Original Article

POSTERIOR SEGMENT FINDINGS IN PATIENTS ON HEMODIALYSIS IN A TERTIARY INSTITUTION IN NIGERIA

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ABSTRACT

Aim: To determine the posterior segment findings of chronic kidney disease in adult patients receiving hemodialysis at a tertiary hospital.

Methods: This is a hospital based descriptive, cross-sectional study the posterior segment findings of chronic kidney disease in adult patients on dialysis in the University of Benin Teaching Hospital, Benin City, Nigeria.

Results: A total of 96 patients who had hemodialysis at the centre were studied. Their age range was between 19 and 75 with a mean of 44.2+13.6 years. Males were about 2/3rd of (65%) of the study population and females just over a third (34.4%), giving a male to female ratio of 1.9:1. 10.4% had normal posterior segment findings. The common posterior segment findings were hypertensive retinopathy 33.3%, macular oedema 20.8% and diabetic retinopathy 11.5%.

Conclusion: The prevalence of visual impairment among patients receiving hemodialysis in the University of Benin Teaching Hospital in Nigeria, was 28.1%, while blindness was 5.2%. The main causes of visual impairment were diabetic retinopathy, hypertensive retinopathy and macular oedema.

Keywords: chronic kidney disease, hemodialysis, posterior segment findings, Nigeria...

INTRODUCTION

Richard Bright was the first to associate renal disease with blindness.[1] The ocular manifestations of chronic kidney disease can be an indicator of control of the disease and posterior segment findings can monitor the effect of treatment.[2] Ocular morbidity in patients receiving hemodialysis can occur from any one or more of the following: uraemia, metabolic imbalance, hypertension, anaemia, underlying cause of chronic kidney disease (CKD) e.g diabetis mellitus, hypertension, dialysis.

CKD tends to occur when the glomerular filtration rate (GFR) is permanently decreased

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in association with the loss of functional nephron population.[3] It is characterized by unrelenting progression towards end stage renal disease (ESRD).

In developed countries, the commonest causes of CKD are diabetis mellitus and hypertension[4]. In Nigeria, the leading causes are chronic glomerulonephritis, hypertension and diabetis.[4]

Renal replacement therapy which can be in the form of dialysis or kidney transplantation is the only known treatment for persons in the end stage of CKD if survival is the goal[4]. In Nigeria, hemodialysis is the main stay of management readily available.[4]

A lot has been documented on the adverse outcomes of CKD in terms of heart disease, stroke and death in Africans. However, little attention (if any) is being allotted to the ocular complications.

It affects the eye by causing hypertensive retinopathy, ischaemic optic neuropathy, central retinal vein occlusion and cortical blindness.[2] There are also some ocular abnormalities that are partly due to the uraemic state of the patient and anaemia.[5]

Systemic diseases such as diabetis mellitus or autoimmune diseases leading to renal failure can also cause eye disorders as part of their clinical manifestations.[6] Many of these patients also suffer from chronic eye diseases such as diabetic retinopathy and glaucoma. The interaction of these diseases with hemodialysis procedure can lead to worsening of vison.[7]

METHODS

This study was a three-month hospital based descriptive, cross-sectional study of the posterior segment findings of CKD in adult patients receiving hemodialysis in a tertiary health institution in Nigeria.

The study population was obtained from the register of the renal unit of the hospital and the persons receiving hemodialysis were enrolled in the study. A structured interviewer administered questionnaire specially designed for the study was used for data collection.

Ethical clearance was obtained from the ethics and research committee of the University of Benin Teaching Hospital, Benin City, Edo state, Nigeria.

RESULTS

A total of 96 patients who had hemodialysis at U.B.T.H were studied. Table 1 shows the socio-demographic characteristics of the respondents. Their ages ranged between 19 and 75, with a mean of 44.2±13.36 years. Males accounted for almost two thirds (65.6%) of the study population, and females just over a third (34.4%), giving a male to female ratio of 1.9:1 A large proportion were married (71.9%). Civil servants accounted for 30.2%, self-employed 25% and artisans 22.9%. Fifteen patients (15.6%) had no formal education, fourteen (12.6%) had primary education, thirty-three (34.4%) had secondary education, while thirty-four (35.4%) had tertiary education.

