

Original Research Article

PREVALENCE OF DIABETIC NEPHROPATHY AND DIABETIC RETINOPATHY IN NEWLY DIAGNOSED TYPE 2 DIABETES MELLITUS PATIENTS ATTENDING MAHATMA GANDHI MEMORIAL HOSPITAL

Vijay Patel Alguvelly¹, Kokkula Venkata Sirisha², N Pavani³

¹Assistant Professor, Department of General Medicine, Yadadri, Bhongir, Telangana, India.

²Assistant Professor, General Medicine, Government Medical College, Jangaon, Telangana, India.

³Associate Professor, General Medicine, Government Medical College, Jangaon, Telangana, India.

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Corresponding Author:

Dr. N Pavani,
Associate Professor, General Medicine,
Government Medical College, Jangaon,
Telangana, India.
Email: drpavanimd@gmail.com

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ABSTRACT

Background: Diabetes mellitus, a chronic metabolic disorder, is characterized by persistent hyperglycemia due to defects in insulin secretion and action. Type 2 diabetes mellitus (T2DM) is the most common form, accounting for 90-95% of all diabetes cases globally. Its increasing prevalence poses public health challenges, including microvascular complications like diabetic nephropathy and diabetic retinopathy. Early detection and management of these complications are crucial for preventing their progression and improving patient outcomes.

Materials and Methods: The present cross-sectional study was conducted on 100 patients newly diagnosed with type 2 diabetes mellitus scheduled for out in the department of General Medicine, Mahatma Gandhi Memorial Hospital, Warangal for a period of 18 months. Prior to the initiation of the study, Ethical and Research Committee clearance was obtained from Institutional Ethical Committee.

Results: The study examined the prevalence and characteristics of complications in diabetic subjects. The majority (55%) had no complications, while 27% had diabetic retinopathy and 18% had diabetic nephropathy. The majority (55.5%) were over 60 years old, and the largest group (44.44%) were 41-50 years old. The majority (82%) had no family history of diabetic microvascular complications. Hypertension and cardiovascular disease were the most common co morbidities. The duration of diabetes was over 10 years for 69% of subjects, with higher durations in diabetic retinopathy and nephropathy cases. Insulin resistance was present in a minority, but a higher rate was noted in diabetic retinopathy. The study's diagnostic measures showed a sensitivity of 0.83 and 0.85 for diabetic retinopathy and nephropathy, respectively.

Conclusion: The study revealed that diabetic nephropathy and diabetic retinopathy are common in newly diagnosed type 2 diabetes patients, emphasizing the need for early detection and proactive management strategies, including structured education programs, life style changes, and pharmacological interventions.

Keywords: Diabetes mellitus, diabetic retinopathy, diabetic nephropathy.

INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Type 2 diabetes mellitus (T2DM), the most

common form, constitutes approximately 90-95% of all diabetes cases globally. The rising prevalence of T2DM poses significant public health challenges due to its association with various complications, including microvascular and macrovascular diseases. Among the microvascular complications, diabetic

nephropathy (DN) and diabetic retinopathy (DR) are particularly concerning due to their impact on morbidity, mortality, and quality of life.^[1,2]

Diabetic nephropathy, a leading cause of end-stage renal disease (ESRD), manifests as proteinuria, declining renal function, and, ultimately, kidney failure. It not only increases the risk of cardiovascular events but also necessitates costly treatments such as dialysis and kidney transplantation. Diabetic retinopathy, on the other hand, is the leading cause of blindness among working-age adults. It progresses from non-proliferative retinopathy, characterized by microaneurysms and hemorrhages, to proliferative retinopathy, marked by neovascularization and potential retinal detachment.^[3]

Early detection and management of DN and DR are critical to preventing their progression and mitigating their impact on patients' health and healthcare systems. Screening for these complications at the time of T2DM diagnosis can lead to timely interventions that improve patient outcomes.

Aims and objectives

Aim: The aim of present study was to determine the prevalence of diabetic nephropathy and diabetic retinopathy in newly diagnosed type 2 diabetes mellitus patients attending Mahatma Gandhi Memorial Hospital.

