

Visual Impairment Among Patients with Chronic Kidney Disease Undergoing Haemodialysis in a Tertiary Health Institution in Southern Nigeria

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Received: February 29, 2020; **Published:** March 17, 2020

Abstract

Aim: To determine the prevalence and the degree of visual impairment in patients with Chronic Kidney Disease (CKD) undergoing haemodialysis in University of Port Harcourt Teaching Hospital, Nigeria.

Methodology: This was a hospital-based cross-sectional study. Patients attending the nephrology clinic of the University of Port Harcourt Teaching Hospital; diagnosed with chronic renal failure and undergoing haemodialysis were enrolled into the study after obtaining their informed and written consents. A comprehensive ocular examination was done and data recorded in Microsoft excel sheets and later analysed using SPSS version 25. Frequency was presented in percentages. Mean and standard deviations were calculated for descriptive and comparative purposes. Statistical significance was tested using the chi-square test. P-value < 0.05 was taken as statistically significant.

Results: A total of 170 eyes of 85 persons were examined in this study. A total of 55 (64.6%) males were examined. Male to Female ratio was 1.8:1. Mean age of the study participants was 43.5 ± 15.56 and age range 19 to 83 years. Forty-two (49.4%) of study subjects had visual impairment out of which 2.4% (n = 2) were blind.

Conclusion: The burden of visual impairment is high among persons with CKD and are on hemodialysis. Comprehensive ophthalmic evaluation and care would therefore be necessary for patients with CKD in our hospitals.

Keywords: Chronic Kidney Disease; Haemodialysis; Visual Impairment

Introduction

Chronic Kidney Disease (CKD) often presents as a debilitating illness characterized by poor glomerular filtration rate (GFR) of less than 60 mL per minute for three months or more [1]. In adults, common causes of CKD are hypertension and diabetes mellitus [2,3,4] while in children common causes include glomerulonephritis and posterior urethral valves. Analgesics abuse, ingestion of herbs and use of skin bleaching or lightening soaps and creams containing hydroquinone and mercury are also known preventable risk factors commonly seen in Nigeria [5]. Other causes of CKD are polycystic kidney disease, Human Immunodeficiency Virus (HIV) /Acquired Immune Deficiency Syndrome (AIDS), obstructive nephropathy, renal carcinoma, tuberculosis, sickle-cell disease, autoimmune diseases and past episode of acute renal failure [6,7]. Age has been identified as one of the major key predictors of CKD with the prevalence increasing from 4% at age 20 - 39 to 47% at > 70 years in USA [2]. In a hospital-based study in Nigeria, Chronic kidney disease was observed to be responsible for 8-10% of total hospital admissions [8].

Chronic Kidney Disease (CKD) is associated with visual impairment and is a leading cause of blindness [1]. Renal disease was first associated with blindness by Richard Bright, an English physician regarded as one of the pioneers in research of kidney diseases, in 1836 [9]. Ocular morbidity from CKD may be due to the disease-causing renal insufficiency, complications of chronic renal failure (like hypertension, uremia and anaemia) and the effect of haemodialysis [10].

Citation: Elizabeth A Awoyesuku, *et al.* "Visual Impairment Among Patients with Chronic Kidney Disease Undergoing Haemodialysis in a Tertiary Health Institution in Southern Nigeria". *EC Ophthalmology* 11.4 (2020): 37-44.

High level of serum phosphate has been identified as the cause of the precipitation of calcium pyrophosphate on the cornea and conjunctiva thereby causing conjunctival injection (red eyes of uremia) and conjunctival-corneal calcification [11,12]. When advanced, calcification of the corneal manifests as band keratopathy and can therefore cause severe visual impairment [13]. Dry eye has also been reported and it is due to the reduction of the conjunctival goblet cell and the associated squamous metaplasia of the conjunctiva [14-17].