Table 2 shows the aetiology of CKD of the respondents. The most common cause of CKD was chronic glomerulonephritis (36.5%), followed by hypertensive nephrosclerosis (21.9%), HIV associated nephropathy (14.6%) and diabetic nephropathy (14.6%).
Patients in the 'others' category had systemic lupus erythematosus (2), sickle cell disease

TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Variable	Frequency	Percentage
Age		
18-29	13	13.5
30-44	38	39.6
45-59	30	31.3
>60	15	15.6
Total	**96**	**100.0**
Sex		
Male	63	65.6
Female	33	34.4
Total	**96**	**100.0**
Marital status		
Single	22	22.9
Married	69	71.9
Widow/ widower	5	5.2
Total	**96**	**100.0**
Occupation		
Civil servant	29	30.2
Self employed	24	25.0
Unemployed	9	9.4
Student	5	5.2
Retired	7	7.3
Artisan	22	22.9
Total	**96**	**100.0**
Level of education		
None	15	15.6
Primary	14	14.6
Secondary	33	34.4
Tertiary	34	35.4
Total	**96**	**100.0**

TABLE 2: AETIOLOGY OF CHRONIC KIDNEY DISEASE

Aetiology	Frequency	Percent
Chronic glomerulonephritis	35	36.5
HIVAN	14	14.6
Hypertensive nephrosclerosis	21	21.9
Diabetic nephropathy	14	14.6
Obstructive uropathy	5	5.2
Others	7	7.2
Total **96**		**100.0**

TABLE 3: OCULAR MANIFESTATIONS OF RESPONDENTS*

Variable	Frequency	Percent(patients)
Posterior segment		
Normal	10	10.4
Hypertensive retinopathy	42	43.8
Diabetic retinopathy	11	11.5
Diffuse retinal oedema	4	4.2
Retinal hemorrhage	2	2.1
Suspicious disc	5	5.2
Glaucoma	2	2.1
NAION	1	1.0
Age related macular degeneration	8	8.3
Macular edema	20	20.8
Macular hole	1	1.0
Clinically significant macular oedema	5	5.2

Multiple responses.

(2), multiple myeloma (1), and toxic nephropathy (2).

Table 3 shows findings on ocular examination of the respondents. Only 9.4% had normal anterior segment and 10.4% had normal posterior segment. The most common related ocular findings in the anterior segment were Pallor (84.4%), red eyes (19.8%) and corneo-conjunctival calcification (16.7%). In the posterior segment, hypertensive retinopathy accounted for about a third (33.3%), macular oedema (20.8%) and diabetic retinopathy (11.5%). Others were Age related macular degeneration (8.3%), clinically significant

macular oedema (5.2%), suspicious disc (5.2%), and diffuse retinal oedema (4.2%).

TABLE 4: CAUSES OF VISUAL IMPAIRMENT

Causes of visual impairment	No of cases	% of total no of cases
Hypertensive retinopathy		
Grade III	3	9.4
Grade IV	5	15.6
Macular oedema	8	25.0
Diabetic retinopathy		
Moderate non proliferative	3	9.4
Proliferative	3	9.4
Clinically significant macular edema	5	15.6
Diffuse retinal oedema	4	12.5
Grade V calcification	1	3.1
Total	**32**	**100**

Table 4 shows the causes of visual impairment of respondents. The major causes of visual impairment were macular oedema (25%), followed by grade IV hypertensive retinopathy (15.6%) and clinically significant macular oedema (15.6%). Diffuse retinal oedema was responsible for 12.5%, followed by diabetic retinopathy (moderate non-proliferative and proliferative) and grade III hypertensive retinopathy (9.4% each). Macular oedema and clinically significant macular oedema (maculopathy) were responsible for 40.6% of visual impairment. Diabetic retinopathy (moderate non-proliferative proliferative and clinically significant macular oedema) was responsible for 34.4% of visual impairment, while hypertensive retinopathy was responsible for 25% of visual impairment. Grade V corneo-conjunctival calcification was the only anterior segment cause of visual impairment.

TABLE 5: PREVALENCE OF VISUAL IMPAIRMENT AMONG RESPONDENTS

Visual acuity	Frequency	Percent
Normal vision	64	66.7
Moderate VI	26	27.1
Severe VI	1	1.0
Blindness 3	5	5.2
Total	**96**	**100.0**

VI= Visual impairment
Moderate VI= <6/18 – 6/60
Severe VI= <6/60 – 3/60
Blindness 3= < 3/60- 1/60

According to the WHO definition for visual impairment 27.1% of the patients had moderate visual impairment, 1% had severe visual impairment, while 5.2% were blind. The prevalence of visual impairment and blindness was 28.1% and 5.2% respectively

DISCUSSION

In this study, the mean age of patients is comparable to findings seen in another study done in the same hospital of all patients with CKD by Oviasu et al.[8] Similar findings have been documented across the country and other developing countries[9,10,11,12,13] However, in developed countries the mean age of patients with CKD is higher.[9,13,14]

The preponderance of males compared to females in this study (1.9:1) is like findings by other authors.[8,11] Globally males are more affected by CKD[10,11] It has also been implied that in sub-Saharan African homes, males are more valued than their female counterparts and so, they are more likely to benefit from the scarce family resources.[11] Also, in this

part of the world, males are more financially independent.