Objectives: The following were the objectives of present study:

- To assess the prevalence of diabetic nephropathy in newly diagnosed type 2 diabetes mellitus patients attending Mahatma Gandhi Memorial Hospital.
- To determine the prevalence of diabetic retinopathy in these patients.
- To evaluate the correlation between the presence of diabetic nephropathy and diabetic retinopathy.
- To identify any demographic or clinical risk factors associated with the development of diabetic nephropathy and diabetic retinopathy in this population.

MATERIALS AND METHODS

Place of study: The present study was carried out in the department of General medicine, Mahatma Gandhi Memorial Hospital, Warangal.

Type of study: The present study was a cross-sectional study.

Duration of study: The study was carried out for a period of 18 months.

Sample size: The study was conducted on 100 patients.

Inclusion criteria:

Patients meeting the following criteria were enrolled into the study.

- Patients above 20 years of age.
- Newly diagnosed T2DM adults
- According to ADA, criteria for diagnosis of T2DM are:
 - ❖ Glycosylated hemoglobin (HbA1C) $\geq 6.5\%$.

- ❖ Fasting plasma glucose ≥ 126 mg/dL (7.0 mmol/L)
- ❖ 2-hour plasma glucose ≥ 200 mg/dL (11.1 mmol/L)
- ❖ In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥ 200 mg/dL (11.1 mmol/L).

- Patients willing to give consent.

Exclusion criteria:

Patients meeting the following criteria were excluded from the study.

- Congestive cardiac failure
- Urinary tract infection
- Known Hypertension
- Fever
- Type 1 diabetes mellitus
- Pregnant females.
- Patients who were not willing to give consent.
- Smoking and Alcohol was excluded

Informed Consent

All the patients fulfilling selection criteria were explained about the details of the disease process, options of treatment, ultimate outcome, possible effects, complications and written informed consent was obtained before enrolment. They were informed of their right to withdraw from the study at any stage.

Data Collection

- A detailed clinical history and physical examination was carried out on patients followed by a thorough review of their hospital records.
- All the patients meeting inclusion criteria were included in the study.
- The patient's fasting plasma glucose and the postprandial plasma glucose was assessed.
- The spot urine protein-to-creatinine ratio (UPCR) was determined, and a 24-hour urine protein test was conducted. Renal function was evaluated.
- Indirect ophthalmoscopy was performed to examine the fundus.
- Additionally, routine blood tests were carried out (complete blood picture, HbA1c, lipid profile).
- The data was recorded and noted down in the master charts.
- All the data was documented and analyzed by subjecting to statistical analysis.

Statistical analysis: The collected data was entered into Microsoft Excel Worksheet- 2010 and data was taken into IBM SPSS Statistic for windows, version 24 (IBM Corp., Armonk, N.Y., USA) software for calculation of frequency, percentage, mean, standard deviation and probability value. One Way Analysis (ANOVA) was used to compare more than two groups. A 'P' value of <0.05 was considered statistically significant.

RESULTS

The present cross-sectional study was conducted on 100 patients newly diagnosed with type 2 diabetes mellitus scheduled for out in the department of

General Medicine, Mahatma Gandhi Memorial Hospital, Warangal for a period of 18 months.

Table 1: Distribution of subjects basing on their microvascular complications.

Microvascular complications	Number of subjects (N)	Percentage (%)
Diabetic Retinopathy	27	27
Diabetic Nephropathy.	18	18
Nil	55	55
Total	100	100

The above table gives data on distribution of study subjects basing on their microvascular complications. Majority of subjects had no complications i.e. 55

subjects (55%) followed by 27 subjects (27%) had diabetic retinopathy, and finally 18 subjects (18%) had diabetic nephropathy.

Table 2: Age wise distribution of subjects.

Age group (years)	Total number of subjects (N%)	Number of subjects with retinopathy (N%)	Number of subjects with nephropathy (N%)
20 to 30	2 (2 %)	0 (0 %)	0 (0 %)
31 to 40	25 (25 %)	1 (3.70%)	0 (0 %)
41 to 50	32 (32 %)	3 (11.11%)	5 (27.77%)
51 to 60	23 (23 %)	8 (29.63%)	7 (38.89%)
> 60	18 (18 %)	15 (55.55%)	6 (33.33%)
Total	100 (100 %)	27 (100 %)	18 (100 %)