This study aims to evaluate the prevalence and the degree of visual impairment among patients with chronic kidney disease undergoing haemodialysis in the University of Port Harcourt Teaching Hospital.

Materials and Methods

This was a hospital-based cross-sectional study. All consenting adult patients diagnosed with chronic renal failure and were attending the nephrology/haemodialysis clinic of the University of Port Harcourt Teaching Hospital between March 2013 and October 2013 were enrolled into the study. A comprehensive ocular examination was done and relevant socio-demographic data were obtained from their medical case files. Data were recorded in Microsoft excel sheets and later analysed using SPSS version 25 (Statistical Package for Social Sciences for Windows, version 25.0; SPSS, Chicago, IL, USA). Frequency was presented in percentages. Mean and standard deviations were calculated for descriptive and comparative purposes. Statistical significance was tested using the chi-square test. P-value < 0.05 was taken as statistically significant.

Working definitions: The World Health Organization definition for Visual impairment was adopted and used in this study. Visual impairment and blindness: categorized using WHO definition [18].

Visual status	Category	Presenting visual acuity in the better eye
Normal vision	0	6/6 - 6/18
Moderate visual impairment	1	< 6/18 - 6/60
Severe visual impairment	2	< 6/60 - 3/60
Blindness	3	< 3/60 - 1/60
Blindness	4	< 1/60 - Light perception
Blindness	5	No light perception

Table

Results

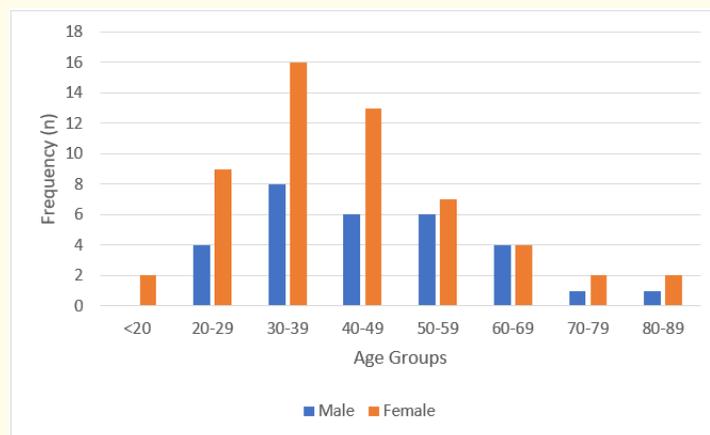


Figure 1: Age and sex distribution of study subjects.

Eighty-five participants participated in this study, 55 (64.6%) were males and 30 (35.4%) females. Male to female ratio was 1.8:1. Their ages ranged from 19 to 83 years with a mean of 43.5 ± 15.56 . The age range 30-39 years was the highest proportion represented (n=24; 28.2%) while those under 20 years had the least representation (n=2; 2.4%).

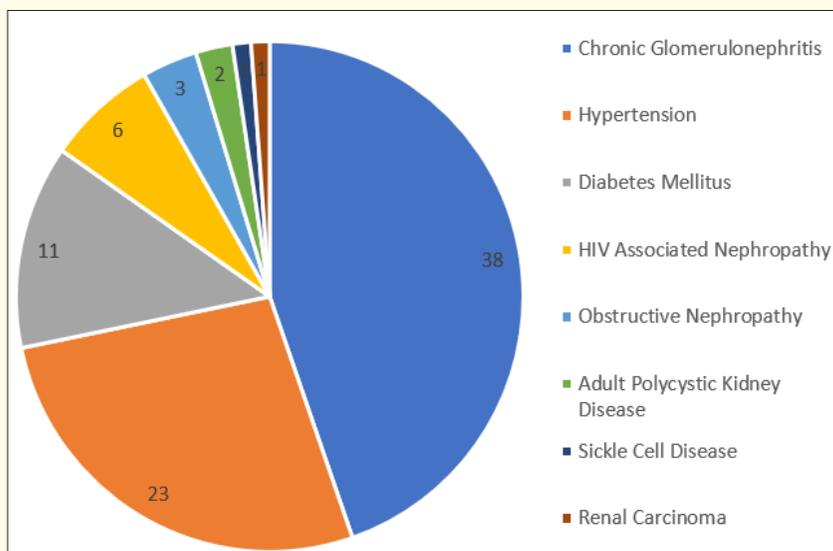


Figure 2: Causes of Chronic kidney disease in 85 subjects.

