



STUDY OF PREVALENCE AND CLINICAL PROFILE OF NEPHROPATHY AND RETINOPATHY IN TYPE 2 DIABETES PATIENTS AT TERTIARY CARE CENTER, UDAIPUR

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ABSTRACT

Microvascular complications of Type 2 Diabetes Mellitus (T2DM), (retinopathy and nephropathy) have a similar etiopathogenetic mechanism besides genetic predisposition. Even though these two complications frequently co-exist, their frequency varies. The association of these two significant complications and their co-existence needs a relook. **Aim:** To study prevalence of retinopathy and nephropathy in Type 2 diabetes mellitus. Comparison of diabetic retinopathy and nephropathy in Type 2 diabetes mellitus and its correlation of diabetic retinopathy and nephropathy with duration of illness and various risk factors that affects development, progression and severity of diabetic retinopathy and nephropathy. **Methodology:** 100 diabetic patients were taken up for study for a period of one year meeting the criteria for the present study. Detailed history was taken from patient and meticulous examination was done of all patients with special emphasis on renal and ophthalmic symptoms. Clinical data and investigation profile was tabulated. Statistical analysis was done. **Results & Conclusion:** Among 100 patients, 22 had diabetic retinopathy. Among patients with diabetic retinopathy, 68.18% patients had positive family history. Among 100 patients, 32 had diabetic nephropathy, mean FBS was 207 mg%, PPBS was 317.8 mg% and mean HbA_{1c} was 9.2%. Among patients with diabetic retinopathy, mean FBS was 211 mg%, PPBS was 324.9 mg%, HbA_{1c} was 9.5%. From this study it is found that diabetic nephropathy starts earlier than retinopathy. In this study hypertension was found to accelerate progression into nephropathy and retinopathy.

KEYWORDS :

INTRODUCTION

The prevalence of diabetes mellitus has been increasing globally and India now stands next only to China in terms of absolute numbers. This has also resulted in a parallel increase in the macrovascular and microvascular complications of Diabetes which imposes a huge burden on the health care services of the country.¹⁻³ Microvascular complications of type 2 Diabetes Mellitus Nephropathy and Retinopathy have similar etiopathogenetic mechanisms. These two complications frequently co-exist; however, the frequency varies. These complications Diabetic Nephropathy and Diabetic Retinopathy (DN and DR) can have severe consequences on health which may eventually lead to end-stage renal disease and blindness respectively. With changing treatment targets, age profile, new drugs, and patient awareness of type 2 DM, the frequency of co-existence of these two significant complications needs a relook. Population-based epidemiological studies have shown that patients with DN experienced higher incidence of DR as compared to patients without DN.^{4,5} However, data from hospital settings regarding similar reports is sparse. Hence, this study aims to determine the association between DR and DN, in patients with type 2 DM presenting to a tertiary care centre.

AIMS & OBJECTIVES

- To study prevalence & clinical profile of retinopathy and nephropathy in Type 2 diabetes mellitus.
- Comparison of diabetic retinopathy and nephropathy in Type 2 diabetes mellitus.
- Correlation of diabetic retinopathy and nephropathy with duration of illness
- To study various risk factors that affects development, progression and severity of diabetic retinopathy and nephropathy.

METHODOLOGY

- This study was conducted in the Department of Medicine at a tertiary care centre in western India from Dec 2019-Nov 2020. Geetanjali Medical College and hospital on 100 known diabetic patients in period of one year. A detailed history was elicited from all patients with special emphasis on renal and ophthalmic symptoms. All patients were then subjected to battery of tests to look for nephropathy. Simultaneously fundus examination was

carried out to look for retinopathy. Diabetic nephropathy was diagnosed based on the presence of albuminuria (microalbuminuria defined as urine albumin-creatinine ratio of 30-299 mg/g Cr or macroalbuminuria defined as albumin-creatinine ratio \geq 300 mg/g Cr) and/or reduced estimated Glomerular Filtration Rate (eGFR) For this, spot urine sample was obtained for estimating urine albumin-creatinine ratio and the samples were freshly analyzed on the same day (Siemens Dimension® EXL™ 200 Integrated Chemistry System). A written informed consent was obtained from the study participants and patients fulfilling the inclusion criteria were taken for further evaluation. The patients underwent fundoscopic examination using a standard ophthalmoscope. Based on fundoscopy, patients were further classified into Non-Proliferative Diabetic Retinopathy (NPDR), Proliferative Diabetic Retinopathy (PDR) and those having Clinically Significant Macular Edema (CSME) as per Early Treatment Diabetic Retinopathy Study (ETDRS) classification.⁶

