

PREVALENCE OF DIABETIC RETINOPATHY AMONG CHRONIC KIDNEY DISEASE PATIENTS UNDERGOING DIALYSIS IN A TERTIARY CARE CENTRE IN TAMILNADU.

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ABSTRACT:

BACKGROUND

Chronic kidney disease (CKD) is a serious global health with a high global prevalence problem leading to end-stage renal disease (ESRD) and dialysis. Retinal microvascular abnormalities are common in chronic kidney disease as diabetes and hypertension account for more than half of all patients with renal failure. The escalating prevalence of diabetes in India, which has already home to over 77million, is also likely to herald an increase in the onset of sight threatening Diabetic retinopathy(DR) in CKD Patients

The aim of this study is to evaluate the sight-threatening diabetic retinopathy changes in these CKD Patients.

Materials and Methods

This study was conducted in the Dialysis Unit, nephrology department of Govt. Villupuram Medical College Hospital from May 2022 – Jan 2023. This was a cross sectional, non-interventional, hospital based study. Total 108 patients having end stage chronic kidney disease on maintenance haemodialysis were examined.

Results

Datas are collected as ratio and proportions on the prevalence of diabetic retinopathy in chronic kidney disease patients undergoing dialysis. Of the 108 screened among 359 patients, 48/108(44%) were found to be Normal. Diabetic retinopathy seen in 46 of 108 screened, Hypertensive Retinopathy in 9 pts, Glaucoma in 2% of patients, Cataracts, BRVO and others seen in (3%).

Conclusion Data shows that severe forms of diabetic retinopathy is more linked to long standing history of diabetes causing kidney damage even among those with good glycaemic control. Hence it is advisable to include ophthalmoscopy and fundus evaluation as the screening tool in all CKD patients, so that we can predict the development of diabetic retinopathy and treat them in early stages.

Keywords

Chronic Kidney Disease, Diabetic Retinopathy, Dialysis, Fundoscopy, Panretinal photocoagulation, Intravitreal Bevacizumab injection.

Introduction

Chronic Kidney Disease (CKD) is a general term for heterogeneous disorders affecting kidney structure and function with variable clinical presentations. Diabetes followed by hypertension is the most common cause of chronic kidney disease. Like face is the index of the mind, the eye can be the index to the disease processes in the kidney. India being a developing country and undergoing socioeconomic growth on fast pace is at a higher risk of catering diabetic population owing to their lifestyle with a significant fraction belonging to the urban population. Hence, this study explores the increased incidence of diabetic retinopathy (DR) in CKD patients leading to vision threatening complications. In countries like India, where there is no nationwide DR screening program and DR screening is more opportunistic, it enabled for timely referral to the ophthalmologist for prompt management of STDR in these dialysis patients, who are generally unaware of these preventable blindness due to their general sickness.

Aims & Objectives

To study the prevalence of diabetic retinopathy among CKD patients, who were on hemodialysis treatment at nephrology department. As the eyes are affected along with kidney and heart, we decided to focus on this high-risk patient to screen for diabetic retinopathy and treat early to prevent the patients from becoming blind.

Materials and Methods

This cross-sectional study was conducted in a tertiary care hospital in South India on 108 patients with CKD undergoing renal hemodialysis during the period of May 2022 to January 2023. About 359 patients underwent dialysis treatment at Govt. Villupuram Medical College Nephrology Department from May 2022 to Jan 2023. After finding the suitability as per selection criteria, 108 patients were selected for the study and briefed about the nature of the study, and written informed consent was obtained. Further, descriptive data of the participants, such as name, age, gender, and detailed history regarding the duration of diabetic medicine they are taking for the dialysis and any history of PRP laser and Anti-VEGF Injection, were obtained by interviewing the participants, and clinical examination and necessary investigations were recorded on predesigned and pretested proforma.

For all patients, anterior segment were examined by torch light and visual acuity was tested by Snellen's chart and after getting patient's consent, pupil was dilated by tropicamide eye drops. After one hour of pupil dilatation, fundus photography was taken by our trained optometrists using portable fundus camera.

Inclusion criteria: CKD Patients who were diabetic or diabetic with hypertension on Hemodialysis are included in this study

Exclusion criteria: children under 12 years of age, the patients who are not willing, CKD patients due to other disease, Hazy view of fundus due to cataract or corneal opacity and some other causes are excluded from our study.