In the present study, the subjects were categorized into five age groups. The above table gives data on distribution of study subjects based on their age. Majority of subjects were in age group of 41 to 50 years i.e. 32 subjects (32%) followed by 25 subjects (25%) in age group of 31 to 40 years, 23 subjects (23%) in age group of 51 to 60 years, 18 subjects (18%) in age group of >60 years and finally 2 subjects (2%) of age 20 to 30 years. Of 27 subjects (100%) with diabetic retinopathy, there were 15 subjects (55.55%) were in age group of

>60 years, 8 subjects (29.63%) in age group of 51 to 60 years, 3 subjects (11.11%) in age group of 41 to 50 years, 1 subject (3.70%) in age group of 31 to 40 years, and finally no subjects in the age group of 20 to 30 years. Of 18 subjects (100%) with diabetic nephropathy, there were 7 subjects (38.89%) were in age group of 51 to 60 years, 6 subjects (33.33%) in age group of >60 years, 5 subjects (27.77%) in age group of 41 to 50 years, and finally no subjects in the age group of 31 to 40 years and 20 to 30 years.

Table 3: Distribution of subjects basing on their gender.

Gender	Total number of subjects (N%)	No. of subjects with DR (N%)	No. of subjects with DN (N%)
Male	56 (56 %)	16 (59.26%)	12 (66.67%)
Female	44 (44%)	11 (40.74%)	6 (33.33%)
TOTAL	100 (100%)	27 (100%)	18 (100%)

The above table gives data on distribution of study subjects based on their gender. Majority of subjects were males i.e. 56 subjects (56%) followed by 44 subjects (44%) females. Out of 27 subjects with diabetic retinopathy, there were 16 (59.26%) male

subjects followed by 11 (40.74%) female subjects. Out of 18 subjects with diabetic nephropathy, there were 12 (66.67%) male subjects followed by 6 (33.33%) female subjects.

Table 4: Mean data of anthropometric parameters of subjects.

Anthropometric parameters	Mean	Sd
Weight (kg)	68.34	5.67
Height (cm)	165.12	15.23
Body mass index (kg/m ²)	27.56	2.45

The above table gives data on mean anthropometric parameters of study subjects. The mean weight of subjects was 68.34 ± 5.67 kg. The mean height of

subjects in was 165.12 ± 15.23 cm. The mean BMI of subjects was 27.56 ± 2.45 kg/m².

Table 5: Distribution of subjects basing on their area of residence.

Area of residence	Total number of subjects (N %)	Number of subjects with retinopathy (N %)	Number of subjects with nephropathy (N %)
Urban	73	21 (77.77%)	15 (83.33%)
Rural	27	6 (22.23%)	3 (16.67%)
Total	100 (100 %)	27 (100 %)	18 (100 %)

The above table gives data on distribution of study subjects basing on their area of residence. Majority of subjects resided in urban area i.e. 73 subjects (73%) followed by 27 subjects (27%) resided in rural area. Out of 27 subjects (100%) with diabetic retinopathy, majority of subjects resided in

urban area; i.e. 21 subjects (77.77%) followed by 6 subjects (22.23%) resided in rural area. Out of 18 subjects (100%) with diabetic nephropathy, majority of subjects resided in urban area; i.e. 15 subjects (83.33%) followed by 3 subjects (16.67%) resided in rural area.

Table 6: Distribution of subjects basing on their family history of diabetic microvascular complications.

Family history of diabetic microvascular complications	Total number of subjects (N %)	Number of subjects with retinopathy (N %)	Number of subjects with nephropathy (N%)
Yes	18 (18 %)	5 (18.52%)	2 (11.11%)
No	82 (82 %)	22 (81.48%)	16 (88.89%)
Total	100 (100 %)	27 (100 %)	18 (100 %)

The above table gives data on distribution of subjects basing on their family history of diabetic microvascular complications. Majority of subjects had no family history of diabetic microvascular complications, i.e., 82 subjects (82%) while 18 subjects (18%) had family history of diabetic microvascular complications. Out of 27 subjects (100%) with diabetic retinopathy, majority of subjects had no family history of diabetic

microvascular complications, i.e., 22 subjects (81.48%) while 5 subjects (18.52%) had family history of diabetic microvascular complications. Out of 18 subjects (100%) with diabetic nephropathy, majority of subjects had no family history of diabetic microvascular complications, i.e., 16 subjects (88.89%) while 2 subjects (11.11%) had family history of diabetic microvascular complications.

