A Study of Clinical and Biochemical Profiles of HIV Subjects in Owerri, Southeast Nigeria
(Original Article)

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ABSTRACT
Background and Objectives: *The impact of Human immunodeficiency virus (HIV) infection is enormous globally. This study aimed at identifying aspects of clinical and laboratory profile of newly-diagnosed HIV subjects in Owerri, southeast, Nigeria.*
Methodology: *This was a cross-sectional, descriptive study involving 393 newly-diagnosed HIV subjects and 136 non-HIV, sex- and age-matched Control, consecutively recruited from an HIV clinic and an out-patient clinic of Federal Medical Center, Owerri. Bio-data and anthropometric data were collected. Relevant investigations were performed. Data were compared between HIV subjects and Control.*
Results: *The mean age of the HIV subjects was 39±11 years and Control 39±12 years. Female/male ratio was 3:1 in boththe HIV subjects and the Control. Mean waist circumference in male HIV subjects was significantly higher than mean WC in male non-HIV Control (p=0.013). Mean high density lipoprotein cholesterol, (p<0.001), serum creatinine, (p=O01), spot urine protein (SUP), (p=0.013), spot urine creatinine, p<0.001), spot urine osmolality, (p<0.001), 24-hour urine protein, (<0.001), 24-hour urine osmolality, (p<0.001), were significantly higher in the HIV subjects than the Control, whereas mean low density lipoprotein cholesterol (p<0.001), hemoglobin, spot urine creatinine/osmolality ratio (p<0.001), 24-hour urine creatinine/osmolality ratio, (p<0.001) were significantly lower in HIV subjects than the Control.*
Conclusion: *Abnormalities of serum creatinine, urine osmolality, urine protein and serum lipids are common among newly-diagnosed HIV subjects in southeast, Nigeria.*
There is need to evaluate HIV patients, at inception, for dyslipidemia, anemia and renal damage.
Keywords: Clinical Characteristics, laboratory profile, HIV patients, Owerri, southeast, Nigeria

INTRODUCTION

Worldwide, HIV infection is a great healthcare challenge. Sub-Saharan African countries account for about 24.5 million people living with HIV infection, comprising about 70% of world total.[1] Nigeria has about 3.5 million of its citizens who are HIV seropositive.[2]

HIV infection affects virtually all organs of the body, including the kidneys. These organs may manifest with abnormalities in body biochemistry and hematology. Renal diseases associated with HIV range from acute kidney injury to chronic kidney disease and end-stage-renal-failure.[3-5] Many biochemical abnormalities have also been demonstrated in all stages of HIV-related kidney diseases.[6] Such abnormalities may arise from HIV infection, opportunistic infections, malignancies associated with advanced immunosuppression or drugs used in treating HIV infection and its complications.

Some studies have shown that proteinuria is prevalent in HIV patients.[7-10] Similarly, it has been documented that renal impairment is high in HIV subjects.[11]

Hemoglobin levels in HIV subjects decline as HIV infection progresses.[12] Lipid abnormalities have been demonstrated in HIV patients at various stages of the disease.[13] Body mass index and waist circumference have been noted to decrease as HIV infection progresses, in consonance with the name, wasting disease, that HIV infection is sometimes called.[14]

Urine osmolality varies over a range of values but may be impaired with involvement of renal tubules in HIV infection.[15]

Urine creatinine/osmolality ratio in both spot and random samples were associated with chronic kidney disease in HIV subjects.[11]

There is a paucity of studies on laboratory profiles of HIV subjects in Nigeria. We have undertaken this study to evaluate the laboratory profile of HIV subjects in Owerri, southeast Nigeria.

MATERIALS AND METHODS

This was a cross-sectional, prospective study of clinical and laboratory profile of newly-diagnosed HIV subjects in Owerri, southeast Nigeria. It was a six-month study conducted in 2011 at the Federal Medical Centre (FMC), Owerri, Imo State, Nigeria. FMC Owerri is one of the two tertiary hospitals in the state. It receives referrals from the state and some neighboring states. Imo State has a population of 3,927,563; about 125,337 of these live in Owerri Municipal.[16]

The subjects consisted of 393 newly-diagnosed, 18-65 year-old HIV sero-positive patients and 136 age- and sex-matched, non-HIV Control. The HIV subjects and the non-HIV Control were recruited from the HIV clinic and Medical Out-Patient Department of the hospital respectively. Exclusion criteria for the study population were: age below 18 years and above 65 years, menstruation at the time of sample collection, pregnancy, fever, urinary tract infection, diabetes mellitus, hypertension, heart failure, bladder tumor, chronic use of nephrotoxic drugs, and use of anti-retroviral drugs. Subjects who did not freely consent to the study were also excluded.