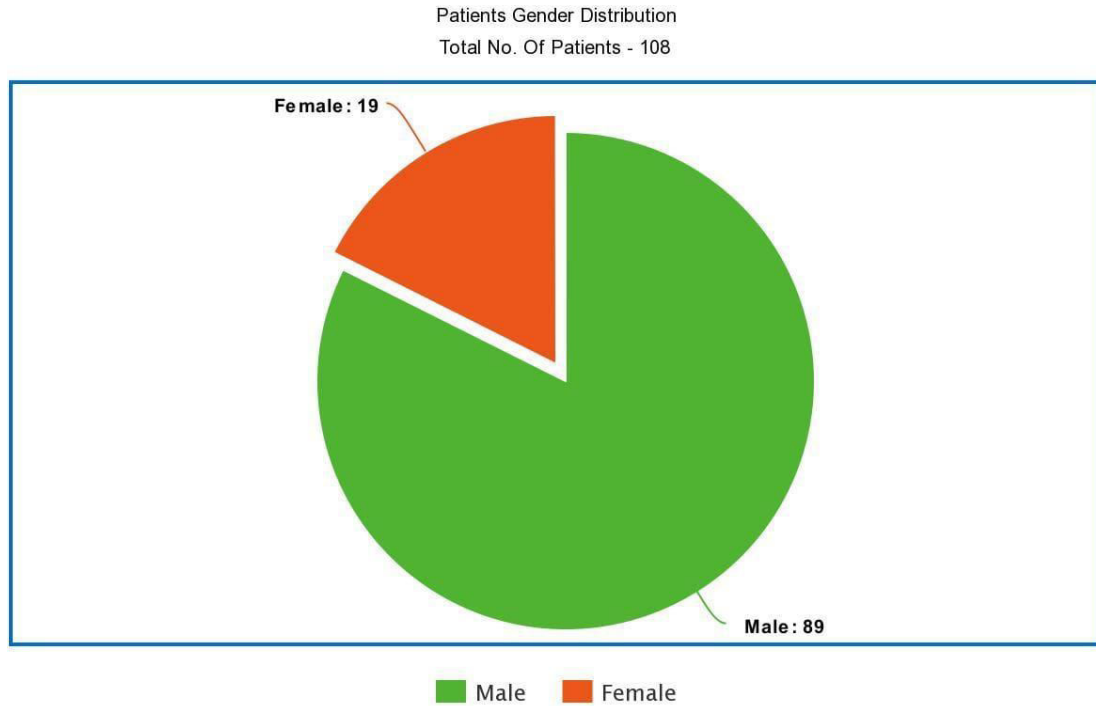
The study was approved by the Institutional Review Boards and ethics committee. Informed Written Consent was obtained from all participants after explaining the procedure of examination in detail.

Results

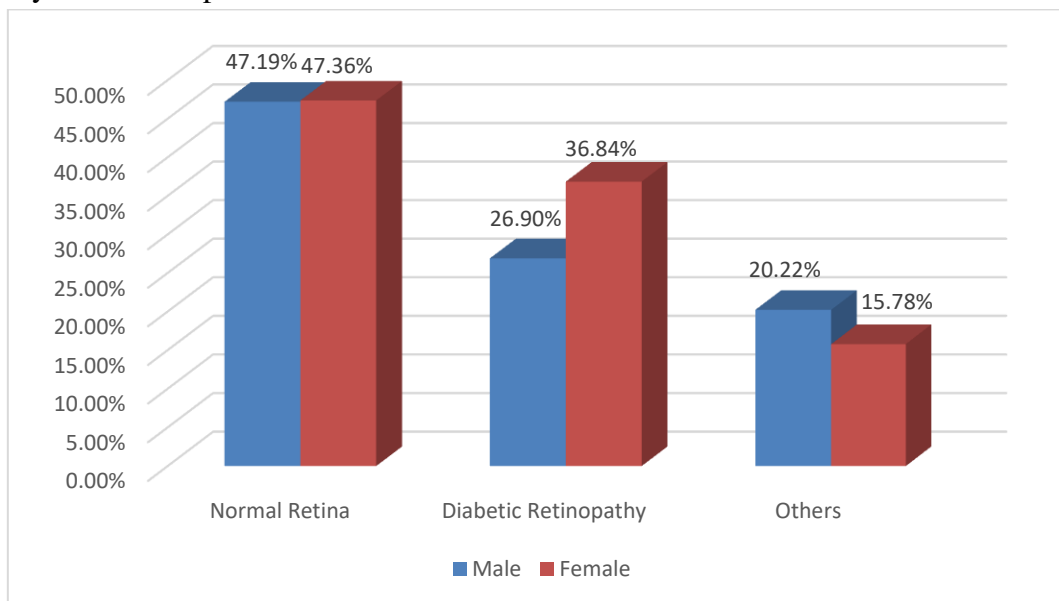
Statistical Analysis Data entered in Microsoft excel and analysed in SPSS version 25.0.0.0. Mean and percentage were used to interpret results of the study. The absolute and relative