Table 7: Distribution of subjects basing on their co-morbidities.

Co-morbidities	Total number of subjects (N %)	Number of subjects with retinopathy (N%)	Number of subjects with nephropathy (N%)
Hypertension(HTN)	38 (38 %)	12 (44.44 %)	8 (44.44 %)
Cerebrovascular accident (CVA)	02 (02 %)	02 (07.40 %)	01 (05.55 %)
Obesity	18 (18 %)	06 (22.22 %)	02 (11.11%)
Cardiovascular disease(CVD)	23 (23%)	07 (14.82%)	04 (22.22%)
Obesity and Hypertension	11 (11%)	01 (03.70%)	02 (11.11%)
Hypertension and CVA	05 (05%)	01 (03.70%)	NIL
HTN, CVD& Obesity	03 (03%)	01 (03.70%)	01 (05.55%)

The above table gives data on distribution of subjects basing on their co-morbidities. Majority subjects had Hypertension, i.e., 38 subjects (38%); followed by 23 subjects (23%) had Cardiovascular disease; 18 subjects (18%) had Obesity, 11 subjects (11%) Obesity& Hypertension, 05 subjects (5%) Hypertension & Cerebrovascular accident, 03 subjects (3%) Hypertension, Cardiovascular disease & Obesity and finally 2 subjects (2%) had cerebrovascular accident. Out of 27 subjects (100%) with diabetic retinopathy, the majority had hypertension, i.e., 12 subjects (44.44%), followed by 6 subjects (22.22%) with obesity, 4 subjects (14.81%) with cardiovascular

disease, and 2 subjects (7.40%) with cerebrovascular accident. The remaining 1 subject (3.70%) each had obesity with hypertension, hypertension with cerebrovascular accident, and hypertension with cardiovascular disease and obesity. Out of 18 subjects (100%) with Diabetic Nephropathy, majority subjects had Hypertension i.e., 08 subjects (44.44%); followed by 04 subjects (22.22%) had Cerebrovascular disease; 02 subjects (11.11%) had Obesity; 02 subjects (11.11%) had Obesity & Hypertension; and 1 subject (5.55%) had Hypertension, Cerebrovascular disease & Obesity; and finally NO subjects for Hypertension & Cerebrovascular disease.

Table 8: Distribution of patients basing on duration of diabetes

Duration of diabetes	Total number of patients (n%)	Numbers of patients with retinopathy (n%)	Number of patients with nephropathy (n%)
< 5	8 (8 %)	1 (3.70%)	0 (0 %)
5 to 10	23 (23 %)	5 (18.52%)	2 (11.11%)
> 10	69 (69 %)	21 (77.78%)	16 (88.89%)
Total	100 (100 %)	27 (100 %)	18 (100 %)

The above table gives data on distribution of study subjects basing on duration of diabetes. Majority of subjects had diabetes for >10 years i.e. 69 subjects (69%) followed by 23 subjects (23%) had diabetes for 5 to 10 years and 8 subjects (8%) had diabetes for

< 5 years. Out of 27 subjects (100%) with diabetic retinopathy, majority of subjects had diabetes for >10 years i.e. 21 subjects (77.78%) followed by 5 subjects (18.52%) had diabetes for 5 to 10 years and 1 subject (3.70%) had diabetes for < 5 years.

Out of 18 subjects (100%) with diabetic nephropathy, majority of subjects had diabetes for >10 years i.e. 16 subjects (88.89%) followed by 2 subjects (11.11%)

had diabetes for 5 to 10 years and no subjects had diabetes for < 5 years.

Table 9: Distribution of subjects basing on their glyceimic control

HbA1c (%)	Total number of subjects (N %)	Number of subjects with retinopathy (N %)	Number of subjects with nephropathy (N %)
6.5 to 8	41 (41 %)	0 (0 %)	0 (0 %)
8.1 to 11	34 (34 %)	4 (14.81%)	3 (16.67%)
≥ 12	25 (25 %)	23 (85.16%)	15 (83.33%)
Total	100 (100 %)	27 (100 %)	18 (100 %)

The above table gives data on distribution of study subjects basing on their glyceimic control. Majority of subjects had HbA1c of 6.5 to 8% i.e. 41 subjects (41%) followed by 34 subjects (34%) had HbA1c of 8.1 to 11% and 25 subjects (25%) had HbA1c of ≥ 12%.

