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Predictors of Renal Dysfunction Among Patients With Human Immunodeficiency Virus Seen at Benue State University Teaching Hospital, Makurdi, Nigeria

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Abstract*: HIV positive individuals are at increased risk for a variety of renal disorders including Acute Kidney Injury (AKI), HIV associated nephropathy (HIVAN), comorbid chronic kidney disease such as diabetic nephropathy, hypertensive nephrosclerosis and treatment related renal toxicity. We aimed to determine the predictors of renal dysfunction among HIV infected patients attending HIV Clinic at Benue State University Teaching Hospital, Makurdi, Nigeria.*
Materials*; This was a retrospective study among HIV infected patients attending the HIV clinic at the Benue State University Teaching Hospital, Makurdi between January 2013 and January 2015.*
Results*: Data for 315 (189 females and 126 males) patients were retrieved. The mean age of the population was 39.55±12.34.*
Seventy-eight patients (24.8%) had a reduced estimated glomerular filtration rate (eGFR) defined as ≤60ml/ml with more females than males (25.4% vs 23.5% P= 0.04) having reduced eGFR.
Younger age and female sex were found to have significant associations with reduced eGFR.
Conclusion*: Younger age and female sex were independently associated with likelihood of having lower eGFR among patients with HIV seen at Benue State University Teaching Hospital, Makurdi. We recommend routine assessment of renal function of HIV infected patients.*
Key words:*Predictors, renal dysfunction, human immunodeficiency virus*

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I. Introduction

Chronic kidney disease (CKD) is a frequent complication of HIV infection. Renal disease in HIV patients can occur as a complication of HIV infection, other co-morbid diseases like diabetes mellitus, hypertension, autoimmune conditions and infections or from treatment of HIV and opportunistic infections[1].

The classic involvement of the kidney in HIV infection is HIV-associated nephropathy (HIVAN) which is the most common finding in renal biopsy in HIV-infected black patients. It is a common cause of end stage renal disease (ESRD) in patients with HIV.[2,3]HIV-immune complex disease is the second most common histologic category of renal disease in HIV infected patients[2].

CKD is caused by factors related to the virus, host genetic factors and environmental factors. HIV-related kidney disease has become a common cause of ESRD requiring renal replacement therapy. In addition kidney disease may be associated with rapid progression of HIVto AIDS and death[4,5].

Progression to end stage renal disease has been reported to be more likely when high grade proteinuria, severely reduced eGFR, hepatitis B and C co-infection diabetes mellitus, extensive glomerulosclerosis and chronic interstitial fibrosis are present[1].

The incidence of CKD is higher in blacks compared with Caucasians [4, 6].This racial difference may be partially driven by the APOL1 risk variants, which are strongly associated with HIVAN and CKD progression among individuals of African descent [7, 8, 9, 10].

Acute renal failure(ARF) is highly prevalent among persons with HIV infection and like CKD is linked to morbidity and mortality. Major risk factors are the same as in the general population including older age, pre-existing CKD, serious systemic illness or infection and exposure to nephrotoxic agents[11]. Liver disease and low $CD4^+$ cell count also increases the risk of ARF among HIV infected persons[12].

II. Materials And Methods

This was a retrospective study conducted among HIV-1 infected patients attending the HIV clinic of the Benue State University Teaching Hospital, Makurdi between January 2013 and January 2015.

Variables extracted included age, gender, weight and WHO clinical stage of HIV disease, CD4 count, HIV-1 RNA viral load, hepatitis B surface antigen and anti HCV viral antibodiy. Estimated Glomerular Filtration Rate (eGFR) was calculated using Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) Creatinine equation[13,14] as follows: Grade 1>90mL/min , Grade 2 60-89 mL/min; grade 3, 30-59 mL/min; Grade 4, 15-29 mL/min; and grade 5 <15 mL/min. Approval was received from the ethics committee of Benue State University Teaching Hospital, Makurdi.

Statistical analysis

The Statistical Package for Social Sciences (SPSS Inc. Chicago II) version 21.0 statistical software was used for data analysis.

Quantitative variable were expressed as mean ± standard deviation while categorical variables were expressed as proportions. The t-test and the chi-square test were used in the comparison of means and proportions respectively. P-value <0.05 was considered statistically significant.

Factors associated with reduced eGFR (defined as <60 mL/min) were tested for inclusion in a multivariate logistic regression model. A p value of less than 0.05 was considered statistically significant.