frequencies of the qualitative variables, and their mean and standard deviation (or median and interquartile range according to the characteristics of the variable) were calculated.

This study includes Among 359 CKD patients who underwent hemodialysis at Department of Nephrology, Government Villupuram Medical College, Villupuram, 108 individuals met the inclusion criteria. About Fourfifth (82.4 %) of the participants were male and one fifth were (17.6%) female.

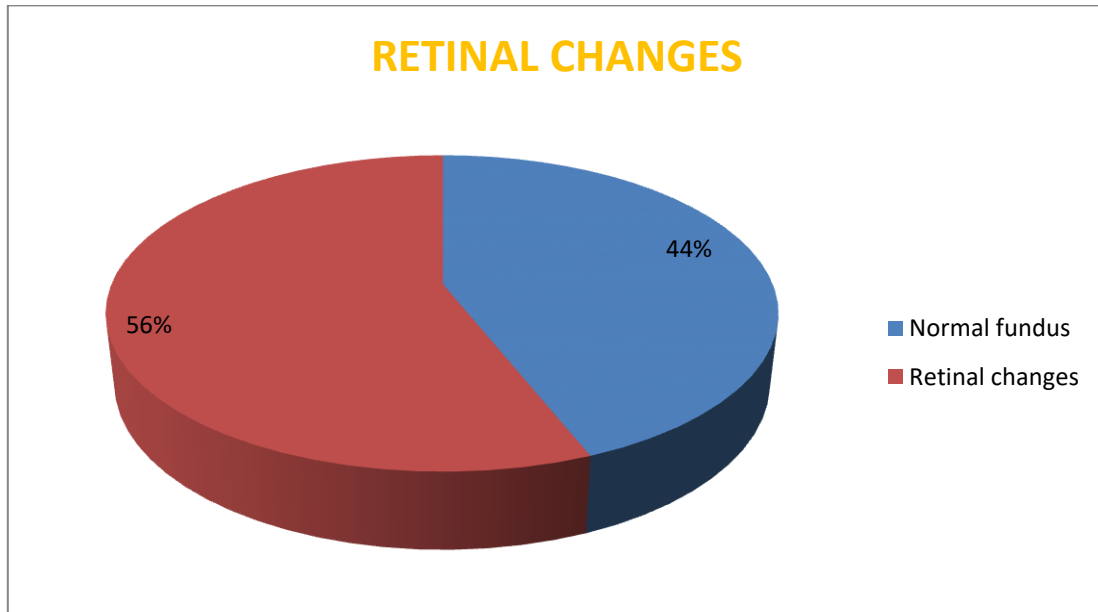


Though there is variation in male-female prevalence of CKD among various studies, their association with Diabetic Retinopathy changes almost correlates with various studies. So sex predominance cannot be considered very significant in view of screening and treating retinopathy and its complications.



