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Microvascular Complications in Newly Diagnosed Patients of Type2 Diabetes Mellitus

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ABSTRACT:

Type 2 diabetes, the most prevalent form of the disease, is often asymptomatic in its early stages and can remain undiagnosed for many years. Patients with diabetes are at increased risk of developing long-terms complications especially of the eyes, kidneys, nerves, heart, and blood vessels. Microvascular complications such as diabetic retinopathy (DR), diabetic nephropathy (DN), and diabetic peripheral neuropathy (DPN) are major causes of morbidity and deaths. Aim: This study was undertaken to study incidence of microvascular complications (Retinopathy, Nephropathy & Neuropathy) already present in the newly diagnosed patients of type 2 DM. Methodology: Out of 100 patients enrolled, 29% patients had neuropathy,4% patients had evidence of non-proliferative diabetic retinopathy and 4% had proliferative diabetic retinopathy and 7% of the patients already had evidence of diabetic nephropathy on diagnosis of diabetes. *Thus it was seen that microvascular complications of diabetes was already present in many patients at time of diagnosis of diabetes. Hence it is suggested that early screening of complications of diabetes and its complications at the time of diagnosis of the disease can prevent further progression of the complications.*

INTRODUCTION

The prevalence of diabetes mellitus is increasing worldwide paralleling the rise in obesity, sedentary lifestyle, and increased life expectancy. More than 95% of all adults with diabetes mellitus have type2 diabetes mellitus (T2DM). India is one of the epicentres of the global diabetes mellitus epidemic and has the second highest number of people with the disease in the world (~69million individuals as of 2015).[1]Persons with diabetes are at increased risk of developing microvascular complications such as diabetic retinopathy (DR), a leading cause of blindness, diabetic nephropathy (DN), a leading cause of renal failure, and diabetic peripheral neuropathy (DPN), a leading cause of diabetic foot disorders and lower limb amputations, and all are major causes of morbidity and deaths. As many patients of diabetes are living longer, the prevalence of these microvascular complications is also on the rise despite improvements in control of glycaemia, blood pressure, and lipid levels.

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The purpose of the present study was to study the incidence of microvascular complications resent at the time of diagnosis of diabetes mellitus. Early detection of microvascular complications and its treatment by intensive therapy can prevent progression of these complications and hence significantly decrease the morbidity and mortality in diabetic patients.

AIMS AND OBJECTIVES

To study the incidence of retinopathy, nephropathy and peripheral neuropathy in patients with newly diagnosed Diabetes Mellitus.

INCLUSION CRITERIA

Patients with newly diagnosed Type 2 Diabetes Mellitus presenting to MGM Institute of Health Sciences, Navi Mumbai.

Age group 30-80yrs. Criteria for establishing Diabetes Mellitus according to ADA guidelines

EXCLUSION CRITERIA

- Age group < 30yrs.
- Known hypertensive.
- Renal diseases
- Type 1 Diabetes Mellitus or any other types of diabetes mellitus.
- Other diseases causing peripheral neuropathy like amylodosis, nutritional deficiencies, motor neuron disease.

METHODOLOGY

Total 100 patients were enrolled on the basis of inclusion and exclusion criteria. It was a prospective observational hospital based study carried out for 3 years in Diabetes Speciality clinic, Dept of Medicine, Mahatma Gandhi Mission Institute of Health Sciences, Kamothe, Navi Mumbai. Enrolled Patients were those who came to the hospital either for a routine check-up or for a follow up for some other disease, unaware of being diabetic and diabetes mellitus Type 2 was diagnosed for the first time. These patients ranged between 30-80 years.

Patients with Age < 30yrs , Known hypertensives, suffering from Renal diseases , Type 1 Diabetes Mellitus or any other types of diabetes mellitus were excluded from this study . Other diseases causing peripheral neuropathy like amyloidosis, nutritional deficiencies, motor neuron disease were also excluded .Informed written consent, institutional ethical clearance was duly taken.Detailed history of chief complains , symptoms and any related microvascular complications were obtained from the patient. Biothesiometry was performed in

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all patients to detect neuropathy. Fundus examination and UACR with other laboratory parameters is done for all patients to assess retinopathy and nephropathy respectively.

STATISTICAL ANALYSIS

Quantitative data was presented with the help of Mean and Standard deviation. Comparison among the study groups was done with the help of paired 't' test as per results of normality test. Qualitative data was presented with the help of frequency and percentage table. Association among the study groups was assessed with the help of 'Chi-Square test'. 'p' value less than 0.05 is taken was significant.

OBSERVATIONS AND RESULTS

A total of 100 patients were included in the study. Majority of the patients (33%) belonged to the age group of 50-59 years followed by 24% in the age group of 60-69 years, 20% in the age group of 40-49 years, 12% in the age group of 30-39 years and 11% in the age group of >70 years. The male:female ratio in the present study was 58% males and 42 % females.