III. Results

Data for 315 patients were available for the study [Table 1]. The number offemales was 189 (60%) while the number of males was 126(40%) with the mean age of the study participants being 39.6 years (±12.34). Seventy-eight patients (24.8%) had an eGFR<60 mL/min, with more females (25.4% vs. 23.5%; P=0.04) having an eGFR<60 mL/min. The mean overall eGFR was 82.2 mL/min (±19.6), with females being more likely to have a lower eGFR (females: 76±23.10, males: 78.3±18.03). Females were more likely to have a viral load of more than 200 copies/ml.

Table 1 Characteristics of Patients

Sex		Male n = 126	Female n=189	P Value	OR
Age	18 – 33years	32	75		
	34-49years	69	72	0.04	1.154
	50-65years	25	36		
	> 65years	0	6		
Mean	CD4 Cells	321.5	391.09		
	CD4 ≤200	50	47	0.005	1.988
	CD4≥200	76	142		
Viral Load	≤200	28	38		
	≥200	98	151	0.652	.881
Mean eGFR Cells		82			
Mean eGFR	eGFR Stage >90	67	96		
	60-89	29	45		
	30-59	19	36	0.769	0.918
	15-29	1	7		
	<15	10	5		
Hepatitis C+		6	2		
-ve		120	187	0.07	4.675
			19		
HBs Ag+		19	2	0.180	1.589
-ve		107	187		
WHO Stage	1				
	2	86	111		
	3	19	19	0.75	2.26
	4	11	32		
		10	27		

Multivariate analysis showed that age and female sex had significant association with reduced eGFR. Table 2

Table 2: Characteristics of patients with reduced eGFR

		<60mL/min	≥60mL/min	P Value	OR
Age	18-33 years	14	93		
	34-49 years	38	103		
	50-65 years	23	38		
	>65	3	3	0.001	0.418
Sex	Male	30	96		
	Female	48	141		
				0.049	0.918
WHO	Stage 1	43	154		
	2	17	21		
	3	10	33	0.735	1.101
	4	8	29		
Hepatitis	C^+	4	4		
	C^-	74	235	0.09	3.149
HBs Ag^+		3	35		
HBs Ag^-		75	202	0.797	0.231
Viral Load	≤200	60	189		
	≥200	18	48	0.596	0.847

IV. Discussion

This study revealed that female sex is a predictor of renal dysfunction among HIV infected patients assessing care at Benue State University Teaching Hospital, Makurdi, Nigeria. This finding is similar to that of several studies done in Africa[15,16,17] . For instance Kaze FF et al[15] reported that women and young adults are more likely to have renal dysfunction among HIV infected patients in Cameroon.Naicker S[16] andAssoramSetal[17] also made similar observation in South Africa.

Younger age was also a predictor of renal dysfunction from our study. This finding is similar to that reported by the Development of Antiretroviral Therapy (DART) Trial group which reported younger age to be predictor of renal dysfunction among HIV infected patients in East Africa[18]. Most of our patients present late with advanced HIV infection and low CD4 count.

However unlike in other similar studies, we did not find an association between CD4 counts, viral loads, HIV infection and reduced eGFR[19,20,21] This difference could be explained in part by the difference in study design as one of these studies usedModification of Diet in Renal Disease(MDRD) equation to estimate eGFR, we used CKD-EPI[13,14]. Also patients in most of the studies mentioned started antiretroviral therapy early.[20]. These studies and others have shown that CD4 counts of <200 cells/µl were predictors of renal dysfunction and that HIV patients withsevere immunodeficiency were more likely to develop CKD[22].

This study also showed that 24.8% of the patients with HIV had reduced renal function. This is similar to a study by Adedeji TA etal[23]who reported that 24% of patients with HIV seen at University of Ilorin Teaching Hospital hadrenal dysfunction.This is however higher than the 7% reports by the DART trial group in East Africa[18]. However, Chukwuonyeet al[24] reported a higher value of 50% of HIV infected patients havingrenal dysfunction. This could be due to the fact that creatinine clearance was used to estimate GFR..Aminu M et al also reported that 56.8% of patients with HIV seen at Aminu Kano Teaching Hospital have renal dysfunction.[25] Other studies in East Africa and Burundi reported a lower prevalence of renal dysfunction[26].

V. Conclusion

This study revealed a significant number of HIV infected patients with renal dysfunction thus emphasizing the need for increased awareness of CKD in HIV positive individuals among healthcare providers in order to identify patients at risk for renal disease and institute early preventive and therapeutic measures.

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