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ORIGINAL ARTICLE

An Evaluation of Renal Care received by Human Immunodeficiency Virus (HIV) Patients admitted in a Tertiary Hospital in Sierra Leone

Une Évaluation des Soins Rénaux Reçus par les Patients Atteints du Virus de l'Immunodéficience Humaine (VIH) Admis dans un Hôpital Tertiaire en Sierra Leone

[1,2]*J. Coker, [3]A. Niang, [2]I. Turay, [1,2]S. Lakoh, [1,2]V. Conteh, [1,2]J. B.W. Russell

ABSTRACT

INTRODUCTION: The burden of HIV is on the rise and patients with HIV are also vulnerable to renal impairment from both acute and chronic causes. This study sets out to evaluate renal care received by such patients.

METHODS: The study was conducted at Connaught Hospital, the main tertiary hospital (for medical and surgical cases) in the country. A retrospective review of all admitted patients with HIV between January and December 2019. Data was collected using a well- structured study proforma.

RESULTS: A total of 230 patients were admitted with HIV during the study period. The mean age of patients was 36.9 ± (11.5) years with a female preponderance of 61.3%. A vast majority of the patients (54.8%) could afford to do some renal investigations and only 13.9% were seen by renal physicians; 69.1% of patients with azotaemia died while on admission.

CONCLUSION: The extent of renal care observed from the study was poor because the majority of the patients were not seen by renal physicians and could not afford renal investigations. Also, the occurrence of renal impairment in patients with HIV suggests a poor prognosis. **WAJM 2022; 39(11): 1193–1197.**

Keywords: Renal care, HIV patients, Tertiary hospital, Sierra Leone.

RÉSUMÉ

INTRODUCTION: Le fardeau du VIH est en augmentation et les patients séropositifs sont également vulnérables à l'insuffisance rénale due à des causes aiguës et chroniques. Cette étude a pour but d'évaluer les soins rénaux reçus par ces patients.

MÉTHODES: L'étude a été menée à l'hôpital Connaught, le principal établissement tertiaire (pour les cas médicaux et chirurgicaux) du pays; un examen rétrospectif de tous les patients admis avec le VIH entre janvier et décembre 2019. Les données ont été recueillies à l'aide d'un proforma d'étude bien structuré.

RÉSULTATS: Un total de 230 patients ont été admis avec le VIH au cours de la période d'étude. L'âge moyen des patients était de 36,9±(11,5) ans avec une prépondérance féminine de 61,3%. La grande majorité des patients (54,8 %) pouvaient se permettre de faire quelques examens rénaux et seuls 13,9 % ont été vus par des médecins spécialisés dans les maladies rénales; 69,1 % des patients atteints d'azotémie sont décédés pendant leur admission.

CONCLUSION: L'étendue des soins rénaux observés dans cette étude est faible car la majorité des patients n'ont pas été vus par des médecins rénaux et ne pouvaient pas se permettre de faire des examens rénaux. De plus, la présence d'une insuffisance rénale chez les patients atteints du VIH suggère un mauvais pronostic. **WAJM 2022; 39(11): 1193–1197.**

Mots clés: Soins rénaux, patients VIH, Hôpital tertiaire, Sierra Leone.

[1]Connaught Hospital, University of Sierra Leone Teaching Hospitals' Complex, Sierra Leone. [2]College of Medicine and Allied Health Sciences, University of Sierra Leone, Sierra Leone. [3]Cheikh Anta Diop University, Dakar, Senegal.

