our study, hypertension was significantly associated with nephropathy which is similar to the study conducted by Agarwal *et al.*[18] who also found significant correlation between Hypertension and Nephropathy as high as 66.67%. Hence, blood pressure measurement should be a routine in a diabetic patient.

In conclusion, a long phase of asymptomatic hyperglycemia in diabetes mellitus patients is responsible for microvascular complications at diagnosis. This study has reconfirmed that a large proportion of diabetes patients had already developed microvascular complications of various organs even before the time of diagnosis. Early diagnosis and prevention is the right approach for the management of diabetes and complications as it can be prevented after the early diagnosis with tight control of hyperglycemia from the beginning. Hence, early diagnosis is the key.

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