Figure 2 above shows the causes of chronic kidney disease in the sample population. The commonest cause of renal failure was chronic glomerulonephritis (n = 38; 44.7%) followed by hypertension (n = 23; 27.1%) then diabetes mellitus (n = 11; 12.9%). The least common causes were sickle cell disease and renal carcinoma each contributing 1.2%.

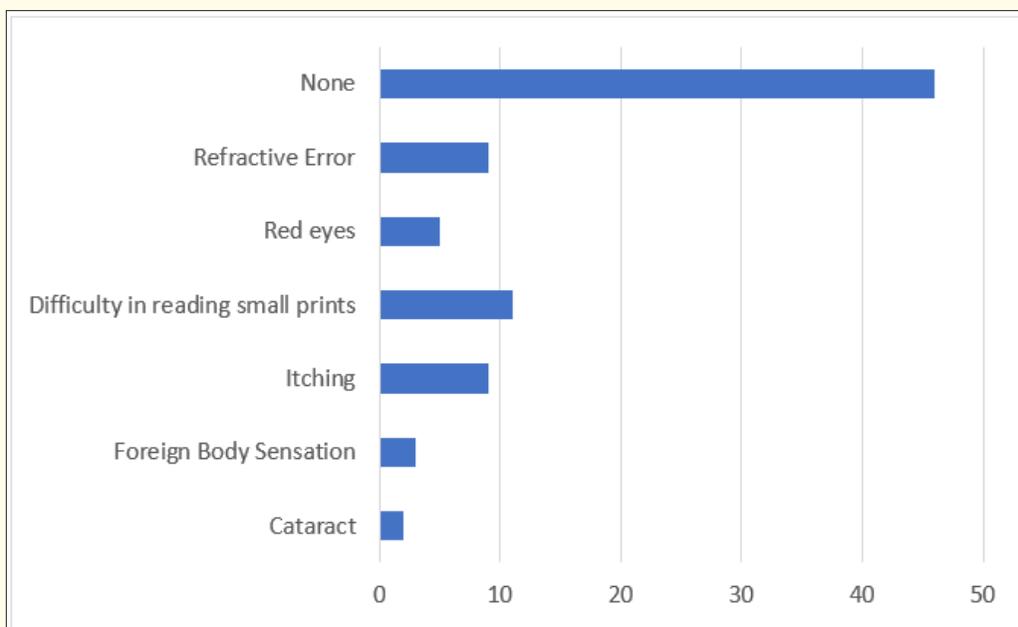


Figure 3: Ocular problems in the study population.

Forty-six of the study population (54.1%) had no previous eye problem prior to developing CRF while about a quarter (n = 20, 23.5%) had refractive error and difficulty in reading near prints (presbyopia).