Correspondence: **Dr. Joshua Coker,** Connaught Hospital, Freetown. Email: bigarcbd@gmail.com +23299613212

Abbreviations: ADH, Anti Diuretic Hormone; **ALE,** Abacavir/Lamivudine/Efavirenz; **ART,** Antiretroviral Therapy; **ATN,** Abacavir/Tenofovir/ Nevirapine Regimen; **CD4,** Cluster differentiation 4; **CKD,** Chronic Kidney Disease; **CKD-EPI,** Chronic Kidney Disease Epidemiology Collaboration Equation; **GFR,** Glomerular Filtration Rate; **HIV,** Human Immunodeficiency Virus; **HIVAN,** HIV Associated Nephropathy; **HIVICK,** HIV Immune Complex Disease Of The Kidneys; **NSAIDs,** Non-Steroidal Anti-Inflammatory Drugs; **PLWH,** People Living With HIV; **SD,** Standard Deviation; **SPSS,** Statistical Package for Social Sciences; **TDF,** Tenofovir-Disoproxil-Fumarate; **TLE,** Tenofovir/ Lamivudine/ Efavirenz; **USLTHC,** University of Sierra Leone Teaching Hospitals' Complex; **ZLN,** Zidovudine/Lamivudine/Nevirapine.

INTRODUCTION

Globally, there are 37.6 million persons living with HIV in 2020, 25.3 Million of those affected reside in sub-Saharan Africa.[1] The HIV prevalence rate in Sierra Leone is estimated to be about 1.7%, accounting for approximately 67,000 HIV-infected persons. The nationwide coverage of antiretroviral therapy is 26%.[2] There has been a 7% increase in new infections with an incidence rate of 0.40.[2,3] There is a 6% rise in AIDS-related mortality, representing 2,505 deaths in 2015.[2,3]

Patients diagnosed with chronic kidney disease tends to progress to end stage kidney disease which leads to a decrease in quality of life and longevity secondary to increased risk of predominantly cardiovascular disease amongst other factors.[4] Patients with HIV are susceptible to renal impairment which may be acute or chronic and both conditions (HIV and kidney disease) interplay to increase the burden of mortality attributable to such patients.[5] Also, such patients tend to have a low CD4+ count and high HIV viral load which further worsen their clinical outcome.[6,7] In low-income countries in Africa, treatment of CKD is hindered by limited numbers of nephrologists, limited resources, poor access to renal replacement therapy (dialysis and kidney transplantation) and a high prevalence of poverty.[8]

Anecdotal reports suggest that HIV patients admitted to our medical wards cannot afford to pay for renal biochemical tests or ultrasound scan and may not benefit from a review by a renal physician. Many of these patients will receive first-line anti retroviral therapy (ART) including tenofovir disoproxil fumarate (TDF) without proper renal assessment and they are at risk of developing renal impairment from nephrotoxic drugs, hypovolemia or from the virus itself. Therefore, it is reasonable for all HIV patients to be evaluated for renal disease or receive proper renal care. This study is carried out to objectively appraise the extent of renal evaluation or care received by HIV patients admitted at the Connaught Hospital. The findings from this study will provide important clinical information that would guide renal care among HIV patients in Sierra Leone.

SUBJECTS, MATERIALS AND METHODS

Study Setting

The study was conducted at the Connaught Hospital, University of Sierra Leone Teaching Hospitals' Complex (USLTHC) situated in Freetown, the capital city of Sierra Leone with about 312 bed capacity. The hospital departments include surgery, internal medicine, pharmacy, nursing, radiology, laboratory, ophthalmology, oral health and ear, nose and throat.

Study Design and Population

The study was a retrospective review of all admitted HIV patients between 1st January 2019 and 31st December 2019.

Inclusion/Exclusion Criteria

The study included HIV patients $\geq$ 18 years old and who were admitted at the Connaught Hospital during the study period and whose case notes were retrievable. All HIV infected patients below 18 years as well as non-HIV admissions were excluded.

Data Collection Tool and Procedure

Data collection was done using a well-structured proforma from the case notes of people living with HIV (PLWH) admitted at the Connaught Hospital during the study period. Data obtained from the proforma included patient's biodata like age, sex and occupation. Details of their HIV history which includes: year of diagnosis as well as duration, type of HIV, CD4 count at admission, viral load at admission, type of antiretroviral drugs, the presence of co-morbidities like tuberculosis, hepatitis B, hypertension, diabetes mellitus, and also the use of other medications like native herbs and other nephrotoxic agents were also retrieved. Renal care was defined as consultation with a renal physician (nephrologist or a senior registrar in nephrology) and/or a patient for whom renal biochemical assessment (urinalysis, electrolytes, urea and creatinine) was carried out. The outcome of admission of HIV patients like death, discharged from hospital or discharged against medical advice were also recorded.

