

Ocular findings in diabetic patients with chronic kidney disease undergoing haemodialysis: A retrospective hospital based study

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Abstract

Purpose: The aim of this study was to analyse the ocular findings in Diabetics with Chronic Kidney Disease (CKD) on haemodialysis and also to assess the causes of visual impairment in these patients.

Materials and Methods: A retrospective, hospital-based case record analysis of 224 case records of diabetics with CKD on haemodialysis over a period of 6 years was done at a tertiary medical college hospital in South India, where 66 case records (33 eyes) sought for an ophthalmic consultation were studied.

Result: In our study, male: female ratio of diabetics with CKD on haemodialysis was found to be 3:2 with a mean age of 49.33 ± 12.86 years, ranging from 22–75 years. 56.1% of the total eyes had BCVA $<6/18$ and the causes for decreased vision were found to be cataract in 8 eyes (12.1%) followed by maculopathy in 7 eyes (10.6%). 41 eyes (62.1%) had Non-proliferative diabetic retinopathy changes and 2 eyes (3%) had PDR changes. 19 eyes (28.7%) showed hypertensive retinopathy changes. 6 eyes (9.1%) had both diabetic and hypertensive retinopathy changes. 3 eyes (4.5%) had glaucomatous changes.

Conclusion: Our results show that 20 patients (60.6%) out of 33 patients had sought an ophthalmic consultation prior, which means that ocular problems are associated with CKD and hence more awareness and importance of ocular examination, to screen patients for any potential visual threat so that necessary treatment and or advice can be given before they become irreversibly visually impaired.

Keywords: Chronic renal disease, Diabetes, Haemodialysis, Retinopathy, Retrospective.

Introduction

Vision is a complex sensory function that has various components like visual acuity, contrast sensitivity, colour vision and depth perception. Impairment in any one of these is strongly correlated with low quality of life including impairment of daily activities, accident falls that result in hospitalization, functional decline and death sometimes.¹⁻³ CKD affecting 10-16% of the adults in Asia, is considered a global health problem and affects almost all the organs of the body.⁴ Diabetes Mellitus is a condition associated with macro and microvascular complications including retinopathy and nephropathy. There was a strong association found between retinopathy changes and renal function deterioration in the cardiovascular health study, where retinal vessel calibre has been inconsistently associated with renal dysfunction.⁵ Arteriolar narrowing, AV nicking were associated with low eGFR and renal dysfunction. Patients with CKD may be at a higher risk of age-related ocular diseases like cataract, glaucoma, age-related macular degeneration. In patients on haemodialysis, increased intra-ocular pressure and decreased ocular perfusion pressure are found to be the risk factors for development and progression of glaucoma.⁶

Due to a significant rise in the prevalence of diabetes worldwide, there is an increased risk of blindness especially in CKD patients with diabetes. And these patients undergoing haemodialysis are more prone to visual morbidity. Blindness due to proliferative retinopathy or maculopathy is approximately five times more common in diabetic patients with nephropathy compared with normalalbuminuric patients.⁷ Diabetic retinopathy (DR)

tends to deteriorate with falling renal function and in patients in whom no retinal treatment has been given before.^{8,9} Ocular condition is also an indicator of the metabolic control of the disease process.¹⁰

Aim

Aim of the study is to study the ocular findings in diabetic patients with CKD on haemodialysis.

Materials and Methods

This is a retrospective hospital-based analysis of records at a tertiary medical College hospital in south India. All diabetic patients with CKD who underwent haemodialysis in the previous six years were included in the study. Cases of acute reversible renal failure irrespective of cause/ aetiology were excluded from the study. The study protocol was approved by the institutional Ethics Committee. The data collected included the age, gender, duration of diabetes, hypertension, any other co morbidities, the duration of dialysis, serum creatinine, blood urea levels were noted. Ophthalmology consultation if sought for by the physician was noted. In cases where ophthalmology consultation was done, the ocular complaints and details of ocular examination were noted. Data was entered in the Microsoft excel sheet. Statistical analysis was done using the SPSS software version 20.