INCLUSION CRITERIA

- Adult patients with known type 2 Diabetes Mellitus

EXCLUSION CRITERIA

- Clinical signs of cardiac failure and CNS abnormality affecting vision
- Systemic diseases like connective tissue disorder or any long standing illness which might affect the course of illness
- Any structural abnormality of kidney, ureter, bladder, prostate detected on USG
- Any drugs known to interfere with kidney function like antibiotics (aminoglycosides; NSAIDs), chemotherapeutic, etc.
- Pregnant females

RESULTS

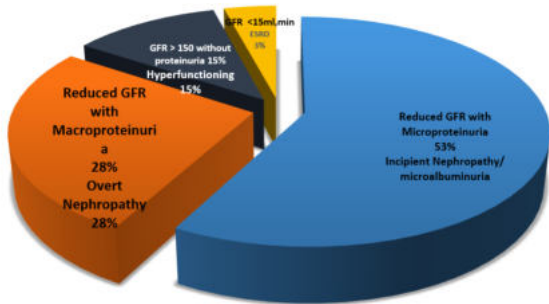
Prevalence

- Among 100 Patients, 62 males and 38 were females in our study, out of which 32 patients had diabetic nephropathy. So prevalence is 32% (Males : 23, Females : 9) Among 62 males, 15 having diabetic retinopathy and among 38 females 7 having diabetic retinopathy. So, prevalence of retinopathy is 22%.

Clinical Profile & staging :

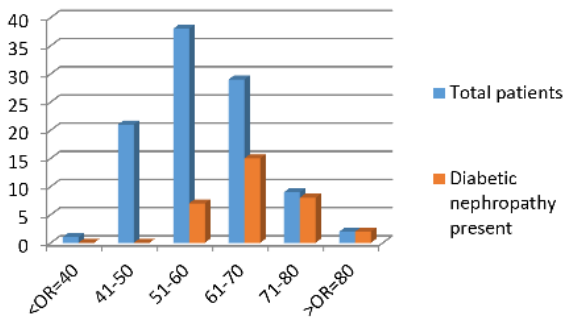
Diabetic Nephropathy-

• Among 32 patients with diabetic nephropathy 9 patients were asymptomatic; 23 patients had pedal edema. On screening for 24Hr. Urine protein and estimating Glomerular Filtration Rate (eGFR), **STAGES OF DIABETIC NEPHROPATHY** Out of 32 patients, 15% had eGFR more than 150ml/min with no proteinuria (Hyperfunctioning kidneys). 53% patients had normal to minimally reduced eGFR with microproteinuria (30-300mg/dL) (Incipient Nephropathy), 28% patients had reduced eGFR with macroproteinuria (>300mg/dL) (Overt Nephropathy); 3% patients had eGFR <15ml/min with >300mg/day urine protein(ESRD).



GRAPH-1

AGE DISTRIBUTION:



GRAPH-2

Above graph, showing that as the age advances prevalence of diabetic nephropathy increases, showing 100% after the age of 80. It can be attributed to longer duration of diabetes with advancing age.

CORRELATION OF DIABETIC NEPHROPATHY WITH DURATION

TABLE-1

Duration in Years	Total patients	Diabetic nephropathy present	%
<=5	46	0	0
6-10	15	1	6.66
11-15	8	4	50
16-20	10	7	70
21-25	17	16	94.11
>=26	4	4	100
	100	32	

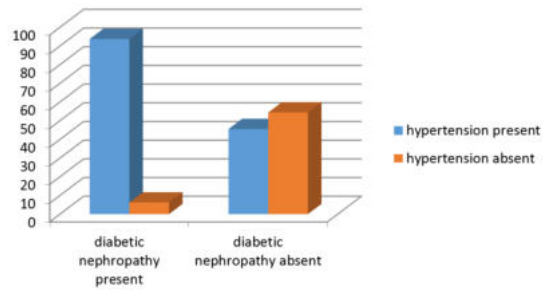
Above table shows that at 10 years after diagnosis, 6.66% of the patients developed nephropathy, but after 25 years of diagnosis almost all patients developed nephropathy

CORRELATION BETWEEN DIABETIC NEPHROPATHY WITH HYPERTENSION

TABLE-2

Diabetic nephropathy	Hypertension		Total
	Present	Absent	
Present	30 (93.75%)	2 (6.25%)	32

	Hypertension		Total
	Present	Absent	
Diabetic nephropathy present	30 (93.75%)	2 (6.25%)	32
Diabetic nephropathy absent	37 (54.41%)	31 (45.58%)	68
	61	39	100