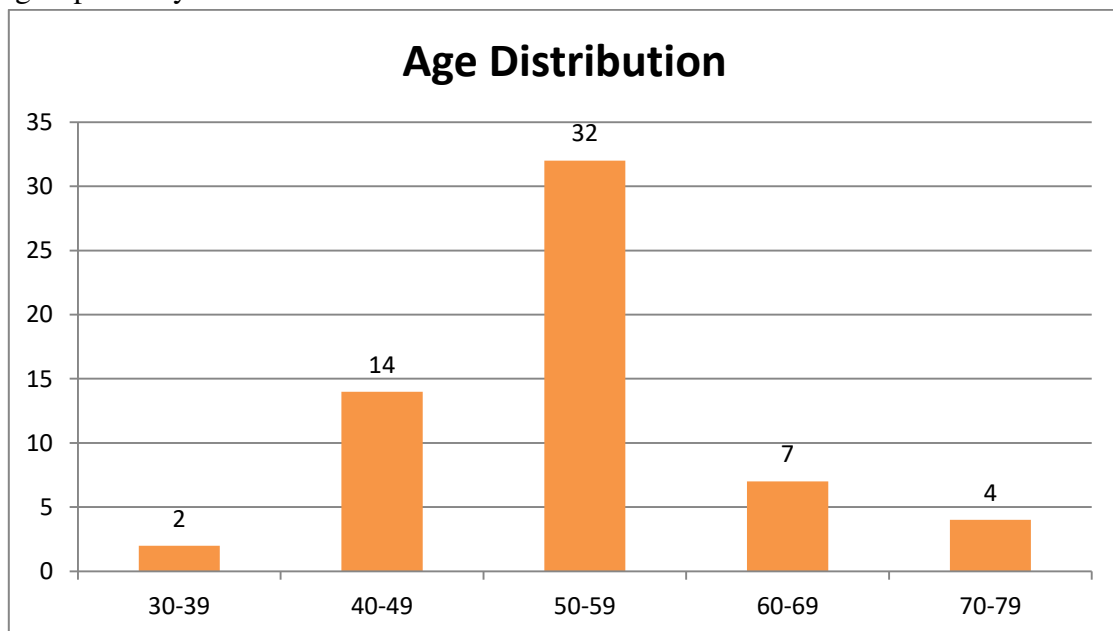
Distribution of retinal changes:

Among the 108 patients screened, retinal changes (ophthalmoscopically visible) were observed in 56% (60) patients and normal fundus were seen in 44% (48 patients). Thus CKD patients are more prone for the retinal microvascular changes.

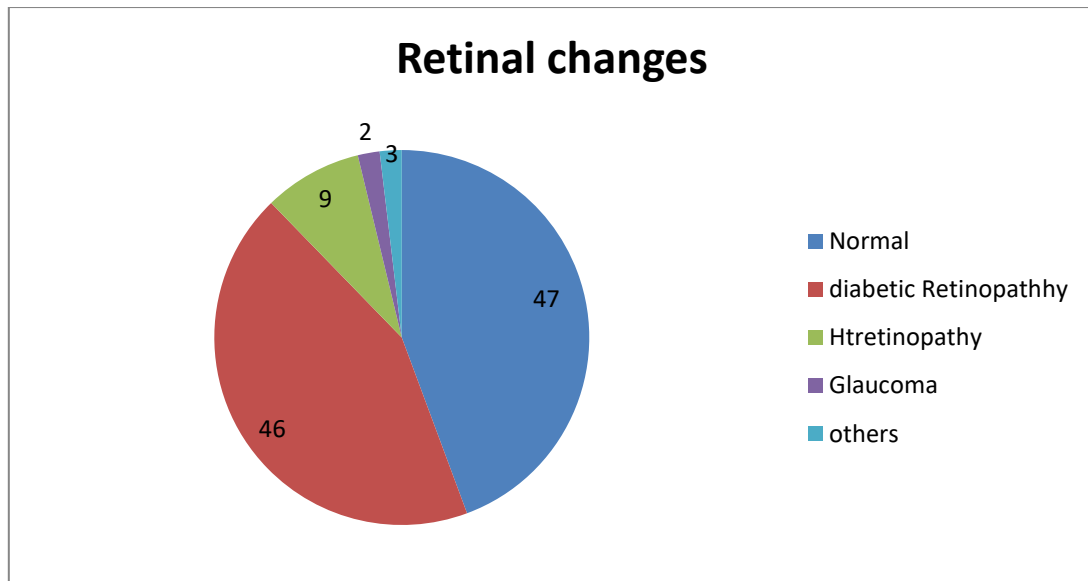


In this study of 108 patients with CKD the retinal changes was higher among the age group of 50-59 years accounting for 54% (32 cases) followed by 23% (14 cases) among 40-49 years. The youngest patient found in our study was 34 years.