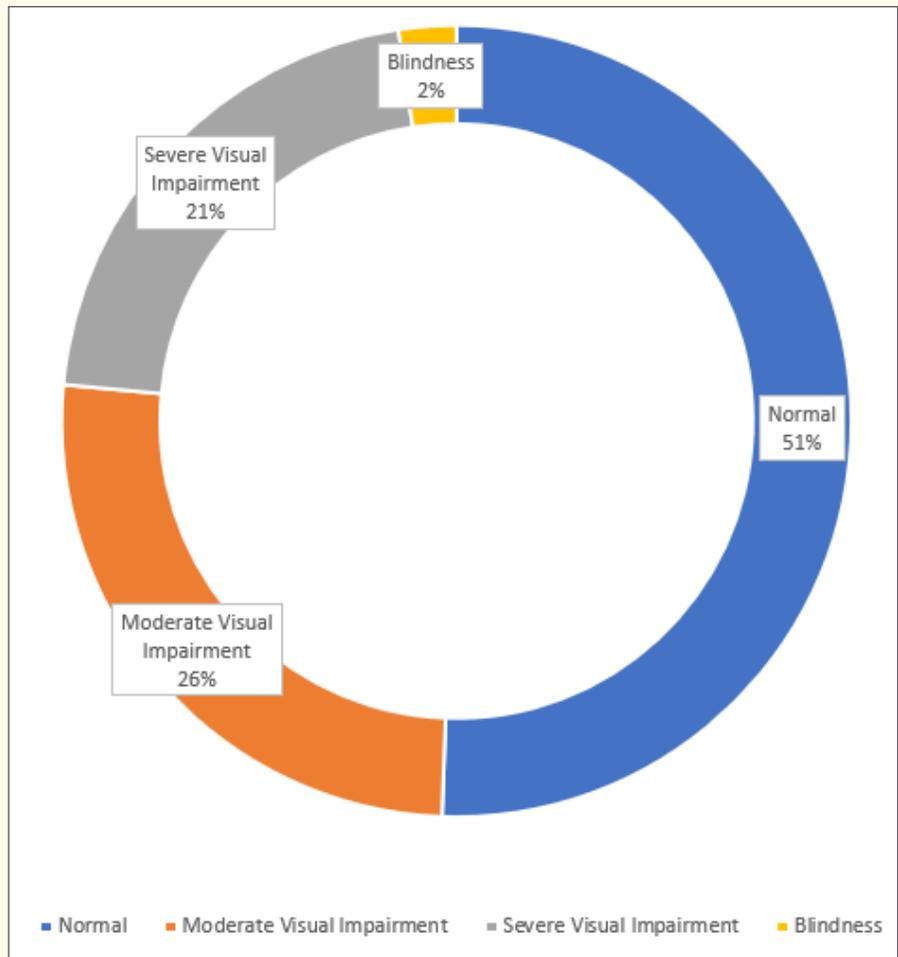


Figure 4: Distribution and degree of visual impairment in study population.

Forty-two (49.5%) study subjects had visual impairment while 2.4% (n = 2) were blind. Approximately half of the study population (n = 43, 50.6%) however had normal vision. The categorization of visual impairment is based on visual acuity in the better eye according to the WHO criteria [18].

Discussion

A total of eighty-five subjects participated in this study, 55 (64.6%) were males and 30 (35.4%) females. Male to female ratio was 1.8:1 (Figure 1). Their ages ranged from 19 to 83 years with a mean of 43.5 ± 15.56 . The age range 30-39 years was the highest proportion represented (n = 24; 28.2%) while those under 20 years had the least representation (n = 2; 2.4%). This result is like findings in various centers in Nigeria [4,6,19-21]. However, in a study in France, Karras, *et al.* noted a mean age of 59.8 ± 14.5 years for patients in various stages of CKD [22]. Similarly, in the United Kingdom a review of general practice computerized data revealed a mean age of 57 ± 18.9 years for all stages of CKD [23]. The predominate age of patients with CKD differs from findings in developed countries. In the industrialized countries the population with CKD is older than in developing countries [24]. Renal function deteriorates with aging [25]. The extent of age-related glomerular filtration rate (GFR) decline, however, differs between ethnic groups (blacks are more affected than whites) and sexes (males more affected than females) [25]. Major causes of CKD tend to occur at a younger age in blacks [26].

