VOLUME - 11, ISSUE - 07, JULY - 2022 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Ophthalomology

STUDY ON CLINICAL CORRELATION OF DIABETIC RETINOPATHY INCLUDING CSME WITH NEPHROPATHY

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ABSTRACT **Purpose:** To evaluate the presence of diabetic retinopathy in patients with nephropathy and to correlate the severity of CSME to that of diabetic nephropathy. **Methods:** This prospective non interventional hospital-based study included 100 consecutive cases of DR, presenting to the eye OPD between January 2019 and January 2020 with minimum 3-year duration of Type 2 DM. Complete ophthalmic examination was done and DR was classified according to early treatment diabetic retinopathy study classification(ETDRS). Diabetic nephropathy was classified based on urine albumin creatinine ratio and estimated GFR. **Results:** The study was conducted on 100 patients of whom 76 were males and 24 females. Mild NPDR was present in 48 patients, moderate in 27 patients, severe in 20 patients, and PDR in 5 patients. In our study 38 patients presented with CSME from which maximum number had macroalbuminuria suggesting significant kidney disease. **Conclusion:** The association of CSME and grading of DR with severity of diabetic nephropathy can be used as a marker for progression of nephropathy in patients with DM.

KEYWORDS : Diabetic nephropathy, diabetic retinopathy, clinically significant macular edema

INTRODUCTION

Diabetes is now a global epidemic with multiple complications.1 Diabetic kidney disease, one of the major complications of diabetes, affects about 25%–40% of patients with diabetes,2 3 and is now the leading cause of end-stage kidney disease (ESKD) worldwide.–35,6 This predicament highlights the need for prognostic tools for these outcomes, helping physicians to decide on the intensity of multifactorial therapies in patients with diabetic kidney disease so as to ultimately alter their prognosis.

Likewise, diabetic retinopathy is one of the microvascular complications in diabetes and affects about 30% of patients with diabetes.7 Diabetic retinopathy can be classified by severity, according to the ETDRS. This classification addresses disease stages and provides patients with an opportunity for early interventions to prevent blindness. Previous epidemiological studies have shown the coexistence of diabetic retinopathy and diabetic kidney disease in type 2 diabetes.9-10 In addition, glycemic and blood pressure control reduces the incidence and progression of both retinopathy and kidney disease in patients with diabetes, suggesting a common pathogenesis of these two complications.11-12The aim of this study was to evaluate for the presence of nephropathy in patients with DR and to correlate the severity of DR with that of DN.

METHODS

This prospective, hospital based, noninterventional study was conducted in the Department of Ophthalmology at a secondary government care hospital in Southern India between January 2019 and January 2020. Permission from institutional review board was taken prior to commencement of study. The study included 100 consecutive cases of DR of either age and sex who present with defective vision to ophthal OPD

Inclusion criteria

Patients with minimum 3-year duration of DM giving informed consent for participation in the study were enrolled.

Exclusion criteria

Patients not willing to give informed consent, known cases of DN were excluded.Patients in whom complete fundoscopy and other evaluations could not be done were excluded.

Ophthalmic evaluation

Patients underwent complete ophthalmologic evaluation which included Visual acquity, Slit lamp evaluation and fundoscopy. Those cases with fundus showing features of DR were graded on the basis of ETDRS classification. Patients with DR were further subclassified into two groups based on presence or absence of clinically significant macular edema (CSME).

Nephropathy evaluation under guidance of a nephrologist :

1. Urine albumin creatinine ratio (UACR estimation):- Based on U.ACR value staging of chronic kidney diseases (CKD) was done as normal or mild (<30 mg/24 h), microalbuminuria (30–300 mg/24 h), and macroalbuminuria (>300 mg/24 h).
2. EGFR estimation (calculated by using CKD epidemiology collaboration equation) by using serum creatinine value:- Based on eGFR value, the staging of CKDs were done as Stage-1 CKD (>90 mL/min), Stage-2 CKD (60–89 mL/min), Stage-3A CKD (45–59 mL/min), Stage-3B CKD (30–44 mL/min), Stage-4 CKD (15–29 ml/min), and Stage-5 CKD (<15 mL/min).