Data Management

All data collected were cross-checked and entered into a Microsoft Excel spreadsheet, and exported to statistical package for social sciences (SPSS) statistical software for analysis. The results were presented in tables.

RESULTS

A total of 230 case notes of patients admitted with HIV were reviewed in this study. A total of 102 (44.3%) were already on antiretroviral therapy or were commenced on anti-retroviral therapy while on admission. The common co-morbidities seen among these patients were pulmonary tuberculosis (33.9%), chronic hepatitis B (4.8%) and systemic hypertension (5.2%). The commonest prescribed nephrotoxic drugs were NSAIDs and aminoglycosides, seen in 65.5% of study patients. The use of herbal medications was seen in 25.9% of study patients. Only 24.3% did a urinalysis, of this, 42.8% had abnormal urinalysis evidenced by both proteinuria and haematuria $\geq$ + 1; while 25% and 10.7% had proteinuria only and haematuria only $\geq$+1 respectively. Urea and Creatinine were done by 46.1% of patients; of which, 51.9% had levels above the laboratory reference range suggesting azotaemia; 32.6% of patients were able to check their electrolytes while on admission. The commonest electrolyte abnormalities were hypernatremia (20.5%) and hypokalemia (53.3%).

A total of 32 patients (13.9%) were seen by a Nephrologist; and 54.8% of patients had at least one of the following renal investigations (urinalysis, urea/creatinine, electrolytes, or renal ultrasound). The percentage of patients with CKD (defined as eGFR < 60%) was 47.6%; 69.1% of patients with abnormal urea and creatinine died while on admission; 27.3% were discharged home and 3.6% got discharged against medical advice. The mortality rate of patients with azotaemia showed a female pre-ponderance of 57.9%.

Table 1 shows the socio demographic characteristics of patients included in the study. Their mean age was 36.9 ± (11.5) years, with majority, 81 (35.2%) between 31–40 years of age. A female, 141 (61.3%) preponderance was

observed with a large proportion 83 (36.1%) being unemployed.

Table 2 shows the HIV profile of the study patients. Most of the respondents (97.8%) had type 1 HIV. CD4 count was done for 40.8% of the patients, of this, 77.0% had CD4 counts less than 200 cells/mm^3; 88.3% were on tenofovir disoproxil fumarate-lamivudine-efavirenz (TLE) fixed-dose combination and 54.3% were either newly diagnosed or in their first year of HIV diagnosis.

Table 1: Socio-demographic Characteristics of Patients included in the Study

Sociodemographic Characteristics	Frequency	Percentage (%)
Age (years)		
≤20	5	2.2
21 – 30	76	33.0
31 – 40	81	35.2
41 – 50	32	13.9
51 – 60	29	12.6
61 – 70	6	2.6
>70	1	0.4
Mean ± SD	**36.9 ± 11.5**	
Sex		
Female	141	61.3
Male	89	38.7
Occupation		
Trader	79	35.0
Artisan	40	17.4
Professional	14	6.1
Farmer	7	3.0
Unemployed	86	37.4

Table 2: HIV Profile of the Study Patients

HIV Profile	Frequency	Percentage (%)
Type of HIV		
Type 1 only	225	97.8
Type 2 only	2	0.87
Type 1 and 2	3	1.3
CD4 count (cells/mm^3)		
≤200	73	77
>200	22	23
Antiretroviral drug combination		
TLE	88	88.3
ALE	10	9.8
ZLN	3	2.8
ATL	1	0.9
Duration of HIV (years)		
Newly diagnosed	125	54.3
1 – 3	52	22.6
4 – 6	21	9.1
7 – 9	4	1.7
10 – 12	4	1.7
Unknown	24	10.4

TLE, Tenofovir Disoproxil Fumarate, Lamivudine and Efavirence; ALE, Abacavir, Lamivudine and Efavirenz; ZLN, Zidovudine, Lamivudine And Nevirapine; ATL, Abacavir, Tenofovir and Lamivudine; HIV, Human Immunodeficiency Virus; CD4, Cluster Differentiation 4.