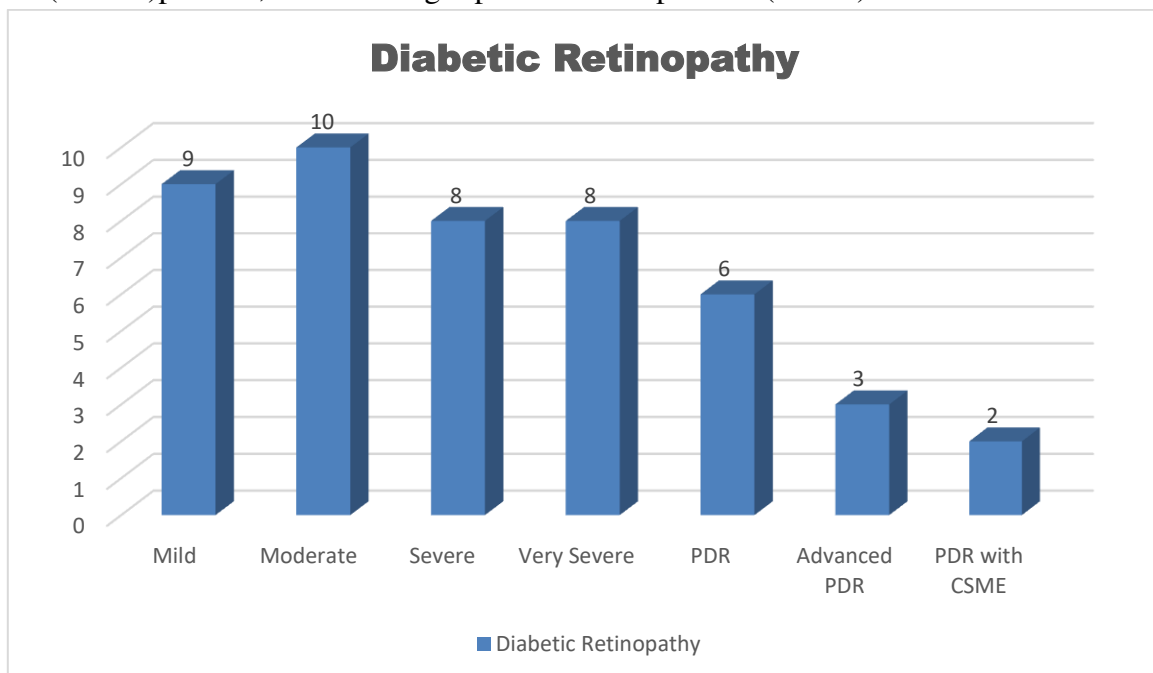
The mean age of the cohort was 59.6 ± 10.2 years and one third of screened patients were in age group of 50 years.



According to our study among the 60 patients, 46 patients had diabetic retinopathy, accounting for 80% of the incidence.



Out of 46 diabetic retinopathy patients mild NPDR changes was seen in 9 patients (19.5%) and moderate NPDR was seen in 10 patients (21.7%), severe NPDR changes were observed in 16 (34.7%) patients, STDR changes present in 11 patients (23.9%) .



