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ORIGINAL ARTICLE

Frequency of Eye Changes in Patients of Chronic Kidney Disease

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ABSTRACT

Background: One important and often ignored aspect in treatment of patients of chronic kidney disease (CKD) is screening for eye disorders. There is a need for continuous monitoring and examination, with cooperation from an ophthalmologist, of all dialysis patients with increased risk of vision loss like patients with coexisting diabetes and hypertension. It is not very common to find vision disorders or other anatomical defects of eye which can be directly attributed to kidney diseases. In general, eye disease is found as incidental finding during screening of patients with kidney diseases.

Aim: To evaluate the frequency of eye changes in patients of chronic kidney disease.

Methods: It was a Cross-sectional descriptive study performed in Department of Medicine and Nephrology Indoor, Fatima Memorial Hospital Lahore. The total duration was 6 months after approval of the project i.e. from 26-12-2019 to 25-06-2020. All patients admitted in the hospital under department of Medicine or Nephrology from 13 to 70 years of age diagnosed as a case of Chronic Kidney Disease as per the Glomerular Filtration Rate (GFR) were recruited for the study.

Results: Total cases were 213, 44(20.65%) were from the age group of 13-40, 169(79.35%) were in 41-70 years age group, mean±Standard deviation(SD)was 47.82±8.55years, 114(53.52%) male, 99(46.48%) females, 129(60.56%) had diabetes mellitus, 141(66.19%) had hypertension, mean duration of disease was calculated as 14.23±4.99 months, 41(19.24%) retinal disorder, 79(37.08%) had cataract while 93(43.66%) had no eye disorder, out of 41 cases of retinal disorders, 17(41.46%) had hypertensive retinopathy while 24(58.53%) had diabetic retinopathy.

Conclusion: There is a high prevalence of cataract and retinal disorders in chronic kidney disease patients. However our study was limited to single center, more extensive studies with a bigger sample size are needed to validate our results.

Keywords: Chronic kidney disease, Eye disorders, Retinal disorders, Cataract, End stage renal diseases

INTRODUCTION

Chronic kidney disease (CKD) is characterized as kidney damage or glomerular filtration rate (GFR) beneath 60 ml/min per 1.73 m^2 of body surface area maintained for a period of 3 months or more regardless of the cause.[1] GFR can be estimated by different equations using serum creatinine levels of the patient. There are various equations to calculate the same, one of these is modification of diet in renal disease (MDRD) which has been accepted widely for our local population[2].

CKD is among the major health issues at a global level. Around 10% of the population of the world suffer from this disease.[3] The most common cause of CKD in our population include diabetes mellitus and hypertension.[4]As a result we see diabetic and hypertensive retinopathy in our CKD patients proving the fact that this entity is associated with substantial morbidity including eye disease.[5]Wang TJ et al, completed a study in CKD patients where they noticed a higher prevalence of eye disorders including retinal disorders 16.62% and cataract 33.08%[6]. Another study performed among 1904 CKD patients in the U.S.A demonstrated that 45% of patients with CKD had some ocular fundus pathology[7].

CKD has become an emerging health problem at global level. Its complications, including loss of renal functionality eventually needing renal replacement therapy and premature death. A global strategy is need of the hour in order to limit prevalence of CKD. Universal guidelines and protocols must be formulated with global consensus after careful research studies in order to make up for the deficiencies in healthcare for kidney diseases.

The best tool to measure and asses the kidney function is glomerular filtration rate (GFR). A decline in this indicates worsening renal functioning.[8]Various factors must be taken in to account while measuring the GFR. This includes gender, age of the patient, race, body mass index (BMI) among others.

The rationale of our study was an attempt to see the ocular condition and extent of undiagnosed retinopathy in patients who have already been diagnosed with CKD. The main purpose is to highlight the importance of fundus examination, to screen patients and provide necessary

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education and treatment in order to avoid irreversible visual damage. Every patient who is diagnosed with CKD must have a fundoscopy examination so that timely advice can be given to them. There have been very few local studies conducted in this regard in our region so keeping in mind the racial and geographical differences we have with other countries of the world, it is needed to perform such study in our settings.

