International Journal of Biomedical and Health Sciences
Vol. 4, No. 1, March 31, 2008
Printed in Nigeria

0794-4748/2008 $12.00 + 0.00

http://www.asopah.org

IJBHS 2007087/4101

The prevalence of renal disorder in HIV/AIDS patients on HAART

O. A. Ogundahunsi*, Akinleye, V. A. Oyegunle, A. A. Amballi, and W. Mbacham

Department of Chemical Pathology and Immunology, Obafemi Awolowo College of Health Sciences, Sagamu, Ogun State, Nigeria

(Received September 27, 2007)

ABSTRACT: Before HAART, HIVAN was the third leading cause of death due to End Stage Renal Disease in African Americans and the disease was almost exclusively restricted to the blacks. However the prevalence and the role of HAART in reducing the prevalence are not established. The prevalence of renal disorder in HIV/AIDs patients was studied in one hundred (I00) HIV/AIDS patient. Fifty patients on HAART for at least three years served as study subjects while the remaining fifty who are HAART naïve (pre- HAART) served as control. The patients were both male and female subjects in the age range of 25-60 years. Blood sample was taken from each patient for the following parameters: sodium, potassium, chloride, bicarbonate, urea, and creatinine, total protein and albumin. Urine was also taken for qualitative analysis of protein and glucose. Systolic and diastolic blood pressures were measured, and the sizes of both kidneys were determined through ultrasonography. The results of the analysis revealed mild hyponatraemia and hypokalaemia in 13% and 19.3% in the patients on HAART respectively. Hypochloriemia was 14.8% while bicarbonate was 3.7%. 29.6% of patients suffered from azotaemia which is a good marker for HIV nephropathy. 7.4% of patients had a mild increase in creatinine concentration. Total protein values were maintained within the reference range and 9.3% had a slight reduction in albumin. 7.4% had protenuria and none of the patients had glucosuria. Both the systolic and diastolic blood pressures were found to be within the reference range. The sizes of the two kidneys were also normal.

Key Words: HIVAN; Black population; Proteinuria; Azotemia; Electrolytes; HAART.

Introduction

HIVAN is a disease with unique clinical, pathologic, and epidemiologic features that progresses rapidly to end stage renal disease (ESRD). HIVAN was first described by Herman and Klotman in 1984. The disease was rarely reported as a complication of HIV infection until late 1990s. Since then, HIVAN has increased in incidence each year and is now the third leading cause of end stage renal disease in African-Americans between the ages of 20 – 64 (Monahan and Klotman, 2001).

*To whom correspondence should be addressed.
E-mail: E-mail address: ogundahunsibola@yahoo.com

The renal complications can be subdivided into several categories, some of which are disturbances of fluid and electrolyte metabolism and disturbances in acid-base balance. Varied abnormalities have been reported in fluid and electrolyte. Of these, hyponatremia is the most common. The varied conditions of acid-base balance, as well as fluid and electrolyte has been attributed to varied drug use in the treatment of the associated opportunistic infections. Patients with HIVAN usually present with azotemia and proteinuria. Most patients are normotensive, and on renalsonogram kidneys are typically normal or slightly increased in size. Acute renal failure syndromes encountered in HIV patients are diverse. Many are similar to those in non-HIV patients where as some are unique to HIV patients. Renal disorders are attributed to various combinations of multiple risk factors some of which are infections, heavy drinking, smoking, dietary factors, genetic susceptibility, hyperglycaemia, and hyperlipidaemia.(Braundwald and Kasper 2001) The marked racial predisposition of HIVAN to blacks has been previously reported (D' Agati *et al* 1998) recent studies have confirmed this association. Analysis of data from United States Renal Data System revealed that HIVAN is more strongly associated with black race than any other cause of failure with the exception of sickle cell disease. (Abbott *et al* 2001) Hailemarian *et al* 2001 reported a series of 239 autopsies performed on patients with AIDS in Switzerland from 1981 to 1989(before introduction of HAART). Various abnormalities were reported among the 228 white patients. However, the only case of HIVAN in these autopsies was detected in one of the six African patients involved in the study. This marked racial disparity in HIVAN suggests that genetic factors are important determinants of HIVAN pathogenesis. Chronic renal disease is progressive and irreversible. Since the onset is frequently insidious, patients may be unaware of the presence of chronic renal disease until the process is far advanced and very little renal function remains, hence the need to identify and monitor the patients who are at risk.