Results

A total number of 224 cases of diabetics with CKD on hemodialysis were analyzed. Out of these 224 cases studies, Ophthalmology consultation was sought for 33 cases (66

eyes). Mean age of total patients was 49.33, with a standard deviation of 12.86 (ranging from 22–75 years) and the male: female ratio was 6:4. Only 20 patients (60.6%) had a history of previous eye check-up.

Table 1: General characteristics of the subjects

Characteristics	Number of Subjects	% of total subjects
Age (years)		
<20 years	0	0%
20 – 40 years	6	18.2%
40 – 60 years	21	63.6%
60 – 80 years	6	18.2%
Gender		
Males	20	60.6%
Females	13	39.4%

Table 2: Co-morbidities in the subjects

Duration of Diabetes	Number of Subjects	% of total subjects
Newly diagnosed – 5 years	11	33.3%
6 to 10 years	9	27.3%
>10 years	13	39.4%
Hypertension		
Present	29	87.9%
Absent	4	12.1%
Duration of hypertension		
Newly diagnosed – 5 years	16	48.5%
6 to 10 years	4	12.1%
>10 years	9	27.3%
Other co-morbidities		
Present	8	24.2%
Absent	25	75.5%
Duration of Haemodialysis		
Newly initiated	9	27.3%
<6 months	19	57.6%
6 months – 1 year	3	9.1%
1 – 5 years	2	6.1%

Hypertension was noted in 87.9% of the study subjects of which 48.5% of the subjects were newly diagnosed. 39.4% of the subjects had diabetes for more than 10 years of duration. Majority of the study subjects had undergone haemodialysis for less than 6 months of duration.

Table 3: Ocular complaints in the subjects

Ocular complaints	Number of Subjects	% of total subjects
Present	26	87.9%
Absent	7	21.2%
Consulted an Ophthalmologist before		
Yes	20	60.6%
No	13	39.4%

87.9% of the study subjects had ocular complaints. 60.6% of the total study subjects had consulted an ophthalmologist earlier for their complaints.

Table 4: BCVA in the eyes among the subjects

Visual acuity (WHO criteria)	Number of eyes	% of total eyes
Good vision $\geq 6/18$	37	56.1%
Impaired vision 6/60 – 6/24	23	34.8%
Legally blind <6/60	6	9.1%
Total eyes	66	100%

According to WHO criteria, 37 eyes (56.1%) had good vision, 23 eyes (34.8%) were visually impaired and 6 eyes (9.1%) had vision <6/60.

Table 5: Anterior and posterior segment findings in the eyes among the subjects

Anterior segment findings	Number of eyes	% of total eyes
Clear lens	18	27.3%
Pre-senile cataract	1	1.5%
Senile cataract	45	68.1%
Other types of cataract	2	3%
Posterior segment findings		
Total eyes with DR changes	43	65.2%
Mild NPDR	15	22.7%
Moderate NPDR	18	27.3%
Severe NPDR	8	12.1%
PDR	2	3%
Maculopathy (DM/HTN)	7	10.6%
Glaucoma	3	4.5%
Myopic fundus	2	3%
Hazy media	3	4.5%

Significant anterior segment findings include cataractous changes in 45 eyes (68.1%). Significant posterior segment findings include Moderate NPDR changes in 18 eyes (27.3%), Mild NPDR in 15 eyes (22.7%), PDR in 2 eyes (3%), Maculopathy in 7 eyes (10.6%), Glaucomatous changes in 3 eyes (4.5%).

Table 6: Causes of visual impairment (BCVA <6/18) in diabetics with CKD on haemodialysis

Causes of Visual Impairment	Number of eyes	% of the total eyes
Significant Cataract	8	12.1%
PDR	2	4.5%
Maculopathy	7	10.6%
Glaucoma	3	4.5%

The common cause of visual impairment was cataract, 8 out of 66 eyes (8%), Maculopathy in 7(10.6%), glaucoma in 3(4.5%), PDR in 2 eyes (4.5%).