The more male preponderance (male to female ratio of 1.8:1 (figure 1) found in this study is like worldwide data and the findings of Alasia, *et al.* Alebiosu, *et al.* Ulasi, *et al.* in their various centers in Nigeria [4,6,20,27]. The reasons for this male preponderance are unknown but in Sub-Saharan Africa, more values are placed on the male sex in the families and may therefore spend more money on them for medical treatment [19]. However, it could also be due to faster rate of deterioration of kidney function in males with some forms of glomerulonephritis and polycystic kidney disease as compared to the female counterparts [20].

The 3 commonest causes of CKD in this study were chronic glomerulonephritis (44.7%), hypertension (27.1%) and diabetes mellitus (12.9%) (Figure 2). This observation corroborates with studies from other hospitals in Nigeria and some developing countries [2,8,28]. A rise in the percentage contribution of diabetes has however been noted in various centers in Africa, which is consistent with the increase in urbanization and improvement in the living standards in these countries. In Western countries however, diabetes and hypertension alone are the leading causes [29]. Glomerular disease is more prevalent in Africa and this is due to the high prevalence of infection-related nephropathies [2]. These infections include infected scabies, plasmodium malaria, schistosomiasis, mycobacterium leprae, filarial worms, toxoplasmosis and streptococcal organisms [20]. The use of skin lightening creams and herbal remedies is also prevalent in our environment [5].

Human immunodeficiency virus-associated nephropathy (HIVAN) is another important cause responsible for 7.1% of cases in this study (Figure 2). This prevalence is lower than that noted from a study carried out in an HIV clinic in Lagos in which 23.5% of 402 patients had signs of early CKD [30]. The difference noted may however be since the patients for the Lagos study were antiretroviral naïve while patients in this study were already on antiretroviral drugs. Early initiation of antiretroviral therapy has been shown to reduce the burden of CKD secondary to HIV infection in a study by Fabian, *et al.* demonstrated by a rapid and sustained resolution of proteinuria within 3 - 6 months of antiretroviral therapy [21]. Two studies in Cote d'Ivoire also had higher HIVAN prevalence of 17% and 15% [31,32]. This may be because Cote d'Ivoire had the highest national HIV prevalence (4.7%) in West Africa during the period of the study. The prevalence for Nigeria was not reported as at 2007 [33].

Other causes in this study were obstructive uropathy (3.5%), polycystic kidney disease (2.3%), renal carcinoma (1.2%) and sickle cell nephropathy (1.2%). This was like findings in other studies worldwide [6,26,34-36].

The commonest eye complaint following diagnosis of CKD was blurring of vision (65.9%) (Figure 3) like the findings of Bajracharya, *et al.* in Nepal [10]. This could be due to changes in the refractive status of the eye [38]. Other eye complaints include lid swelling from fluid retention of renal failure (64.7%), red eyes due to uremic irritation of the conjunctiva (22.3%), presbyopia (5.9%), loss of vision (2.4%) eye pain (2.4%) and flashes of light (1.2%). This is like findings by other researchers [11,34,38].

Visual impairment was present in half of the patients (Figure 3). A similar finding was observed in a hospital-based study by Ahmed, *et al.* in Jordan in which 87 eyes of 44 patients undergoing haemodialysis were examined and it demonstrated a 43% prevalence of visual impairment with 9% legally blind (VA < 6/60) [34]. A Nepal study however observed normal visual acuity in majority (76.6%) of the subjects with only 23.4% having visual impairment [10]. This is likely because the patients in the Nepal study were in early stages of CKD with only 24.3% being in End Stage Renal Disease and thus requiring dialysis as opposed to 100% in this study and the study carried out in Jordan [34].

Conclusion

The prevalence of visual impairment is 49.5%. The main cause of visual impairment is maculopathy associated with hypertensive and diabetic retinopathy. Chronic Kidney Disease and End Stage Renal Disease patients should have routine ophthalmological examinations for timely identification and intervention of sight-threatening conditions.

Consent and Ethical Approval

As per university standard guideline participant consent and ethical approval has been collected and preserved by the authors.

Competing Interests

Authors have declared that no competing interests exist.

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Volume 11 Issue 4 April 2020

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