Materials and Methods

One hundred PLWHA patients attending the HIV clinic at the department of Community Medicine and Primary Health care were recruited for the study. 50 PLWHA who have been on HAART therapy for a minimum of 3 years aged between 25-60 years served as the study subjects .All the subjects are AIDS or symptomatic HIV patients mainly in Group 3 and 4 of WHO classification. They presented with thrush, cough, rashes or fever for more than two weeks, and other opportunistic infections. The subjects receiving HAART medication were managed with combination of at least 3 antiretroviral drugs from 2 of the 3 groups of antiretroviral drug. Viz: The protease inhibitors (PI), The Nucleoside Reverse Transcriptase Inhibitors (NRTI), and the Non Nucleoside Reverse Transcriptase Inhibitors. (NNRTI)
The two arms of drugs given to the patients were combined thus

ARM 1 = 1PI + 2NRTI

Or

ARM 2 = 1NNRTI + 2NRTI.

Fifty PLWHA (HAART naïve) who were about to start HAART served as control. Sodium, potassium, Chloride, bicarbonate, urea, creatinine, total protein and albumin concentration were estimated from the plasma samples of the random venous blood. The urine samples were tested for sugar and protein. Sodium and potassium concentration were estimated by flame photometer. The chloride ion, Bicarbonate ion, urea and creatinine concentration was estimated by standard methods.

Total protein and plasma albumin were estimated by the biuret and bromocresol green method respectively.

Results

Clinically all the subjects in the study and control groups had normal blood pressure and normal kidney ultrasonography. There were more females than males in the two groups. (Table 1) The mean duration of

HAART was 4.24 ± 1.0 years, with a minimum therapy on HAART of 3years and a maximum therapy of 5 years. Hyponatremia, hypochloremia, hypouraemia were common in the two groups. (Table 3)

Table 1: Mean Age, Sex and HIV status of Subjects.

PARAMETERS	HAART %	HAART naïve %
Sex		
Male	34%	16%
Female	66%	84%
Mean Age	42.2 ± 8.3years	35.8 ± 7.2 years
HIV status		
HIV I	96	100
HIV II	2	0
HIV I & II	2	0

Table 3: Percentage of clients with abnormal biochemical parameters.

Parameters	% abnormality in HAART subjects	% abnormality in naive HAART subjects
$Na^{+}_{mmol/l}$	5% hypo	8 hypo
$K^{+}_{mmol/l}$	10% hypo	0%
$Cl^{-}_{mmol/l}$	24% hypo	14% hypo
$HCo_3^{-}{}_{mmol/l}$	4% hypo	0%
Urea mg/100ml	6% hypo, 26% hyper	10% hypo, 4% hyper
Creatinine mg/100ml	8% hypo, 4% hyper	10% hypo
Albumin g/100ml	2% hypo, 8% hyper	8% hypo
Total Protein g/100ml	14% hyper	8% hypo,
Glycosuria % positive	0%	0%
Proteinuria % positive	6%	8%

Table 4: Mean concentration of Biochemical parameters.

Parameters	HAART subjects	HAART Naïve subjects	P value
CD4 count/cell/m	344.1 ± 64.2	179.9 ± 64.2	$P < 0.05$
$Na^{+}_{mmol/l}$	129.9 ± 3.5	129.7 ± 4.4	$P > 0.05$
$K^{+}_{mmol/l}$	3.3 ± 0.3	3.7 ± 0.3	$P < 0.05$
$Cl^{-}_{mmol/l}$	96.6 ± 3.6	97.7 ± 5.0	$P > 0.05$
$HCo_3^{-}{}_{mmol/l}$	22.7 ± 2.7	21.1 ± 1.6	$P < 0.05$
Urea mg/100ml	35.3 ± 15.3	23.3 ± 8.3	$P < 0.05$
Creatinine mg/100ml	0.84 ± 0.3	0.70 ± 0.1	$P < 0.05$
Albumin g/100ml	3.7 ± 0.6	3.5 ± 0.6	$P > 0.05$
Total Protein g/100ml	7.43 ± 0.8	7.1 ± 0.8	$P > 0.05$

