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

Alapati Naga Yasaswini¹, Vidya Hegde², Rashmi Jain³, Anupama Bappal⁴, Rashmi S⁵

¹Junior Resident, ²Professor, ³Associate Professor, ⁴Assistant Professor, Dept. of Ophthalmology, Yenepoya Medical College Hospital, Mangalore, Karnataka, India

*Corresponding Author: Rashmi Jain
Email: drrashjain@gmail.com

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 intraocular 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 normoalbuminuric 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%               |

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 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%                |

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 4: BCVA in the eyes among the subjects

| Visual acuity (WHO criteria) | Number of eyes | % of total eyes |
|------------------------------|----------------|-----------------|
| Good vision ≥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%            |

Significant anterior segment findings include cataractous changes in 45 eyes (68.1%). Significant posterior segment findings include Moderate NPDR in 28 eyes (43.7%), PDR in 2 eyes (3%), Glaucoma in 7 eyes (10.6%), and other causes 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. 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.

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. Hilton et al, found 46.2% CKD patients undergoing haemodialysis had cataract. 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. 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. 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.

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. Mathew RG et al, found 50.9% had NPDR changes in their study. 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. Bhajracharya et al, found that 47.1% had hypertensive retinopathy changes in CKD patients.

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%.

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.

References

1. Vrabec R, Vatavuk Z, Pavlovic D, Sesar A, Cala S, Mandic K, Bucan K. Ocular findings in patients with Chronic Renal Failure undergoing haemodialysis. Collegium Antropologicum 2005;29(1):95-8.
2. Ghasemi H, Afshar R, Zerafatjou N, Abdi S, Davati A, Askari MK, Shabpiray H. Impact of haemodialysis on visual parameters in patients with end-stage renal disease. Iran journal of kidney diseases. 2012;6(6):457.
3. Lord SR, Dayhew J. Visual risk factors for falls in older people. Am J Geriatr Soc 2001;49:508-15.
4. Gao B, Zhu L, Pan Y, Yang S, Zhang L. Ocular fundus pathology and chronic kidney disease in a Chinese population. BMC Nephrol 2011;12:62.
5. Klein R, Marino EK, Kuller LH, Polak JF, Tracy RP, Gottdiener JS, Burke GL, Hubbard LD, Boineau R. The relation of atherosclerotic cardiovascular disease to retinopathy in people with diabetes in the Cardiovascular Health Study. Br J Ophthalmol 2002;86(1):84-90.
6. Wong CW, Lamoureux EL, Cheng CY, Cheung GC, Tai ES, Wong TY et al. Increased burden of vision impairment and eye diseases in persons with chronic kidney diseases - a population-based study. E Bio Med 2016;5:193-7.
7. Schrier RW, Gottschalk CW. Diseases of the kidney Vol. 1, II, III. 5th ed. Boston-Toronto-London: Little Brown & Comp 1993:364,1563, 2180-1.
8. Albert DM, Jacobiec FA, Azar DT, Gragoudas ES, Power SM, Robinson NL. Principles and Practice of Ophthalmology Vol II. 2nd ed. Philadelphia: WB Saunders 2000;1900-13.
9. Leys AM. Eye fundus of the diabetic patient with nephropathy and hypertensive retinopathy. Macroangiopathic complications. Bull Soc Belge Ophtalmol 1995;256:49-59.
10. Janka HU, Ziegler AG, Valsania P, Warram JH, Krolewski AS. Impact of blood pressure on diabetic retinopathy. Diabetes Metabol 1989;15:333-7.
11. Jiang L, Liang Y, Qiu B. Prevalence of Chronic Kidney disease in a rural Chinese adult population: The Handan Eye Study. Nephron Clin Pract 2010;114(4):295-302.
12. Mathew RG, Abraham G, Prashanth HR. Ocular Changes in Chronic Kidney disease. Scient Open Access J Ophthalmol Vis Neurosci 2016;1(2):1-5.
13. Manjula B, Khadari M H, Velampalli S. A clinical study of Retinal changes in Chronic Renal Failure Patients. IOSR J Dent Med Sci 2017;16(4):31-4.
14. Wang TJ, Wu CK, Hu CC, Keller JJ, Lin HC. Increased risk of co-morbid eye disease in patients with chronic renal failure: a population-based study. Ophthalmic Epidemiol 2012;19(3):137-43.
15. Hilton A, Harrison J, Lamb A, Petrie J, Hardie I. Ocular complications in Hemodialysis and Renal Transplant Patients. Aust J Ophthalmol 1982;10(4):247-53.
16. Thulasidas M, Amin H. Ocular Evaluation in patients with Chronic Kidney Disease- A Hospital Based Study. Open Access J Ophthalm 2018;3(5):1-9.
17. Bhajracharya L, Shah DN, Raut KB, Koirala S. Ocular evaluation in patients with Chronic Renal Failure – A Hospital Based Study. Nepal Med Coll J 2008;10(4):209-4.
18. Sandhu JS, Kansal S, Bajwa GS, Sandhu J. Ocular changes in renal allograft recipients and patients of chronic kidney disease. Saudi J Kidney Dis Transpl 2014;25(6):1285-9.

How to cite this article: Alapati Naga Yasaswini, Vidya Hegde, Rashmi Jain, Anupama Bappal, Rashmi S. Ocular findings in diabetic patients with chronic kidney disease undergoing haemodialysis: A retrospective hospital based study. Indian J Clin Exp Ophthalmol 2019;5(2):211-4.