RESULTS

Table 1: Association of severity of DR with severity/staging of diabetic nephropathy (EGFR staging)

Nephropathy (EGFR staging)	Mild NPDR	Moderate NPDR	Severe NPDR	PDR
1	15	2	0	0
2	18	8	3	0
3A	5	11	5	0
3B	2	6	9	3
4	2	3	2	1

5	0	2	2	1
Total	42	32	21	5

EGFR – Estimated glomerular filtration rate

Table 1 show association of severity of DR with severity of DN (eGFR staging). In 42 mild NPDR patients, 18 patients had stage 2 CKD. In 32 moderate NPDR patients, 11 had stage 3A CKD. In 21 severe NPDR patients, nine patients had stage 3B CKD. In five PDR patients, 3 had stage 3A CKD. Out of 38 patients with CSME 20 had stage 3B CKD

Table 2: Association of severity of DR with severity/staging of nephropathy (UACR staging)

Nephropathy (UACR staging)	Mild NPDR	Moderate NPDR	Severe NPDR	PDR
Normal (A1)	8	2	0	0
Microalbuminuria (A2)	24	18	8	2
Macroalbuminuria (A3)	10	12	13	3
Total	42	32	21	5

UACR – Urine albumin creatinine ratio

Table 3: Association of CSME with UACR staging

Nephropathy (UACR staging)	CSME
Normal (A1)	0
Microalbuminuria (A2)	6
Macroalbuminuria (A3)	32
Total	38

CSME – Clinically significant macular edema, UACR – Urine albumin creatinine ratio

Table 4 and 5 show an association of severity of DR with severity of DN (UACR staging). In mild NPDR 24 had microalbuminuria, mod NPDR had 18 and severe NPDR and PDR had 8 and 2 patients with microalbuminuria. Coming to CSME grading maximum patients had macroalbuminuria suggesting progression of CKD.

DISCUSSION

Diabetes mellitus is a chronic hyperglycemic state characterized by defects in insulin secretion or/and action. Depending on etiology of DM, factors contributing to hyperglycemia include reduced insulin secretion, decreased glucose utilization, and increased glucose production.(3) Several investigations have demonstrated the relationship between diabetic retinopathy and diabetic nephropathy among patients with type 2 diabetes mellitus.(8). The present study was done with primary objective to find the correlation of DR with that of nephropathy and its association with the severity of retinopathy.

In this study, there was male predominance with 74% and 26% females. Similar male predominance was also seen in the study done by Saini et al.,.[14,16] .Among 100 patients, 95% had NPDR and 5% had PDR. This was comparable to study done by Bhutia et al and Saini et al.[15,16]. In our study population, mild NPDR was present in 42%, moderate NPDR in 32%, severe NPDR in 21% and PDR in 5%.In our study population 38% patients presented with CSME. Mild NPDR was present in 48% out of whom only six presented with CSME. Out of 14% of moderate NPDR, only eight presented with CSME. In the case of severe NPDR and PDR, all patients presented with CSME.

In our study we have also observed that among the 38% with CSME only six had micro albuminuria while a majority of thirty two had macroalbuminuria. Similarly among the 38% 5 had 3A stage, 20 had 3B stage, 8 had stage 4 and 5 had stage 5 Diabetic nephropathy. The mechanism of pathogenesis by which chronic hyperglycemia causes micro vascular complications DR and DN are almost same, so onset and progression of DR and DN are closely related; therefore, in our study, increase in severity of DR is closely related to increase in the severity of DN. Similar findings were observed in a study conducted by Nag et al.[17] in which 20.50% patients with diabetes for less than 5 years duration had micro albuminuria and 25.6% had retinopathy.So, we can conclude that on the basis of severity of DR we can predict the presence/absence and severity of nephropathy in diabetic patients and we can make appropriate referral to nephrologist for subclinical nephropathy in DR patients.

Diabetic retinopathy and nephropathy are two most dangerous complications of DM resulting in increased morbidity among patients with diabetes. As both the complications are dealt by two different medical fraternities, a better understanding of the association between the two will help us in its early management and prevention.

CONCLUSION

In our study we have observed that diabetic nephropathy was closely associated with retinopathy and vice versa. Hence early detection and complete examination of diabetic patients by ophthalmologist and nephrologist might prevent in increased morbidity and diabetes induced blindness among patients.