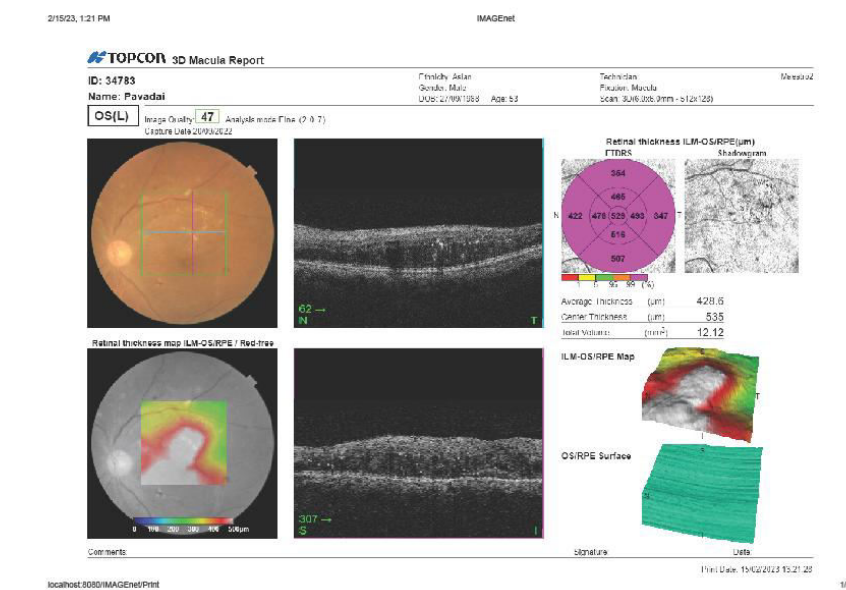
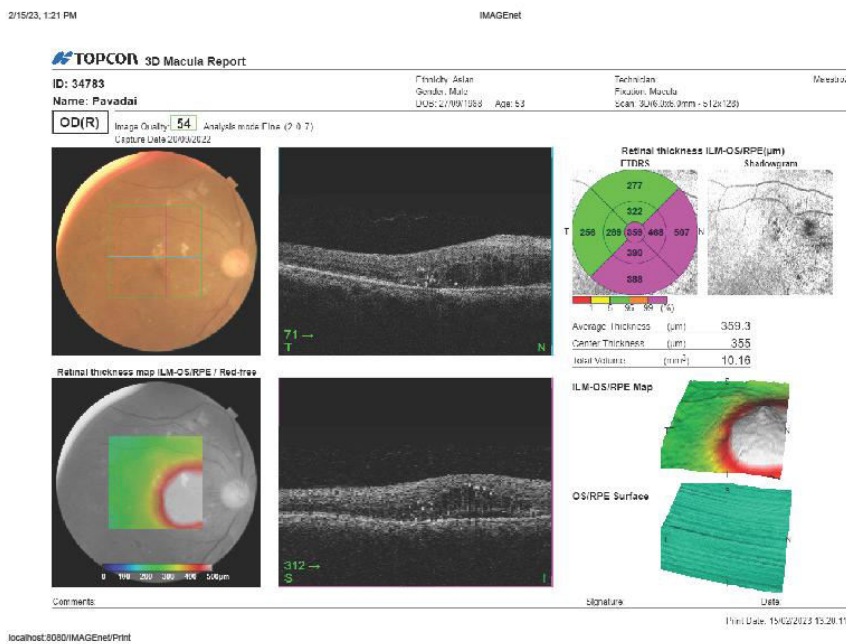
The types of treatment recommended included focal laser, panretinal photocoagulation (PRP), intravitreal injections with anti-vascular endothelial growth factor (anti-VEGF agents), and vitrectomy surgery.

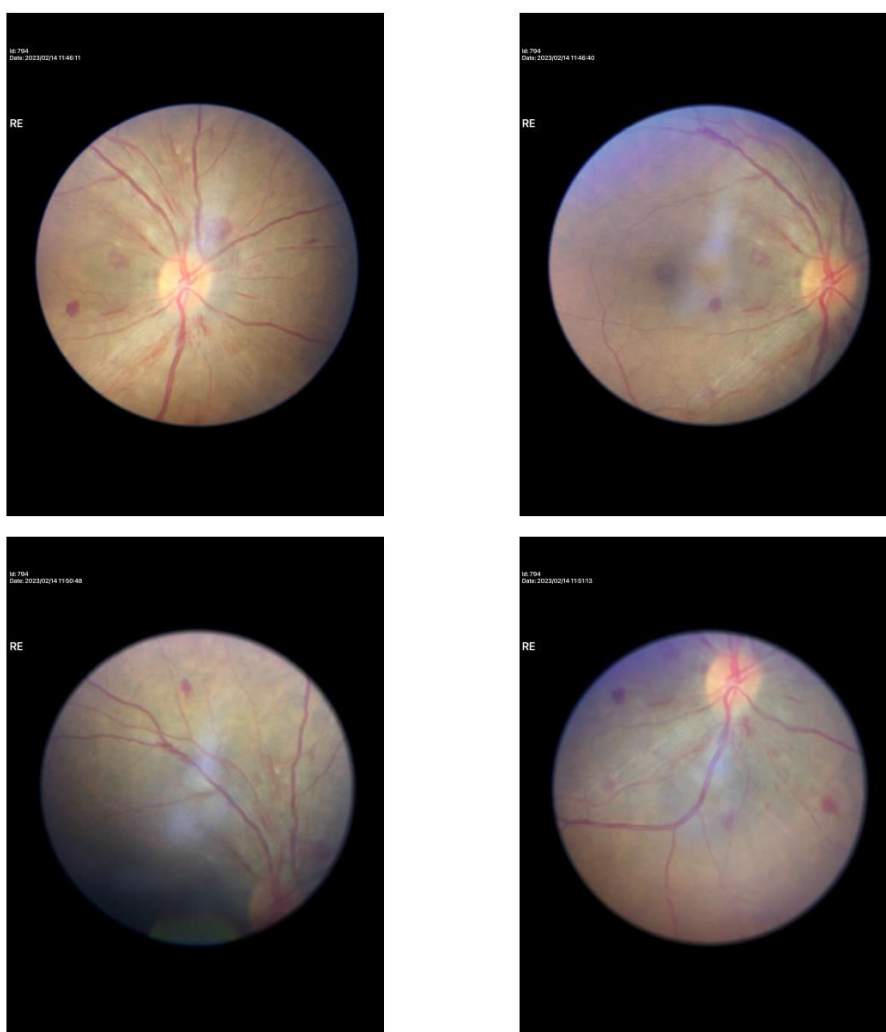
- ❖ Among the 46 diabetic retinopathy patients 14 patients were treated with pan retinal photocoagulation.
- ❖ The central macular thickness was observed in all the patients with diabetic retinopathy changes. Out of 11 patients in STDR 5 patients had a CMT of more than 300mm whom were treated with intravitreal injection Bevacizumab.
- ❖ Out 11 patients in STDR one patient was referred for Vitreoretinal surgeon for the surgical management.