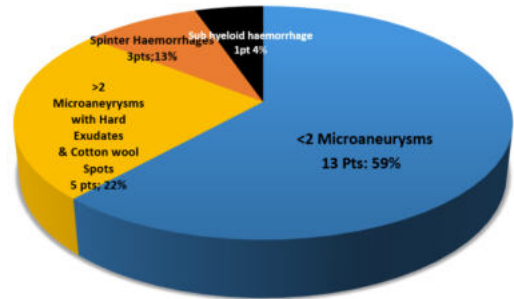


GRAPH-3

Above table shows that among 32 patients with diabetic nephropathy 30 had positive history of hypertension. Only 2 patients had negative history of hypertension.

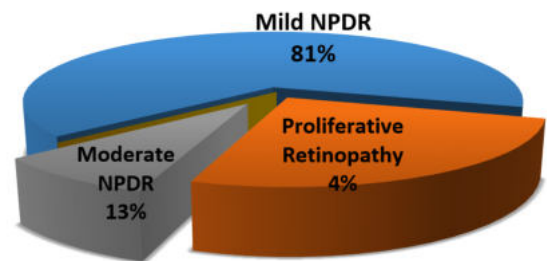
Diabetic Retinopathy

• Among diabetic patients 59% patients were symptomatic, having most common complaint of floaters & diminished vision. On Detailed clinical examination by ophthalmoscopy & slit lamp examination Out of 22 patients, 13 patients had <2 microaneurysms 59%, 5 patients had >2 microaneurysms with Hard Exudates & Cotton wool Spots 22%, 3 patients has splinter haemorrhages 13%, 1 patient had sub hyeloid haemorrhage 4%.



GRAPH-4

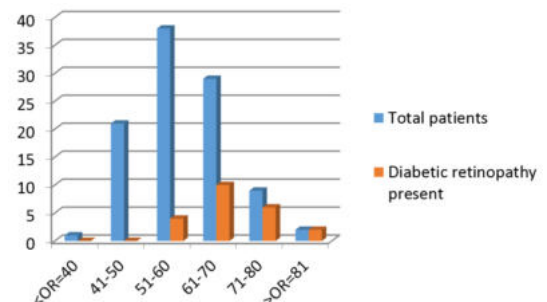
STAGING OF D.RETINOPATHY



GRAPH-5

81% patients have Mild Non proliferative diabetic retinopathy, 13% have moderate Non proliferative diabetic retinopathy and 4% patients have proliferative retinopathy.

AGE DISTRIBUTION



GRAPH-6

Above table shows that with advancing age prevalence of diabetic retinopathy increases, almost approaching to 100% by 80 years of age.

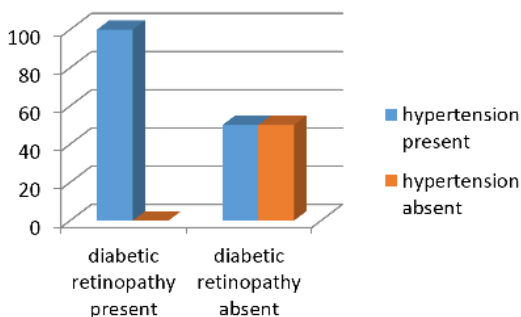
CORRELATION OF RETINOPATHY WITH DURATION
TABLE-3

Duration in years	Total patients	Diabetic retinopathy present	%
<=5	46	0	0
6-10	15	0	0
11-15	8	3	37.5
16-20	10	4	40
21-25	17	11	64.7
>=26	4	4	100
	100	22	

This table shows that patients with diabetes duration less than 5 year had not developed retinopathy. Even after 10 years of diagnosis, none of the patients developed retinopathy. This shows that nephropathy starts earlier than retinopathy.

CORRELATION BETWEEN DIABETIC RETINOPATHY WITH HYPERTENSION
TABLE-4

Diabetic retinopathy	Hypertension		Total
	Present	Absent	
Present	22 (100%)	0 (0%)	22
Absent	39 (50%)	39 (50%)	78
	61	39	100

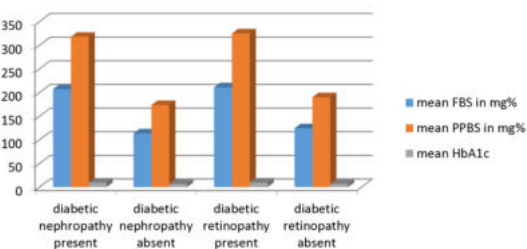


GRAPH-7

Above table shows that among 22 patients with diabetic retinopathy, all patients have positive history of hypertension present.