REFERENCES:

1. World Health Organization Global report on diabetes, 2016. Available: https://www.who.int/diabetes/global-report/en/
2. Afkarian M, Zelnick LR, Hall YN, et al.. Clinical manifestations of kidney disease among US adults with diabetes, 1988-2014. JAMA 2016;316:602–10. 10.1001/jama.2016.10924 [PMC free article] [PubMed] [CrossRef] [Google Scholar]
3. United States Renal Data System. 2016 USRDS annual data report: epidemiology of kidney disease in the United States. National Institutes of health, National Institute of diabetes and digestive and kidney diseases, Bethesda, MD, 2016. [Google Scholar]
4. ERA-EDTA Registry: ERA-EDTA Registry Annual Report 2015 Academic medical center, department of medical informatics, Amsterdam, the Netherlands, 2017. [Google Scholar]
5. Japanese Society for Dialysis Therapy Renal Data Registry. Annual Report JSDT renal data registry (JRDR). Renal Replacement Therapy 2014;3. [Google Scholar]
6. Afkarian M, Sachs MC, Kestenbaum B, et al.. Kidney disease and increased mortality risk in type 2 diabetes. JASN 2013;24:302–8. 10 .168 1/AS N.201 20707 18 [PM C free article] [PubMed] [CrossRef] [Google Scholar]
7. Wong TY, Klein R, Islam FMA, et al.. Diabetic retinopathy in a multi-ethnic cohort in the United States. Am J Ophthalmol 2006;141:446–55. 10 .10 16/j.ajo. 2005.08.0 63 [PMC free article] [PubMed] [CrossRef] [Google Scholar]
8. Olk RJ, Lee CM. Chapter 2. Philadelphia PA: Lippincott; 1993. Classification of diabetic retinopathy. In: Diabetic Retinopathy: Practical Management; pp. 5–18. [Google Scholar]
9. Zhang X, Saaddine JB, Chou C-F, et al.. Prevalence of diabetic retinopathy in the United States, 2005-2008. JAMA 2010;304:649–56. 10.1001/jama.2010.1111 [PMC free article] [PubMed] [CrossRef] [Google Scholar]
10. Parving HH, Hommel E, Mathiesen E, et al.. Prevalence of microalbuminuria, arterial hypertension, retinopathy and neuropathy in patients with insulin dependent diabetes. Br Med J 1988;296:156–60. 10.1136/bmj.296.6616.156 [PMC free article] [PubMed] [CrossRef] [Google Scholar]
11. Orchard TJ, Dorman JS, Maser RE, et al.. Prevalence of complications in IDDM by sex and duration: Pittsburgh epidemiology of diabetes complications study II. Diabetes 1990;39:1116–2. 10.2337/diab.39.9.1116 [PubMed] [CrossRef] [Google Scholar]
12. Mohamed Q, Gillies MC, Wong TY. Management of diabetic retinopathy: a systematic review. JAMA 2007;298:902–16. Review. PubMed PMID. [PubMed] [Google Scholar]
13. Wong TY, Cheung CMG, Larsen M, et al.. Diabetic retinopathy. Nat Rev Dis Primers 2016;2 10.1038/nrdp.2016.12 [PubMed] [CrossRef] [Google Scholar]
14. Rema M, Srivastava BK, Anitha B, Deepa R, Mohan V. Association of serum lipids with diabetic retinopathy in urban South Indians—the Chennai urban rural epidemiology study (CURES) eye study—2. Diabet Med. 2 0 0 6; 23 :1 0 29 –36. [PubMed] [——Google Scholar]
15. Bhutia KL. Prevalence of diabetic retinopathy in type 2 diabetic patients attending tertiary care hospital in Sikkim. Delhi J Ophthalmol. 2017;28:19–21. [Google Scholar]
16. Saini DC, Kochar A, Poonia R. Clinical correlation of diabetic retinopathy with nephropathy and neuropathy. Indian J Ophthalmol. 2021;69:3364–8. [PMC free article] [PubMed] [Google Scholar]
17. Nag RN. Association between microalbuminuria and diabetic retinopathy in type 2 diabetic patients. 2011 [Google Scholar]