Table 3 shows the factors that influence the outcomes in HIV patients with renal impairment. Female gender and poor compliance to antiretroviral drugs were shown to influence patient outcomes in terms of death or discharge.

DISCUSSION

The findings from this study suggests that majority of the patients admitted with HIV at the Connaught Hospital belong to the young and unemployed, with a female preponderance. Young people tend to involve in a lot of social vices including intravenous drug abuse, sexual promiscuity and alcoholism. These vices, as well the high rate of unemployment among them makes them vulnerable to infection with the virus. The high surface area of the vagina increases the likelihood of infection among females and so explains the higher prevalence among the female patients. Another study on HIV patients done in Sierra Leone also supported a female preponderance as well as the young age bracket of our patients.[9] However, the main focus of that study was to outline the common causes of hospitalization among HIV patients. The female preponderance and young age of study participants was also noted in a study on socio demographic characteristics of HIV patients in Southern Nigeria.[10]

Majority of the patients admitted with HIV could not access care from renal physicians. This may be due to shortage of such specialized doctors in the country or due to a lack of policies governing renal care for HIV patients. Presently, there are 2 nephrologists in the country but for the period reviewed in this study, there was just one nephrologist at that time. There is need for developing this specialty in Sierra Leone as well as making favourable renal care policies for this subset of patients. Due to the high unemployment rates, many of our patients cannot afford to pay for renal investigations. This might be a reflection of the overall poverty status in the country.[11] Of those who can afford to do tests of renal function like biochemistry or urinalysis, there is a high rate of admissions with chronic kidney disease (defined by eGFR < 60ml/min/1.73m^2

Table 3: Factors that Influence the Outcomes in HIV Patients with Renal Failure

Factors	Outcomes		
	Death (P-Value)	Discharge (P-Value)	DAMA (P-Value)
Age	0.28	0.58	0.81
Female sex	0.00	0.01	0.20
Compliance to ARV	0.00	0.01	0.09

ARV, Antiretroviral Drugs; DAMA, Discharge Against Medical Advice; HIV, Human Immunodeficiency Virus;

using CKD-EPI equation), suggesting that renal impairment is a common complication of HIV. Other studies reported similarly high prevalence of renal impairment among HIV patients of 39% and 33.5% in South-east Nigeria[12] and Zambia respectively.[13] The CKD-EPI used to estimate glomerular filtration rate in this study performs better in patients with early renal failure and may be an ideal screening tool.[14] However, it tends to overestimate the eGFR and so under-estimate the extent of renal impairment among such patients.[14] However, interpretation of eGFR equations in HIV patients must be done with caution as the equations (which are Creatinine based) tend to be inaccurate as these patients have profound muscle wasting.[15] Kidney biopsies were not done for any of these patients due to unavailability of biopsy needle and histology facilities at that time.

The commonest electrolyte abnormality noted was hypokalaemia followed by hypernatraemia. Hypo-kalaemia may be due to gastrointestinal potassium loss mainly from profuse diarrhea or from potassium loss in urine. The hyper-natraemia may be explained by dehydration due to anorexia, diarrhoea, vomiting which are common symptoms in patients with HIV. In another study, the electrolyte changes were mainly hyponatraemia and hyper-kalaemia.[16] The hyponatraemia was attributed to syndrome of inappropriate ADH release whilst hyperkalaemia was due to renal impairment.[16] The common urinary abnormalities were isolated proteinuria, isolated haematuria or both proteinuria and haematuria. These urinary changes may be due to urinary tract infections, HIV-related nephropathies like HIV-associated nephropathy (HIVAN), HIV-immune complex disease of the kidneys (HIVICK) or thrombotic microangiopathy.[17] Studies done in other countries in sub-Saharan Africa also documented proteinuria and haematuria in addition to leucocyturia.[18,19]