Ophthalmology 2007;114:743–750 © 2007 by the American Academy of Ophthalmology, states that Primary intravitreal bevacizumab at doses of 1.25 to 2.5 mg seem to provide stability or improvement in VA, OCT, and FA in DME at 6 months. Follow-up is still short to make any specific treatment recommendations; however, the results appear promising.

Review of Literature

Evaluation in a multicenter randomized controlled clinical trial with longer follow-up is needed. The association between CKD and DR investigated in a cross sectional, descriptive study conducted in nephrology unit of Tribhuvan university shows diabetic retinopathy was present in 38 out of 43 diabetic cases (88.3%) and hypertensive retinopathy was present in 56 out of 119 (47.1%) and also more severe grades of diabetic retinopathy were detected with increasing severity of the renal diseases by L Bajracharya et al





The multivariate model by mao-meng MD et al indicates that age is a key predictor of CKD. It also shows increased incidence of clinically recognised CKD with diabetes, hypertension, dyslipidaemia and female sex preponderance.

A study on chronic kidney disease in developing countries in south Asia by georgi Abraham et al, shows an annual growth rate of 8% and, Diabetes and hypertension is increasing in srilanka and these patients are finally being treated in dialysis and transplant centres .This study also shows CKD with diabetic retinopathy in 31%, and hypertension in 15% of participants.

A prospective study done by midhila Gopinath et al., with 50 patients with long standing history of Type 2 Diabetes Mellitus (more than 5 years) attending Medicine OPD showing the incidence of diabetic retinopathy in different stages of diabetic nephropathy, CKD stages calculated and analysed with significant with a P value of 0.016.

A kofoed–Enevoldsen et al., studied the association between the incidence of diabetic retinopathy and the development of diabetic nephropathy in 110 Type I (insulin-dependent) diabetic patients. It concluded that development of clinical diabetic nephropathy implies an extremely high risk for developing severe retinopathy

In contrast to our study, G Wolf et al., showed no evidence of diabetic retinopathy in 40% of dialysis-dependent Type 2 diabetics.

pawanpawan et al., observed that The mean age group was 55.86 ± 9.61 years with 47 males and 13 females and Changes in VA and decrease in central subfield macular thickness during follow up visit was statistically significant ($p < 0.05$) in DR and CKD patients.

We observed that renal function might affect the response to IVBI treatment in patients with DME in a retrospective study of 104 treatment-naïve DME patients. In the case of a poor response to initial IVBI treatment for DME in patients with moderate to severe CKD, our study supports switching to the aflibercept or dexamethasone implant Tae Hwan Moon et al.

A 1 year cross-sectional study was conducted Chougule et al., in the department Of ophthalmology at a tertiary care hospital in South India on 50 patients with diabetes mellitus undergoing renal hemodialysis. Male (74%) preponderance was observed, and 50% of the patients had age more than 60 years. Overall ocular changes seen in patients were Diabetic retinopathy (48%), hypertensive retinopathy (12%), and cataract (9%). Proliferative diabetic Retinopathy was the most common (50%) cause of visual impairment. The other causes of visual impairment were cataract (17%), optic Neuropathy (3.84%), maculopathy (9.61%), and retinal Detachment (7.60%). The other causes such as ARMD and vitreous haemorrhage contributed 11.53% as causes of visual impairment.