Table 1: Incidence of Sensory Neuropathy (SN)

Sensory Neuropathy	N	%
Normal	54	54%
Impaired vibration sense	29	29%
Impaired vibration and joint position sense	9	9%
Impairment of other modalities of sensation	8	8%
Total	100	100%

29% patients had impaired vibrationsenseand9%hadimpairedvibration as well as joint position sense.

Table 2: Incidence of Diabetic Retinopathy (DR) in patients

Diabetic Retinopathy (DR)	N	%
Absent	92	92
Non-Proliferative	4	4
Proliferative	4	4
Total	100	100

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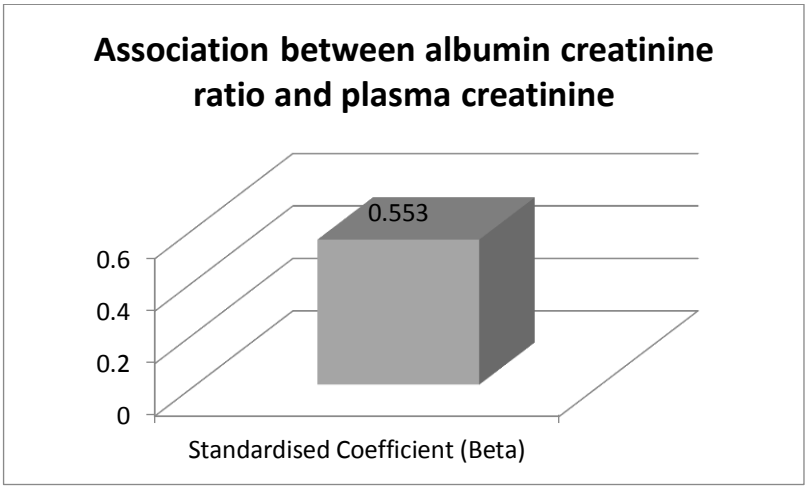
4% patients each had non-proliferative diabetic retinopathy and proliferative diabetic retinopathy respectively at initial presentation.

Table 3: Incidence of Diabetic Nephropathy (DN) in patients:

Diabetic Nephropathy (DN)	N	%
Absent	93	93
Present	7	7
Total	100	100

7% patients had elevated urinary protein creatinine ratio suggestive of diabetic nephropathy.

Table 4: Association between albumin creatinine ratio and plasma creatinine



A significant positive correlation was observed between urine albumin creatinine ratio and plasma creatinine ($r = 0.553$, $p<0.05$) which indicates that UACR serves as a marker of neuropathy.

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Table 5: Correlation of hyperglycemia level and Sensory neuropathy (SN) in DM

SN		N	Mean ± SD	p Value
FBS	**Present**	46	244.63 ± 121.89	p=0.234
	Absent	54	220.41 ± 78.53	
RBS	**Present**	46	318.61 ± 104.56	**p<0.05***
	Absent	54	265.20 ± 66.19	

***p<0.05 – Statistically significant**

Table shows that, the correlation between sensory neuropathy and random blood sugar was statistically significant.

Table 6: Correlation of hyperglycemia level and Diabetic retinopathy in DM

DR		N	Mean ± SD	p Value
FBS	**Present**	8	260.00 ± 146.51	p=0.409
	Absent	92	229.08 ± 96.80	
RBS	**Present**	8	314.13 ± 78.54	p=0.426
	Absent	92	287.65 ± 90.58	

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Table 6 shows that the correlation between fasting and random blood sugars with diabetic retinopathy is statistically non significant.