The leading cause of CKD in this study is CGN (36.5%), followed by hypertensive nephrosclerosis and then HIVAN and diabetic retinopathy. The high prevalence of infection/infestation (like malaria, schistosomiasis, filariasis, hepatitis and mycobacterium leprae) especially in childhood leading to CGN has been proposed as the cause for the relatively younger patients with CKD in Nigeria and other developing countries.[9,11,15]

Hypertensive retinopathy of various grades was documented in 43.8% of patients. Prevalence documented by other authors vary. Some are comparable to the prevalence in this study (47.1% and 45.6% respectively), while one is lower (25%).[2,16,17] Yet another author reported a higher prevalence (68%) of all hypertensive vascular changes.[9] The prevalence and severity of hypertensive retinopathy increases with the severity of the disease.[2,16] Differences in compliance to medication and hemodialysis could be responsible for this variation. Macular oedema in non-diabetics was not specifically mentioned in other studies. It is possible that it was documented as part of hypertensive vascular changes or maculopathy. Three patients who were not diabetic and did not have obvious hypertensive vascular changes had macular oedema. Fluid overload from underdialysis, focal vascular permeability and choroidopathy could be responsible. Diffuse retinal oedema was found in 4 patients who were having infrequent sessions of hemodialysis (<1 session/week). Associated findings in these patients were blurring of vision, lid oedema resulting in mild mechanical ptosis and massive anarsaca. This suggests that excessive fluid accumulation due to inadequate hemodialysis is an important factor in the development of diffuse retinal oedema in a patient on hemodialysis. Diffuse retinal oedema has been suggested to be a sign of coexistent severe diabetic nephropathy in diabetic patients.[19]

Diabetic retinopathy contributed 11.5%, and clinically significant macular oedema 5.2% (as defined by the ETDRS study guidelines) of the posterior segment findings. There were fourteen diabetic patients in this study, only two had normal posterior segment findings. Hence the prevalence of diabetic retinopathy among diabetics was 85.7%, which is similar to findings by other authors.[2,18] In the USA the odds of developing retinopathy in a diabetic with CKD was high[16]. This study agrees with earlier findings that diabetic nephropathy increases the progression of diabetic retinopathy.[2,19] Some studies have found reduction in macular thickness with hemodialysis, while another study did not record any statistically significant reduction.[20-24] This study cannot comment on the effect or none of hemodialysis on clinically significant macular oedema, since objective methods like fluorescien angiography or optical coherence tomography was not used in this assessment. All the cases of diabetic retinopathy were detected for the first time. This shows the importance of ocular examination in patients with CKD.[2]

The major causes of visual impairment in this study were macula oedema, followed by hypertensive retinopathy (grade III and IV) and the.n clinically significant macular oedema. Grade III and IV hypertensive retinopathy is an indication of bad prognosis, and this should alert the physician to more aggressive management.[2] Maculopathy was

responsible for 40.6% of visual impairment. This is similar to a study done in Nepal, where maculopathy was the most important cause of visual impairment.[2] Diabetic complications were responsible for 34.4% of visual impairment. Diabetic retinopathy is invariably present in cases of diabetic nephropathy and becomes more severe as the disease progresses.[2] Optimal management requires interdisciplinary collaboration and adequate knowledge of the ophthalmological problems.[25] Early detection and treatment would help to prevent visual loss in this group of patients. Interventions for diabetic retinopathy and maculopathy, have been found to be successful in patients on hemodialysis.[21,26] In the Nepal study, cataract was the next most common cause of visual impairment (after maculopathy) followed by proliferative diabetic retinopathy.[1] In this study, cataract was not a cause of visual impairment. This is in keeping with findings by another author that renal function has no significant effect on the incidence of cataract of any type.[27]

The prevalence of visual impairment in this study was 28.1%, 27.1% were in the moderate visual impairment category, 1% were severe. The prevalence of blindness was 5.2%. This is slightly higher than what was reported by other authors.[2,18] This could be because in the first study, patients were drawn from all grades of CKD[1]. This study was conducted among patients with end stage disease, undergoing hemodialysis. Ocular problems have been associated with advancing renal disease.[2] In the second study, (among patients on hemodialysis) some patients had had interventions such as argon laser photocoagulation for diabetic retinopathy.[18]

Visual loss is a possibility for a patient with CKD on hemodialysis. This can have great implications in the life of the patient and the economy of the country. Serial ocular examinations should be carried out and patients should be educated on the risks of visual loss. This is to ensure that patients are more vigilant and report ocular symptoms early so that necessary interventions can be instituted, where possible. Treatment should be multidisciplinary and individualized, to ensure improved outcomes and quality of life.

In conclusion, the prevalence of visual impairment among patients receiving HD in the University of Benin Teaching Hospital was 28.1%, while blindness was 5.2%%. The most common posterior segment finding was hypertensive retinopathy (43.8%). The main causes of visual impairment were diabetic retinopathy, hypertensive retinopathy and macular oedema.

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