The objective of the study was to evaluate the frequency of eye changes in patients of chronic kidney disease

OPERATIONAL DEFINITONS

Chronic kidney disease: Patients with glomerular filtration rate (GFR) less than 60 ml/min per 1.73 meter^2 of body surface area for equal to or more than 3 months were labeled to haveChronic kidney disease (CKD) irrespective of the cause. GFR was calculated at time of presentation through M.D.R.D equation

Cataract: Patients were labeled to have Cataract if they had clouding of the normal clear eye lens. It was assessed by fundoscopy.

Retinal disorders: Patients were labeled to have retinal disorder if any of these present

Hypertensive retinopathy: It was accessed by fundoscopy. Grading done as Keith–Wagener–Barker (KWB) grading).Grade I or higher were labeled to have hypertensive retinopathy

Diabetic retinopathy: It was accessed by fundoscopy. It was labeled if anyone of these present

METHODOLOGY

This cross-sectional descriptive study was conducted in the Medicine and Nephrology Indoor, Fatima Memorial Hospital Lahore from 26-12-2019 to 25-06-2020. Sample size was 213. It was calculated with 95 % confidence level and 5% margin of error and taking percentage of prevalence of eye changes i.e. 16.62% in patients of chronic kidney disease. Sampling technique used was non-probability / consecutive sampling

Inclusion criteria: Patients with chronic kidney disease between ages 13 to 70 years of either sex were included in the study

Exclusion criteria:

- All patients having congenital eye diseases derived by history e.g. congenitally absent eye or retinoblastoma or congenital cataract
- Patients with pre-existing eye disease before the development of chronic kidney disease (CKD) derived by history.
- Patients of Acute kidney injury (AKI) with deranged renal functions i.e. estimated (eGFR)<60ml/ min/1.73meter^2 for less than three months.

Data collection procedure: All patients admitted in medical and nephrology wards from 13 to 70 years of age diagnosed as a case of Chronic Kidney Disease on the basis of glomerular Filtration Rate (GFR) were recruited for the study. Estimated GFR was calculated by Modification of Diet in Renal Disease (MDRD) equation.

In this cross-sectional study, all CKD patients underwent assessments for eye disorders through fundoscopy and presence of cataract or retinal disorders were noted as per operational definitions and all the findings were confirmed by two senior Ophthalmologists of the hospital who had vast experience in dealing such kind of patients to avoid any bias. All the data was entered on a structured Performa.

Data analysis procedure: Statistical Package for the Social Sciences SPSS version 24.0 was used for data entry and analysis. Frequency and percentages were calculated for the qualitative variables like gender, hypertensive retinopathy and diabetic retinopathy, cataract. Quantitative variables of the study like age was expressed as Mean ± SD. Data was stratified for age, gender, duration of CKD and eGFR. Post stratification chi square test was applied. p-value<0.05 was considered as significant.

RESULTS

A total of 213 cases were included in the study. Study of age distribution demonstrated that 44(20.65%) were between 13-40 years of age while 169(79.35%) patients were between 41-70 years of age, mean±sd was calculated as 47.82±8.55 years (Table 1).

Table 1: Distribution of patients by Age and Gender, Frequency of Diabetes Mellitus, Hypertension, Duration of the disease, Eye disorders and retinal disorders (n=213)

Age(in years)	**n**	**%age**
13-40	44	20.65
41-70	169	79.35
Total	213	100
Mean±SD	47.82±8.55	
Gender		
Male	114	53.52
Female	99	46.48
Total	213	100
Diabetes mellitus		
Yes	129	60.56
No	84	39.44
Total	213	100
Hypertension		
Yes	141	66.19
No	72	33.81
Total	213	100
Duration of disease (CKD*)		
1-12 months	56	26.29
>12 months	157	73.70
Total	213	100
Eye disorder		
Retinal disorder	41	19.24
Cataract	79	37.08
No disorder	93	43.66
Total	213	100
Retinal disorder		
Hypertensive retinopathy	17	41.46
Diabetic retinopathy	24	58.53
Total	41	100

*Chronic kidney disease

Gender distribution showed that 114(53.52%) were male and 99(46.48%) were females (Table 1). 129(60.56%) were diabetics while 82(38.87%) had no history of diabetes (Table 1). 141(66.19%) patients had hypertension while 70(36.32%) had no findings of hypertension (Table 1). Duration of chronic kidney disease was calculated as 56(26.29%) between 1-12 months and 157(73.70%) had

>12 months of duration of disease, mean±standard deviation (SD) was calculated as 24.57±6.49 months (Table 1). Frequency of eye disorders in chronic kidney disease was calculated as 41(19.24%) retinal disorder, 79(37.08%) had cataract while 93(43.66%) had no eye disorder (Table 1). Frequency of retinal disorders in chronic kidney disease was recorded in 41 cases and out of these cases 17(41.46%) had hypertensive retinopathy while 24(58.53%) had diabetic retinopathy (Table 1).