Out of 27 subjects (100%) with diabetic retinopathy, majority of subjects had HbA1c of ≥ 12% i.e. 23

subjects (81.16%) followed by 4 subjects (14.81%) had HbA1c of 8.1 to 11% and no subjects had HbA1c of 6.5 to 8%.

Out of 18 subjects (100%) with diabetic nephropathy, majority of subjects had HbA1c of ≥ 12% i.e. 15 subjects (83.33%) followed by 3 subjects (16.67%) had HbA1c of 8.1 to 11% and no subjects had HbA1c of 6.5 to 8%.

Table 10: Distribution of subjects basing on their cholesterol levels.

Cholesterol type	Range (mg/dL)	Total number of subjects (N %)	Number of subjects with retinopathy (N %)	Number of subjects with nephropathy (N %)
Total cholesterol	Less than 200	20 (20%)	5 (18.50%)	03 (16.60%)
	More than 200	80 (80%)	22 (81.40%)	15 (83.30%)
HDL cholesterol	Less than 50	75 (75%)	19 (70.30%)	13 (72.20%)
	More than 50	25 (25%)	08 (29.60%)	05 (27.70%)
Triglycerides	Less than 150	28 (28%)	07 (25.90%)	06 (33.33%)
	More than 150	72 (72%)	20 (74.07%)	12 (66.66%)
LDL Cholesterol	Less than 120	32 (32%)	09 (33.33%)	08 (44.44%)
	More than 120	68 (68%)	18 (66.66%)	10 (55.55%)

The above table gives data on distribution of subjects basing on their cholesterol levels. Of 20 subjects (20%) with total cholesterol of less than 200 mg/dL, there were 5 subjects (18.50%) with diabetic retinopathy and 3 subjects (16.60%) with diabetic nephropathy. Of 80 subjects (80%) with total cholesterol of more than 200 mg/dL, there were 22 subjects (81.40%) with diabetic retinopathy and 15 subjects (83.30%) with diabetic nephropathy.

Of 75 subjects (75%) with HDL cholesterol of less than 50 mg/dL, there were 19 subjects (70.30%) with diabetic retinopathy and 13 subjects (72.20%) with diabetic nephropathy. Of 25 subjects (25%) with total cholesterol of more than 50 mg/dL, there were 08 subjects (29.60%) with diabetic retinopathy and 05 subjects (27.70%) with diabetic nephropathy.

Of 28 subjects (28%) with triglycerides of less than 150 mg/dL, there were 7 subjects (25.90%) with diabetic retinopathy and 6 subjects (33.33%) with diabetic nephropathy. Of 72 subjects (72%) with total cholesterol of more than 150 mg/dL, there were 20 subjects (74.07%) with diabetic retinopathy and 12 subjects (66.66%) with diabetic nephropathy.

Of 32 subjects of with LDL Cholesterol of less than 120mg/d, there were 9 subjects (33.33%) with diabetic retinopathy and 8 subjects (44.44%) with diabetic nephropathy. Of 68 subjects with LDL Cholesterol of more than 120mg/dl, there were 18 subjects (66.66%) with diabetic retinopathy and 10 subjects (55.55%) with diabetic nephropathy.

DISCUSSION

The global prevalence of diabetic nephropathy has increased significantly over the past few decades, primarily due to an increase in type 2 diabetes mellitus (T2DM).^[1] Diabetic nephropathy is a major cause of end stage renal disease (ESRD), with early symptoms being difficult to detect. Gross proteinuria identifies patients at risk of progression to ESRD, leading to maintenance dialysis or kidney transplantation. Diabetic retinopathy and Diabetic nephropathy are major microvascular complications of diabetes, with a gradual progression to irreversible damage.^[2,3]

Diabetic retinopathy in patients with diabetes is 34.6%, while pediatric diabetic retinopathy is the most frequent cause of new cases of blindness globally.^[4] Early diagnosis and treatment can delay the occurrence and progression of diabetic nephropathy and diabetic retinopathy, improving prognosis in patients with diabetes.^[5] Non-invasive imaging can help observe retinal blood vessels, which may inform on the development of other microvascular complications of diabetes, including diabetic nephropathy. Diabetic retinopathy is classified as nonproliferative and proliferative, and studies investigating the correlation between diabetic retinopathy and diabetic nephropathy clinical manifestations are limited.