The Ethical Committee of the FMC Owerri approved the study.

The biographic and anthropometric data were collected by a healthcare provider. Investigations performed on the subjects included HIV screening and confirmatory tests, spot urine protein (SUP), spot urine creatinine (SUCr), spot urine osmolality (SUOsm), serum creatinine (SCr), fasting serum lipid profile, hemoglobin, CD4 cell count, 24-hour urine creatinine (24HUCr),24-hour urine osmolality (24HUOsm), 24-hour urine protein (24HUP). Patients were instructed on how to collect 24-hour urine. Blood samples were collected. 24-hour urine protein/creatinine ratio (24HUPCR), 24-hour urine protein/osmolality ratio (24HUPOR), spot urine creatinine/osmolality ratio (SUCOR), 24-hour urine creatinine/ osmolality ratio (24HUCOR) and creatinine clearance (ClCr) were calculated.

Statistical Analysis

Data were analyzed using SPSS version 17.0 (SPSS Inc. Chicago, Il, USA). Chi square was used to compare means. Associations of variables were determined by correlation statistics. P<0.05 was taken as statistically significant.

RESULTS

A total of 393 HIV subjects and 136 non-HIV Control were studied. The mean age of the HIV subjects was 39±11 years and the non-HIV Control 39±12 years. There was no significant difference between the mean age of the HIV subjects and the non-HIV Control, p=O.814. The HIV subjects' age distribution is shown in Figure 1. Out of the 393 HIV subjects, 283 (72.0%) were females, while 110(28.0%) were males. The female: male ratio was approximately 3:1 in both the HIV subjects and the non-HIV Control. There was no significant difference in the female: male ratio between the HIV subjects and the non-HIV Control, p=0.838.

The HIV subjects comprised of Igbo 92.6%, Hausa 3.1%, Itsekiri 2.0%, others 2.3%. (Table 1). Tables 2 and 3 show the clinical and laboratory characteristics, respectively, of the study population. The mean BMI in males was significantly higher in the HIV subjects than the Control, p<0.001. However, in females, the mean BMI showed no significant difference between the HIV subjects and the Control, p=0.588. The meanWC for males was low in both the HIV subjects and the Control. However, it was significantly lower in the Control than the HIV subjects, p=0.031.

Conversely, in females, there was no significant difference in the mean WC between the HIV subjects and the Control, p=0.253.

The mean systolic blood pressure in the HIV subjects and the Control did not differ significantly (p=0.525). There was also no significant difference in the mean diastolic blood pressure between the HIV subjects and the Control, p=O.201. There was no significant difference in the mean ClCr between the HIV subjects and the Control, p=0.458. The mean hemoglobin was significantly lower in the HIV subjects compared to the Control, p<0.001. The difference in the mean total cholesterol and triglyceride between the HIV subjects and the Control was not significant, p=O.139 and p=O.331 respectively. The mean LDL was significantly lower in the HIV subjects than the Control, p<0.001. However, the mean HDL was lower in the Control than the HIV subjects, p<0.001.

The mean serum creatinine was significantly higher in the HIV subjects compared to the non-HIV Control, p<0.001. The HIV subjects had significantly higher mean SUP than the Control, p=0.013. The mean SUCr did not differ significantly between the HIV subjects and the Control, p=0.387. The mean SUOsm was significantly higher in the HIV subjects than the Control, p=0.001. The mean 24HUP was significantly higher in the HIV subjects than the Control, p<0.001. The mean SUPCR and SUPOR showed no significant difference between the HIV subjects and the Control, p=0.120 and p=O.357 respectively. The HIV subjects had significantly higher mean 24HUCr than the Control, p<0.001. The mean 24HUOsm was higher in the HIV subjects than the Control, p<0.001. The HIV subjects had lower mean SUCOR and 24HUCOR values than the Control, p<0.001 for SUCOR and 24HUCOR.

DISCUSSION

This study determined aspects of clinical and laboratory profiles of newly- diagnosed HIV subjects in Owerri, southeast Nigeria. In the study, the mean age of HIV patients was 39±11 years. This is in keeping with the findings of studies done in Nigeria and South Africa.[17,4] This, perhaps, shows a high transmission level among people of this age group, who have been found to have high sexual activity.[18] Females constituted the majority of the patients that presented in the study, with female: male ratio of 3:1 (p<0.001), similar to a report from another study.[16], This is

in agreement with the fact that female gender is a known risk factor for heterosexual transmission of HIV infection.[18]

Majority of the HIV subjects, 92.6%, were Igbo, apparently reflecting the study domain that was a core Igbo state.