Several studies have shown that DR severity was significantly associated with reduced kidney function and increased risk of DR in CKD Patients. Although some cross-sectional studies have reported associations between renal function and prevalent DR, there are scarce data about their prevalence in CKD patients undergoing Hemodialysis

Discussion

The Early Treatment of Diabetic Retinopathy Study (ETDRS) fundus photographic grading protocols were used to assess the severity of retinopathy in this patients. For Assessment of Retinopathy in this Hospital based screening programme, fundus photography with portable fundus camera is considered to be the preferred option [19]. AS Optical coherence tomography (OCT) provides important additional information about the retina bringing new insights into morphological changes of the retina in diabetic retinopathy, OCT was taken in willing patients. It produces reliable, reproducible and objective retinal images especially in diabetic macular edema and provides information about vitreoretinal relationships. Photographs are captured from each eye and the severity of DR is categorized according to ETDRS Classification as follows:

- NDPR (Non proliferative diabetic retinopathy)
- PDR (proliferative diabetic retinopathy)
- Diabetic maculopathy
- Advanced diabetic eye disease

Based on ETDRS Classification, the NDPR has been further classified as Mild NDPR, Moderate NDPR, Severe NDPR & Very severe NDPR and CSME (clinically significant macular edema).

Management Recommendations for Patients with Diabetes

Severity of Retinopathy	Presence of Macular Edema	Follow-up (Months)	Panretinal Photocoagulation (Scatter) Laser	Focal and/or Grid Laser*	Intravitreal Anti-VEGF Therapy
Normal or minimal NPDR	No	12	No	No	No
Mild NPDR	No	12	No	No	No
	ME CSME+	4-6 1*	No No	No Sometimes	No Sometimes
Moderate NPDR	No	6-12	No	No	No
	ME CSME+	3-6 1*	No No	No Sometimes	No Sometimes
Severe NPDR	No	4	Sometimes	No	No
	ME CSME+	2-4 1*	Sometimes Sometimes	No Sometimes	No Sometimes
Non-high-risk PDR	No	4	Sometimes	No	No
	ME CSME+	4 1*	Sometimes Sometimes	No Sometimes	No Sometimes
High-risk PDR	No	4	Recommended	No	Considered
	ME CSME+	4 1*	Recommended Recommended	Sometimes Sometimes	Usually Usually

Though strict glycemic and blood pressure control remains the cornerstone in the primary prevention of DR, Pan-retinal, focal retinal laser photocoagulation and intra-vitreous injection of bevacizumab reduces the risk of visual loss in patients with severe DR and macular edema, and the patients were treated as per AIOS guidelines as quoted above.

- Patient with severe NPDR with CSME (clinically significant macular edema) were planned for intra-vitreous injection of bevacizumab (Avastin injection) or PRP laser (pan retinal photo coagulation)
- Patient with moderate NPDR were asked to review after every 6 months.
- Patient with mild NDPR were advised to review after every 1 year.
- 11 patients were found with PDR .
- Even after proper counselling, 16% of patient was not willing to review due to their disability. So screening must be insisted as mandatory to prevent blindness.
- 5 patients were advised for the Avastin injection but only 2 patients were treated, as other patients couldn't understand its significance and refused treatment.

- Many were not willing for further follow up and treatment due to general sickness. They couldn't understand the effect and complications of diabetic retinopathy on future vision, so proper awareness should be created among the high-risk patient by ophthalmologist or other care giving person like physician, staff nurse etc.

Hence Routine Screening, follow-up and management of ocular and retinal disorders in CKD patients with diabetes would be important for earlier and aggressive management of diabetic retinopathy and prevention of vision loss.

Conclusion

Despite the high prevalence and burden of vision impairment among CKD Patients, due to their low socioeconomic status, mental and physical instability, poor compliance, improper care, protein malnutrition, and lack of knowledge do not present for eye screening as a standard practice... Hence this review suggests that all patients with CKD should be encouraged to undergo a complete eye examination, as early referral of patients with diabetic end-stage kidney disease may bring to surface a retinal lesion, where an ophthalmologist's intervention and appropriate management might prevent loss of vision.

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Conflict of interest: Nil

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