Stratification for frequency of eye disorder with regards to age, gender, duration of CKD, diabetes mellitus and hypertension was recorded in Table 2.

Table-2: Frequency of eye disorders in chronic kidney disease (n=213)

	Eye disorder		P value
	Yes	No	
Age in years			
13-40	08	36	0.92
41-70	112	57	
Gender			
Male	64	50	0.00
Female	56	43	
Duration of CKD			
1-12 months	41	15	0.82
>12 months	79	78	
Diabetes mellitus			
Yes	87	42	0.000
No	33	51	
Hypertension			
Yes	83	58	0.23
No	37	35	

DISCUSSION

One important and often ignored aspect in care of chronic kidney disease (CKD) patients is screening for eye disorders. There is a need for continuous monitoring and examination, with cooperation from an ophthalmologist, of all dialysis patients with increased risk of vision loss like patients with coexisting diabetes and hypertension. It is not very common to find vision disorders or other anatomical defects of eye which can be directly attributed to kidney diseases. Diagnosis of a coexisting eye disorder in patients of kidney disease is generally incidental.

The reason behind this study was to assess the prevalence of eye related disorderslinked with CKD. With this study, we aim to focus on importance of regular eye examination in order to screen for disorders in a timely fashion and avoid irreversible complications which can eventually lead to permanent vision loss. Early detection can help in prevention of various complications.

In our study, out of 213 cases, 44(20.65%) were of the age group 13-40 while 169(79.35%) were between 41-70 years, mean±sd was found to be 47.82±8.55 years, 11453.52%) male, 99(46.48%) females, 129(60.56%) had diabetes mellitus, 141(66.19%) had hypertension, mean duration of disease was calculated as 14.23±4.99 months, 41(19.24%) retinal disorder, 79(37.08%) had cataract while 93(43.66%) had no eye disorder, out of 41 cases of retinal disorders, 46(41.17%) had hypertensive retinopathy while 24(58.53%) had diabetic retinopathy.

A study was conducted in United States recently, where 1904 patients with CKD wereincluded in the study. The frequency of ocular pathology was 45%[6], supporting the need for screening examinations of fundus in these kind of patients. Another study done by Wang TJ et al also demonstrated similar results, where retinal disorders were found in 16.62% and cataract was prevalent in 33.08% of patients with CKD. These findings are similar to results of our study[7].

Patients with history of Diabetes and who are on hemodialysis due to end stage renal disease frequently have ophthalmic complications. One of the leading cause of vision loss in adults is Diabetes. For such patients, assistance from a qualified ophthalmologist with experience in photocoagulation is required for proper management of such cases. 75 percent of patients of CKD V in the USA need laser therapy for associated retinal disorders caused by Diabetes Mellitus by the time dialysis is initiated. Glaucoma is another entity which should be kept in mind for diabetic patients undergoing dialysis.There is a strong association between retinopathy and nephropathy secondary to diabetes. The correlation is estimated to be nearly 100 percent. So in case patient has normal fundoscopy examination, we should look for some cause other than diabetes for renal insufficiency.

There have been concerns that use of Heparin during hemodialysis may cause hemorrhagic complications in patients of diabetic retinopathy. However several studies have proved this is not the case. In order to evaluate this risk, a comparison of patients receiving hemodialysis with those receiving peritoneal dialysis can be helpful. One such study in this regard, where 112 patients of Diabetes Mellitus were included in the study, 63% of them underwent hemodialysis while 37 percent received peritoneal dialysis. Loss of vision in two groups did not depend on the method of dialysis used or type of diabetes of the patient[10]. Generally, if hypertension is well controlled, there is no additional risk caused by anticoagulation done by heparin in patients on hemodialysis.[11]Hypertension in itself can impose additional hazard for progression of diabetic retinopathy if I is not optimized, can lead to complications such as vitreous hemorrhage or retinal hemorrhage[12-13].