Table 7: Correlation of hyperglycemia level and Diabetic nephropathy in DM

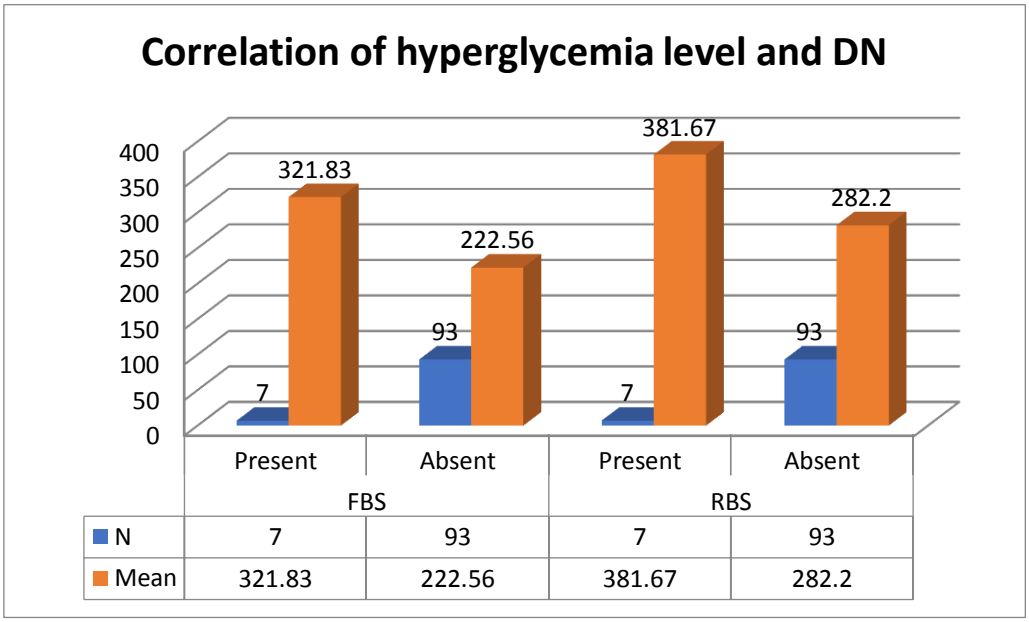

Table 7 shows that in patients with diabetic nephropathy the co relation between fasting blood sugar and random blood sugar and diabetic nephropathy is statistically significant.

DISCUSSION:

Type 2 DM is the commonest form of diabetes constituting approximately 87 % of disease burden. Global prevalence of diabetes is estimated to increase to 5.6% by the year 2025.[2]. Metabolic syndrome consists of constellation of metabolic abnormalities that lead to an increased risk of DM and CVD. The major features of metabolic syndrome includes[3] central obesity (waist circumference >90cm in males and >80cm in females),hypertrigylceridemia (triglyceride levels >150mg/dl or specific medication),low HDL cholesterol (<40mg/dl and <50mg/dl for men and women respectively or specific medication),hypertension (blood pressure >130mmHg systolic or >85mmHg diastolic or specific medication),fasting plasma glucose level (>100mg/dl or specific medication or previously diagnosed type 2 diabetes).The early diagnosis of metabolic syndrome is crucial in preventing the changes that terminate in various complications of diabetes, which can be detected by regular monitoring of blood sugars and BMI. Thus early treatment of metabolic syndrome with lifestyle modications, exercise, behavioral therapy as well as various drugs to control hypertension, dyslipidemia and hyperglycemia have a significant impact in delaying the various microvascular complications of DM. Metabolic syndrome precedes the onset of diabetes by many years.

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The present study was designed to see the incidence of microvascular complications at the time of diagnosis of diabetes mellitus. Early detection of microvascular complications and its treatment at this time by intensive therapy can prevent progression of these. In present study, 29% patients had sensory neuropathy in the form of impaired vibration sense of which 9% had impaired joint position sense; 5% had motor neuropathy. 4% patients had evidence of non-proliferative diabetic retinopathy and 4% had proliferative diabetic retinopathy. 7% of the study group had evidence of diabetic nephropathy. The impaired renal function as a consequence to uncontrolled blood glucose levels can be progressively monitored using plasma creatinine levels. Indeed plasma creatinine and urea concentrations are significantly higher in DM patient when compared with non-diabetics patients[4].

The mean fasting and random blood sugar was 231.55 ± 101.01 and 289.77 ± 89.61 respectively and mean value of glycosylated haemoglobin was 8.25 ±1.65 which is comparable to the results obtained by Ezenwaka CE et al[5] and Wierusz WB et al[6]. A significant positive correlation was observed between urine albumin creatinine ratio and plasma creatinine ($r = 0.553$, $p<0.05$). Since long-term hyperglycaemia among diabetic patients can lead to permanent organ dysfunction including kidneys, regular monitoring of HbA1c levels and organ-specific biomarkers are essential[7, 8]We observed positive correlation between urine albumin creatinine ratio and plasma creatinine which in consistence with other studies[9, 10]. There was significant statistical correlation between random blood sugar levels and sensory neuropathy. There was also significant statistical correlation between fasting blood sugar and diabetic nephropathy. This is comparable to results obtained in the study done by Tzeng TF et al[11].

It was concluded that the cause of microvascular complications which are present at the diagnosis of diabetes at the onset are mainly due to late diagnosis of the disease due to lack of awareness of the silent nature of the disease. Also the asymptotic phase of metabolic syndrome precedes onset of diabetes by many years, and it is in this phase that microvascular complications can begin to develop.

CONCLUSION

Type 2 DM is the commonest form of diabetes constituting about 90% of the diabetic patients. As diabetes is a silent disease in most cases patient is diagnosed late, some 3-5 years after onset. Due to delay in diagnosis microvascular complications they are commonly present at the time of diagnosis.

Neuropathy was found to be the commonest microvascular complication followed by diabetic nephropathy and diabetic retinopathy. Early diagnosis and management of DM and its complications can prevent further progression of the disease process. Early screening for complications with tests such as Fundoscopy and urine Microalbuminuria are essential to identify the complications at an early stage of the disease.

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