Discussion

CKD is a slow, progressive deterioration of the kidney function over a period of several years that can occur in any age group.¹¹ Worldwide, CKD is a major health problem with a prevalence of 15% among the Indian population. It affects eyes equally as the other organs of the body. As the patients are asymptomatic till the end- stages of CKD, ocular findings are missed out and ocular screening is important in these patients for an early detection and treatment for preventing further loss of vision.

Overall, male: female ratio in diabetic CKD patients who underwent haemodialysis was found to be 3:2, that was similar to other studies. Mean age of the 66 study participants was 49.33 ± 12.86 years with range of 22 – 75 years. In a study done by Mathew RG et al, the mean age of the patients was 54.7 ± 12.1 years and range of 22-85 years.^{12,13}

In our study only 20 patients (60.6%) out of 33 patients had sought an ophthalmic consultation prior, which means that ocular problems are associated with CKD and hence more awareness should be created about the ocular complications of diabetes in CKD patients.

In our study, 56.1% of the total eyes had a vision $<6/18$, according to WHO criteria. 45 eyes (68.1%) had cataract changes and 18 eyes (27.3%) had clear lens. 8 eyes (12.1%) with significant cataract as the anterior segment finding was responsible for major cause of reduction in visual acuity. In a study done by Wang et al, 33.08% with CKD had cataract.¹⁴ Hilton et al, found 46.2% CKD patients undergoing haemodialysis had cataract.¹⁵ The low prevalence rate of cataract among the study subjects in our study might be due to a less number of sample size.

In our study cataract with 8 eyes (12.1%) and maculopathy with 7 eyes (10.6%) were the causes of visual impairment which was consistent with a study done by Thulasidas M et al, where 32 eyes (11.1%) had cataract and 39 eyes (13.5%) maculopathy.¹⁶ In a study by Bhajracharya et al, 23% of the eye had impaired vision of which maculopathy and cataract were the main causes followed by proliferative diabetic retinopathy.¹⁷

In our study, Diabetic retinopathy changes were seen in 43 eyes (65.2%). In a study by Sheen et al, 26.6% of the CKD patients have diabetic retinopathy changes. Mathew RG et al, found 28.5% of the total patients had diabetic retinopathy changes and 53.7% of diabetics had DR changes.¹²

In our study, 41 eyes (62.1%) had Non-proliferative diabetic retinopathy changes and 2 eyes (3%) had PDR changes. 70% of the diabetics with CKD had NPDR changes in a study done by Sandhu et al.¹⁸ Mathew RG et al, found 50.9% had NPDR changes in their study.¹² The prevalence of DR is high in our study due to the fact that all the included patients were diabetics. Hence, regular ocular

examination including the posterior segment findings should be done in CKD patients to prevent visual morbidity.

In our study, hypertensive retinopathy changes were seen in 19 eyes (28.7%). In a study done by Mathew RG et al, 39% had Hypertensive retinopathy changes.¹² Bhajracharya et al, found that 47.1% had hypertensive retinopathy changes in CKD patients.¹⁷

Both Hypertensive and Diabetic Retinopathy changes were seen in 6 eyes (9.1%). Mathew RG et al, found 13.5% patients had both diabetic and hypertensive retinopathy changes in 13.5%.¹²

The strength of the study was that only diabetics with CKD were selected but the drawback was a very small sample size. Other limitations are that this study was a retrospective study and conducted in a tertiary care center. A prospective study as a community-based study will bring out the true prevalence rate of ocular complications in diabetics with CKD on haemodialysis.

Conclusion

In diabetics with CKD undergoing haemodialysis, early intervention during the initial stages of the disease with adequate control of diabetes, hypertension and regular ocular check-up with detailed documentation and close follow-ups is the key for the reduction of ocular disease prevalence and low vision burden.

It is intended to highlight the awareness and importance of ocular examination, to screen patients for any potential visual threat so that necessary treatment and or advice can be given before they become irreversibly visually impaired.

Conflict of Interest: None.

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