The mean BMI observed in the HIV subjects in our study is similar to that reported inone study.[19] The normal BMI, here, may be because most of the patients recruited in this study were stable asymptomatic individuals who came for voluntary counseling and testing. This may reflect early presentation created by increasing awareness of HIV infection and the availability of free medications. In addition, both BMI and WC were observed in this study to be significantly higher in male HIV subjects than male non-HIV Control. This might suggest that the male HIV subjects probably complied with early HIV screening and detection.

Proteinuria, a marker of renal disease, was high in HIV subjects, compared to non-HIV Control. This observation is close to those reported in studies done in Nigeria with similar occurrence of proteinuria in HIV patients.[7-10] The different methods of assessment of protein in urine did not influence the outcome between the HIV subjects and the non-HIV Control.

In this study, the mean ClCr in the HIV subjects did not differ significantly from that of the non-HIV Control. Expectedly, drug-naive HIV subjects might not have significant renal involvement.

Both systolic and diastolic blood pressure were found not to differ significantly between the HIV subjects and the non-HIV Control, probably because those who were hypertensive were excluded from the study.

Our study showed that HIV subjects have significantly lower mean hemoglobin than the non-HIV Control. This is in agreement with studies in which anemia was associated with HIV infection.[20,21]

Mean total cholesterol and triglyceride were found not to differ significantly between the HIV subjects and the Control. However, the finding of significantly lower LDL and higher HDL in HIV subjects agrees with a report from a study that associated dyslipidemia with HIV infection.[13]

In this study, HIV subjects have significantly higher mean serum creatinine than the Control. This tends to suggest that HIV subjects might have higher renal impairment than the non-HIV Control. High renal impairment in HIV infection has been reported in drug-naive early stage as well as in advanced HIV infection.[8,11] No doubt, on a broad note, high serum creatinine is a marker of kidney damage. However, serum creatinine-based equations are preferred for the assessment of renal function.[22] The higher the serum creatinine, the lower the glomerular filtration rate, and, by extension, the worse the degree of renal impairment.[22]

We found that mean SUP was significantly higher in HIV subjects than the Control. Although SUP has variable values during the day and may not reflect real time 24- hour urine protein excretion,[23] still very high values may be a pointer to renal damage.

This study showed that there was no significant difference in the mean SUCr between the HIV subjects and the Control. SUCr is known to vary over 24 hours of the day and may not indicate quantitatively the presence of renal damage.[11]

The mean SUOsm was, as found in this study, to be significantly higher in HIV subjects than the Control. High SUOsm may suggest a high capacity to regulate and concentrate urine by the kidney. In contrast, reduced ability to concentrate urine has been found as HIV infection progressed, indicating the presence of renal damage. [15]

The mean 24HUP was significantly higher in HIV subjects than the Control. However, both mean SUPCR and mean SUPOR were found not to differ significantly between the HIV subjects and the Control. By inference, HIV subjects excreted more 24-hour urine protein than the Control.

We also found that the mean 24HUCr was significantly higher in the HIV subjects than the

Control. However, low 24HUCr may indicate renal impairment.[24]

The mean 24HUOsm was significantly higher in HIV subjects than the Control. This contrasts with a study in which low values of 24HUOsm were associated with advanced HIV infection.[15]

Both the mean SUCOR and 24HUCOR were significantly lower in HIV subjects than the Control. One study has reported that both SUCOR and 24HUCOR were associated with chronic kidney disease in HIV subjects but not in non-HIV Control.[11] Therefore, low values of these indices suggest the presence of renal damage in the HIV subjects in our study.
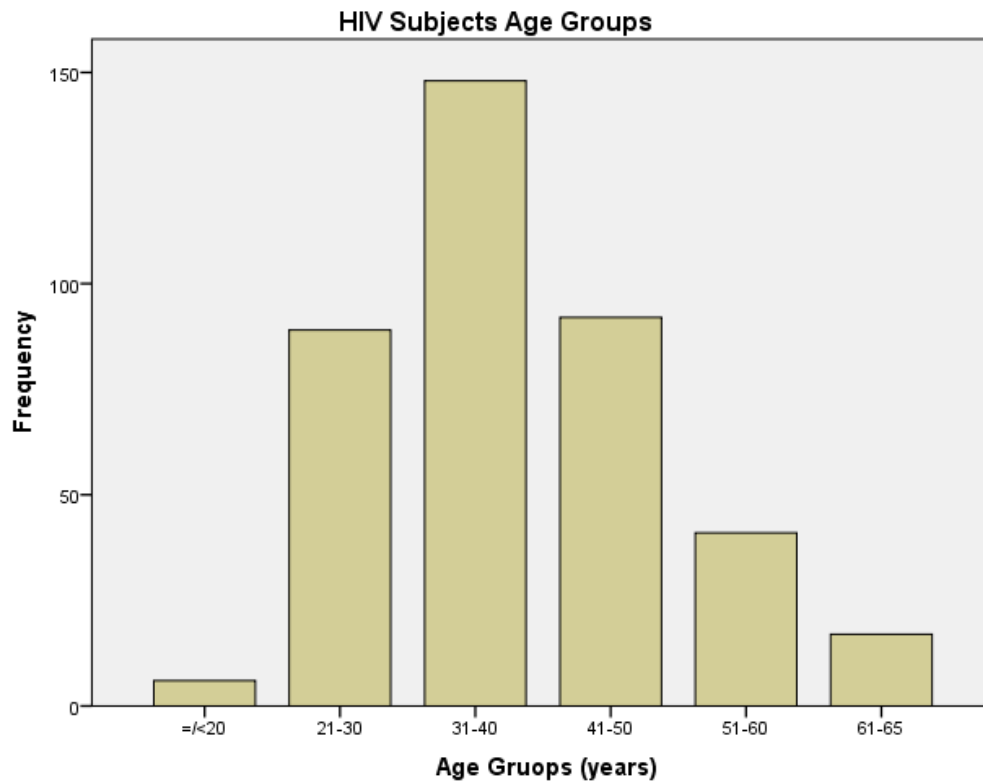