Discussion

HIV infection can lead to derangements in multiple organs of which the kidney is a common target.(Rao 2001). The phrase HIVAN, formerly known as AID-AN usually presents with proteinuria,

azotemia, hyponatremia, normal to large kidneys on ultrasonography images, normal blood pressure and focal segmental glomerulosclerosis with marked podocyte proliferation, microcytic dilation of the tubules and interstitial nephritis. Once diagnosed rapid progression to renal failure and end stage renal disease leading to death or dialysis was the norm in the pre antiretroviral therapy era. Even with HAART this study shows that HIVAN defined by azotemia and proteinuria is still common. The prevalence of renal disorder defined by proteinuria was found to be 7.4%. and defined by azotaemia is 29.6% in the study subjects who have been on ARV for a mean duration of 4. 24 ± 1years. The prevalence of these renal disorders was more with the study subject than with the control. This observation may result from drug resistance strains of the virus or drug toxicity which were already been seen clinically in some of the patients who were getting ill again. We were however constrained to confirm the presence of resistant strain in these study subjects because of the lack of infrastructure. Since chronic renal disease is progressive and irreversible, it may be necessary to monitor these disorders in the Patients who have the multiple risk factors and on HAART in order to further prolong their lives. The multiple risk factors that have been attributed to renal disorders include infections, heavy drinking, smoking, dietary factors, low birth weight, infant malnutrition, increasing adult weight, genetic susceptibility, hyperglycaemia, hyperlipidemia amongst others.(Braundwald, E and Kasper DL 2001)

Protenuria or azotemia or both were the presenting features in more than 90% of HIV infected patients The conclusion from this study is that HIVAN is still common with patients on HAART. The disease can result from direct kidney infection with HIV, from the adverse effects of HAART. Patients at risk should be monitored closely and ARV medication whose adverse effect directly affect the kidney or causes some deterioration of the kidney should not be administered to patients who are at risk.

References

1. Herman ES and Klotman PE, (2003) HIV associated Nephropathy: Epidemiology, Pathogenesis and treatment seminars in Nephrology. 2003 Mar; 23 (2): 200-208
2. Monahan M, Tanji N, and Klotman PE: (2001) HIV associated nephropathy: An Urban Epidemic Semin Nephrol 21: 394 – 402,
3. Braundwald and Fauci AS, Kasper DL, Hauster SL, Longo DL, Jameson JL, edition (2001) Harrison's principle of Internal medicine. 15th ed. New York; McGraw -Hill
4. D' Agati V, Suh JI, Carbone L, (1998) Pathology of HIV-associated nephropathy: A detailed morphologic and comparative study. Kidney int 35: 1358-1370
5. Abbott KCE, Hypolite I, Welch PG, Agodoa LY (2001) Human Immunodeficiency Virus/acquired immunodeficiency syndrome-associated nephropathy at end-stage renal diseases in the united States: patient characteristics and survival in the pre highly active anti retroviral therapy era. 2001 J. Nephrol 14: 277-383,
6. Hailemarian S, Walder M, Burger HR, Cathomas G, MIhatsch M, Binswanger U, Ambuhl PM; (2001)Renal Pathology and premortem clinical presentation of Caucasian patients with AIDS: An autopsy study from the era prior to antiretroviral therapy. Swiss Med. Weekly 131; 412-417 2001
7. Rao TK: Human Immunodeficiency Virus infection and renal failure. Infect Dis Clin North Am. 15: 833-850. 2001
8. Henry RJ, Sobel C, Berkmans; Anal Chem 92; 1491, 1957
9. Schales O. and Schales S.S J.Biol. Chem, 140; 879,1941
10. Segal M.A: Am J Clin Pathol 25 25: 1212, 1955
11. Wybenga DR, DI Giogio J, Pileggi VJ: Clin Chem. 17; 891, 1971