Prevelence of microvascular complications: Majority of subjects had no complications i.e. 55%

subjects followed by 27% subjects had Diabetic Retinopathy, and finally 18% subjects had Diabetic Nephropathy. Our study was in correlation with Faselis C et al, Agrawal et al.^[6,7]

AGE: Majority of subjects were in age group of 41 to 50 years i.e. 32 subjects (32%) followed by 25 subjects (25%) in age group of 31 to 40 years, 23 subjects (23%) in age group of 51 to 60 years, 18 subjects (18%) in age group of >60 years and finally 02 subjects (02%) of age 20 to 30 years. Out of 27 subjects (100%) with diabetic retinopathy, there were 15 subjects (55.55%) were in age group of >60 years, 08 subjects (29.63%) in age group of 51 to 60 years, 03 subjects (11.11%) in age group of 41 to 50 years, 01 subjects (3.70%) in age group of 31 to 40 years, and finally no subjects in the age group of 20 to 30 years.

Out of 18 subjects (100%) with diabetic nephropathy, there were 07 subjects (38.89%) were in age group of 51 to 60 years, 06 subjects (33.33%) in age group of >60 years, 05 subjects (27.77%) in age group of 41 to 50 years, and finally no subjects in the age group of 31 to 40 years and 20 to 30 years. Our study was in correlation with Wang Q et al, Wang J et al, Rodriguez-Poncelas A et al.^[8-10]

Gender: Majority of subjects were males i.e. 56 subjects (56%) followed by females 44 subjects (44%). Out of 27 subjects (100%) with diabetic retinopathy, there were 16 (59.26%) male subjects followed by 11 (40.74%) female subjects. Out of 18 subjects (100%) with diabetic nephropathy, there were 12 (66.67%) male subjects followed by 06 (33.33%) female subjects. Our study was in correlation with Nakayama Y et al, Ahmed MH et al, Al-Rubeaan K et al.^[11-13]

Anthropometric parameters: The mean weight of subjects was 68.34 ± 5.67 kg. The mean height of subjects in was 165.12 ± 15.23 cm. The mean BMI of subjects was 27.56 ± 2.45 kg/m². Our study was in correlation with Karoli R et al, Verma A et al, Afarid M et al.^[14-16]

Area of residence: Majority of subjects resided in urban area i.e. 73 subjects (73%) followed by 27 subjects (27%) resided in rural area. Out of 27 subjects (100%) with diabetic retinopathy, majority of subjects resided in urban area; i.e. 21 (77.77%) subjects followed by 06 (22.23%) subjects resided in rural area. Out of 18 subjects (100%) with diabetic nephropathy, majority of subjects resided in urban area; i.e. 15 (83.33%) subjects followed by 03 (16.67%) subjects resided in rural area. Our study was in correlation with Pedro et al, Pradeepa R et al.^[17,18]

Family history of diabetic microvascular complications: Majority of subjects had no family of diabetic microvascular complications, i.e., 82 subjects (82%) while 18 subjects (18%) had family history of diabetic microvascular complications.

Out of 27 subjects (100%) with diabetic retinopathy, majority of subjects had no family history of diabetic microvascular complications, i.e., 22 (81.48%)

subjects, while 05 (18.52%) subjects had family history of diabetic microvascular complications.

Out of 18 subjects (100%) with diabetic nephropathy, majority of subjects had no family history of diabetic microvascular complications, i.e., 16 (88.89%) subjects while 02 (11.11%) subjects had family history of diabetic microvascular complications. Our study was in correlation with Faselis C et al,^[6] Khanam PA et al.^[19]