Less than half of the patients were on antiretroviral treatment; this may be either due to poor access to medications, shortage of drugs, or non-compliance of patients. Many of our patients were on tenofovir-lamivudine-efavirence (TLE) combination which is a first-line therapy in our setting without any baseline laboratory renal assessment like serum urea and creatinine. This scenario is less than ideal as tenofovir disoproxil fumarate (TDF) is a well known nephrotoxin. Apart from TDF, patients with HIV are often prescribed many drugs with nephrotoxic potential like acyclovir, fluconazole, foscarnet, protease inhibitors and co-trimoxazole. Also noted in this study is a high rate of prescription of drugs with nephrotoxic potential like NSAID and aminoglycosides as well as a high rate of ingestion of herbal medicines among the study patients. Monitoring of renal function is key in HIV patients and the lack of it reflects the prevalence of poverty or lack of policies governing renal care for HIV infected patients. It has been documented that baseline assessment and routine monitoring of renal function is a difficult task in sub-Saharan Africa.[20] Mechanisms should be put in place to find patients with increased likelihood of developing renal failure as the burden of kidney disease in HIV patients is high.[20] In various regions of sub-Saharan Africa, including Sierra Leone, many patients cannot afford to pay for renal function tests and laboratories which can perform these tests are hard to find outside of the capital cities. Therefore, if baseline and routine renal monitoring is made mandatory for commencement and continuation of antiretroviral therapy, it will slow down commencement of antiretroviral therapy and stifle efforts made in expanding HIV care.[21,22]

The CD4 count is used to stage the severity of the disease, it also determines the risk of opportunistic infection and also for the initiation of antiretroviral therapy. Less than half of the patients had CD4 count done, this may be due to poor logistics or shortage of testing kits. Majority of the patients in this study had CD4 counts less than 200 cells/mm^3 suggesting advanced immuno-suppression. Low CD4 count amongst other factors like female sex, use of nephrotoxic drugs, APOL I gene variant are common risk factors for renal impairment in HIV patients.[23,24] Also, HIV associated nephropathy (HIVAN) is seen in advanced disease and is often associated with low CD4 count and high viral load.[25]

The common co-morbid conditions seen were pulmonary tuberculosis, systemic hypertension and chronic hepatitis B. This is expected considering the frequency of occurrence of these diseases in both the HIV and non-HIV population in the community. Pulmonary tuberculosis is an AIDS-defining illness and its high frequency lends credence to the fact that our patients present with advanced disease. A study in done in Nigeria cited pulmonary tuberculosis as the commonest AIDS-defining illness seen in HIV patients.[10] This further explains the burden of pulmonary tuberculosis in patients with HIV.

We also noted a high mortality among HIV patients with abnormal urea and creatinine, suggesting that renal involvement is a poor prognostic feature in these patients and inability to access dialysis (if required) due to unaffordabilty and availability of facility may be contributory. Renal impairment has been shown to be a poor prognostic marker in HIV patients.[13] Female gender and poor compliance to antiretroviral drugs were associated with poor outcomes. Possible factors include patient burn out, intolerable adverse effects of drugs and inadequate patient support systems. Further details on patient outcomes could

not be ascertained due to the retrospective design of the study.

Study Limitations

The study was a retrospective review of admitted patients with HIV infection making it prone to incomplete patient information or missing data. Among patients with renal impairment, it was difficult to distinguish between acute kidney injury or chronic kidney disease. The study was a single center study making it difficult for finding to be generalized for the whole country.

CONCLUSION

The extent of renal care observed from the study was poor because the majority of the patients were not seen by renal physicians and could not afford renal investigations. Also, we noted that the occurrence of renal impairment in patients with HIV suggests a poor prognosis. Female gender and poor compliance to antiretrovirals suggest poor outcomes in this cohort of patients.

Possible Recommendations

All patients with HIV (outpatient or inpatient) should have baseline evaluation of their renal function which includes serum urea, creatinine, and electrolytes as well as urinalysis) before initiating antiretroviral drugs and renal function should be monitored yearly or twice a year or as required while on these drugs.

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Duality of Interest

None.

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