As per our knowledge and literature review, no similar study has been carried out in our settings. Due to widely diverse population characteristics and traits, further such studies are recommended involving population from different geographical areas within the country to determine frequency of eye related disorders in patients of CKD.

CONCLUSION

There is a high prevalence of cataract and retinal disorders in patients with CKD. However our study was limited to single center, further multicenter extensive studies with a bigger sample size are needed to validate our results.

REFERENCES

1. Li YH, Sheu WH, Lee IT. Effects of retinopathy and chronic kidney disease on long-term mortality in type 2 diabetic inpatients with normal urinary albumin or protein: a

retrospective cohort study. BMJ open. 2018 Jul 1;8(7): 021655.
2. Rouf RS, Ashrafuzzaman SM, Latif ZA. Association of Retinopathy with Chronic Kidney Disease in Diabetes Mellitus. BIRDEM Medical Journal. 2018 Sep 10;8(3):210-4.
3. Pavkov ME, Harding JL, Chou CF, Saaddine JB. Prevalence of Diabetic Retinopathy and Associated Mortality Among Diabetic Adults With and Without Chronic Kidney Disease. American journal of ophthalmology. 2019 Feb 1;198:200-8.
4. Lin HT, Zheng CM, Wu YC, Chang YH, Chen JT, Liang CM, Chang TJ, Zheng JQ, Tai MC, Lin YF. Diabetic Retinopathy as a Risk Factor for Chronic Kidney Disease Progression: A Multicenter Case–Control Study in Taiwan. Nutrients. 2019 Mar;11(3):509.
5. Rodríguez-Poncelas A, Mundet-Tudurí X, Miravet-Jiménez S, Casellas A, Barrot-De la Puente JF, Franch-Nadal J, Coll-de Tuero G. Chronic kidney disease and diabetic retinopathy in patients with type 2 diabetes. PLoS One. 2016 Feb 17;11(2):e0149448.
6. Ng WY, Teo BW, Tai ES, Sethi S, Lamoureux E, Tien Yin W, Sabanayagam C. Cystatin C, chronic kidney disease and retinopathy in adults without diabetes. European journal of preventive cardiology. 2016 Sep;23(13):1413-20.
7. Wong CW, Lamoureux EL, Cheng CY, Cheung GC, Tai ES, Wong TY, Sabanayagam C. Increased burden of vision impairment and eye diseases in persons with chronic kidney disease—a population-based study. EBioMedicine. 2016 Mar 1;5:193-7.
8. Stevens LA, Coresh J, Greene T, Levey AS. Assessing kidney function--measured and estimated glomerular filtration rate. N Engl J Med 2006;354:24-73.
9. Penno G, Solini A, Bonora E, Orsi E, Fondelli C, Zerbini G, Trevisan R, Vedovato M, Cavalot F, Laviola L, Nicolucci A. Defining the contribution of chronic kidney disease to all-cause mortality in patients with type 2 diabetes: the Renal Insufficiency And Cardiovascular Events (RIACE) Italian Multicenter Study. Actadiabetologica. 2018 Jun 1:1-0.
10. Mattix HJ, Hsu CY, Shaykevich S, Curhan G. Use of the albumin/creatinine ratio to detect microalbuminuria: implications of sex and race. J Am SocNephrol 2002;13:1034.
11. Wouters OJ, O'donoghue DJ, Ritchie J, Kanavos PG, Narva AS. Early chronic kidney disease: diagnosis, management and models of care. Nature Reviews Nephrology. 2015 Aug;11(8):491.
12. Garcia Sanchez JJ, Xu M, Sörstadius E, Darlington O, McEwan P, Lande S, Pearson-Stuttard J, Webber L. P0773 Estimating the burden of Chronic Kidney Disease (CKD) in the UK: Comparison of two health economic policy analysis methods. Nephrology Dialysis Transplantation. 2020 Jun 1;35(Supplement_3):gfaa142-P0773.
13. Cho A, de Carvalho JR, Tanaka AJ, Jauregui R, Levi SR, Bassuk AG, Mahajan VB, Tsang SH. Fundoscopy-directed genetic testing to re-evaluate negative whole exome sequencing results. Orphanet Journal of Rare Diseases. 2020 Dec 1;15(1):32.