Duration of diabetes: Majority of subjects had diabetes for >10 years i.e. 69 subjects (69%) followed by 23 subjects (23%) had diabetes for 5 to 10 years and 8 subjects (8%) had diabetes for < 5 years. Out of 27 subjects (100%) with diabetic retinopathy, majority of subjects had diabetes for >10 years i.e. 21 (77.78%) subjects followed by 05 (18.52%) subjects had diabetes for 5 to 10 years and 01 (3.70%) subjects had diabetes for < 5 years. Out of 18 subjects (100%) with diabetic nephropathy, majority of subjects had diabetes for >10 years i.e. 16 (88.89%) subjects followed by 04 (11.11%) subjects had diabetes for 5 to 10 years and no subjects had diabetes for < 5 years. Our study was in correlation with He F et al, Liu Y et al, Butt A et al.^[20-22]

HbA1c Levels: Majority of subjects had HbA1c of 6.5 to 8% i.e. 41 subjects (41%) followed by 34 subjects (34%) had HbA1c of 8.1 to 11% and 25 subjects (25%) had HbA1c of $\geq 12\%$. Out of 27 subjects (100%) with diabetic retinopathy, majority of subjects had HbA1c of $\geq 12\%$ i.e. 23 (85.18%) subjects followed by 04 (14.81%) subjects had HbA1c of 8.1 to 11% and NO subjects had HbA1c of 6.5 to 8%.

Out of 18 subjects (100%) with diabetic nephropathy, majority of subjects had HbA1c of $\geq 12\%$ i.e. 15 (83.33%) subjects followed by 03 (16.67%) subjects had HbA1c of 8.1 to 11% and NO subjects had HbA1c of 6.5 to 8%. Our study was in correlation with Atkin SL et al, Chen P et al.^[23,24]

Cholesterol levels: Of 20 subjects (20%) with total cholesterol of less than 200 mg/dL, there were 5 subjects (18.50%) with diabetic retinopathy and 3 subjects (16.60%) with diabetic nephropathy. Of 80 subjects (80%) with total cholesterol of more than 200 mg/dL, there were 22 subjects (81.40%) with diabetic retinopathy and 15 subjects (83.30%) with diabetic nephropathy.

Of 75 subjects (75%) with HDL cholesterol of less than 50 mg/dL, there were 19 subjects (70.30%) with diabetic retinopathy and 13 subjects (72.20%) with diabetic nephropathy. Of 25 subjects (25%) with total cholesterol of more than 50 mg/dL, there were 08 subjects (29.60%) with diabetic retinopathy and 05 subjects (27.70%) with diabetic nephropathy.

Of 28 subjects (28%) with triglycerides of less than 150 mg/dL, there were 7 subjects (25.90%) with diabetic retinopathy and 6 subjects (33.33%) with diabetic nephropathy. Of 72 subjects (72%) with total cholesterol of more than 150 mg/dL, there were 20 subjects (74.70%) with diabetic retinopathy and 12 subjects (66.66%) with diabetic nephropathy.

Of 32 subjects of with LDL Cholesterol of less than 120mg/d, there were 9 subjects (33.33%) with diabetic retinopathy and 8 subjects (44.44%) with diabetic nephropathy. Of 68 subjects with LDL Cholesterol of more than 120mg/dl, there were 18 subjects (66.66%) with diabetic retinopathy and 10 subjects (55.55%) with diabetic nephropathy. Our study was in correlation with Song KH et al.^[25]

CONCLUSION

The study aimed to determine the Prevalence of Diabetic Nephropathy and Diabetic Retinopathy in newly diagnosed Type 2 Diabetes Mellitus (T2DM) patients. The findings revealed significant insights into early complications associated with T2DM, emphasizing the need for early detection and proactive management strategies.

Diabetic Retinopathy was prevalent among the population, with retinal changes at the onset of Diabetes suggesting that Hyperglycemia may have been present and undiagnosed for a considerable period before the formal diagnosis of T2DM. This underscores the importance of comprehensive eye (fundus) examinations for newly diagnosed Diabetes patients, as regular Ophthalmologic assessments can help in early detection and management of Diabetic Retinopathy.

Diabetic Nephropathy was also prevalent among the population, with early signs of Kidney damage, such as Microalbuminuria, present in a substantial proportion of participants. This highlights the importance of routine screening for renal complications at the time of Diabetes diagnosis. The study also highlighted the importance of early and aggressive management of T2DM, even at the point of diagnosis. Implementing structured Diabetes education programs, promoting lifestyle changes, and considering pharmacological interventions early in the disease course can significantly impact the Prevalence and severity of these Diabetic complications.

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