CORRELATION OF DIABETIC RETINOPATHY AND NEPHROPATHY WITH FBS, PPBS AND HbA_{1c}
TABLE-5

	Diabetic nephropathy present	Diabetic nephropathy absent	Diabetic retinopathy present	Diabetic retinopathy absent
Mean FBS in mg%	207	150.4	211	144.3
Mean PPBS in mg%	317.8	220	324.9	193
HbA _{1c} in %	9.2	8.1	9.5	8.0



GRAPH-8

The mean value of FBS, PPBS, HbA_{1c} is higher in diabetics who had nephropathy and retinopathy than those without the complication.

SUMMARY AND CONCLUSION

Among 100 patients in study, 32 patients had diabetic nephropathy, 23 were male and 9 were female. Among 100 patients, 22 had diabetic retinopathy, 15 were male and 7 were female. Among patients with diabetic retinopathy, 68.18% patients had positive family history of diabetic retinopathy. Among patients with diabetic nephropathy, mean FBS was 207 mg%, PPBS was 317.8 mg% and mean HbA_{1c} was 9.2%. Among patients with diabetic retinopathy, mean FBS was 211 mg%, PPBS was 324.9 mg%, HbA_{1c} was 9.5%. From this study it is found that diabetic nephropathy starts earlier than retinopathy and hypertension was found to accelerate the progression into nephropathy and retinopathy. Poor glycemic control was directly correlated with the both microvascular complications.

DISCUSSION

The results of this study indicate that all types of DR are more common in patients with DN. It was also noted that older age, longer duration of DM and worse glycemic control were associated with greater frequency of DR. The high association between DN and DR complications (both microvascular) in type 2 DM is due to similar pathogenesis of both these microvascular complications. The findings in this study are in agreement with previous studies that have shown that diabetic retinopathy is more common in patients with nephropathy.¹⁻³ However, there were some key differences between demographics compared to the previously reported results. The mean duration of diabetes among this study group was shorter compared to earlier reports, thereby suggesting faster onset of development of DR in patients.^{2,5} It was also observed in this study that subjects with nephropathy had worse glycemic control compared to those without DN. Glycemic control and eGFR both were found to have a strong association with DN which was statistically significant. This has been seen in earlier studies as well and re-emphasizes the importance of optimum glycemic control for preventing microvascular complications.^{7,8} This study can be further carried out in various parts of the country with a larger sample size. Other complications of type 2 DM may be taken into account for subsequent studies and adequately followed up.

REFERENCES

1. Pradeepa R, Mohan V. Prevalence of type 2 diabetes and its complications in India and economic costs to the nation. *Eur J Clin Nutr.* 2017 Jul;71(7):816-824.
2. Molnár M, Wittmann I, Nagy J. Prevalence, course and risk factors of diabetic nephropathy in type-2 diabetes mellitus. *Med Sci Monit.* 2000;6(5):929-36.
3. Sheikhs SA, Baig JA, Iqbal T, Kazmi T, Baig M, Husain SS. Prevalence of microalbuminuria with relation to glycemic control in type-2 diabetic patients in Karachi. *J Ayub Med Coll Abbottabad.* 2009 Sep 1;21(3):83-6
4. Ahmed MH, Elwali ES, Awadalla H, Almobarak AO. The relationship between diabetic retinopathy and nephropathy in Sudanese adult with diabetes: population-based study. *Diabetes and Metabolic Syndrome: Clin Res Rev.* 2017 Nov 1;11:S333-6.
5. Zhang J, Wang Y, Li L, Zhang R, Guo R, Li H, et al. Diabetic retinopathy may predict the renal outcomes of patients with diabetic nephropathy. *Renal failure.* 2018 Oct 15;40(1):243-51.
6. Early Treatment Diabetic Retinopathy Study Research Group. Grading diabetic retinopathy from stereoscopic color fundus photographs-an extension of the modified Airlie House classification: ETDRS report number 10. *Ophthalmol.* 1991 May 1;98(5):786-806
7. Wang G, Ouyang J, Li S, Wang H, Lian B, Liu Z, et al. The analysis of risk factors for diabetic nephropathy progression and the construction of a prognostic database for chronic kidney diseases. *J Translat Med.* 2019 Dec;17(1):1-2.
8. Edwards MS, Wilson DB, Craven TE, Stafford J, Fried LF, Wong TY, et al. Associations between retinal microvascular abnormalities and declining renal function in the elderly population: The Cardiovascular Health Study. *Am J kidney Dis.* 2005 Aug 1;46(2):214-24.