FIGURE 1: HIV Subjects Age Group Distribution

Table 1: Clinical characteristics of the study population

Variable (mean)	All subjects (n=529)	HIV subjects (n=393)	Control (n=136)	p value
Age(yrs±SD)	39±11	39±11	39±12	0.814
Gender:				
Male (%)	148(28%)	110(28%)	38(27.9)	
Female(%)	381(72%)	283(72.0%)	98(72.1%)	
Tribe				
Igbo		364(92.6)	121(89.0)	
Hausa		12(3.1)	4(2.9)	
Itsekiri		8(2.0)	2(11.5)	
Others		9(2.3)	7(5.2)	
BMI(kg/m^2±SD)	26.04±5.69	26.22±5.40	25.51±6.47	0.211
Male	2434±4.92	25.24±4.69	21.74±4.66	<0.001
Female	26.70±5.84	26.61±5.61	26.98±6.50	0.588
Waist $^+$C(cm±SD)	84.66±12.91	85.34±13.35	82.69±11.36	0.039
Male	83.55±12.15	84.82±12.54	79.89±10.27	0.031
Female	85.09±13.19	85.54±13.67	83.78±11.62	0.253
BP(mmHg±SD)	119.6±16.9	119.3±16.5	120.4±18.2	0.525
DBP(mmHg±SD)	75.9±10.6	75.6±10.6	76.9±10.7	0.201

BMI=Body mass index, WC=Waist circumference,SBP=Systolic blood pressure, DBP=Diastolic blood pressure, SD=standard deviation.

Table 2: Laboratory characteristics of the study population

Variable (mean)	All subjects (n=529)	HIV subjects (n=393)	Control (n=136)	p value
ClCr(mls/min±SD)	91.84±21.32	91.42±22.98	93.01±15.91	0.458
Hb(g/dl±SD)	11.6±1.93	11.2±1.8	12.9±1.6	<0.001
FSLP(mmol/l±SD)				
Total cholesterol	4.30±1.00	4.26±0.90	4.41±1.25	0.139
LDL cholesterol	2.26±0.82	2.05±0.58	2.87±1.07	<0.001
HDL cholesterol	1.13±039	1.18±0.39	0.97±0.34	<0.001
Triglyceride	1.24±0.37	1.23±0.37	1.27±0.40	0.331
SCr(mg/dl±SD)	0.99±0.38	1.03±0.42	0.88±0.19	<0.001
SUP(mg/dl±SD)	10.69±19.04	11.89±19.13	7.19±18.39	0.013
SUCr(mg/dl±SD)	139.87±119.98	137.21±98.47	147.55±176.43	0.387
SUOsm (mOsm/kgH$_2$O±SD)	430±261	464±271	334±204	<0.001
24HUP(g±SD0.	162±0.256	0.187±0.290	0.095±0.087	<0.001
SUPCR(mg/mg±SD)	0.120±0.330	0.133±0.371	0.082±0.163	0.120
SUPOR (mg/dl/mOsmol/ kgH$_2$O±SD)	0.037±0.081	0.035±0.050	0.042±0.0357	
24HUCr(mg±SD	1425.63 ±701.56	1506.88 ±781.38	1202.96 ±315.99	<0.001

24HUOsm (mOsm±SD)	489±465	564±501	284±253	<0.001
SUCOR (mg/dl/mosm/H$_2$O)	0.475±0.583	0.422±0.486	0.628±0.728	<0.001
24HUCOR (mg/mOsm±SD)	0.528±0.450	0.460±0.426	0.707±0.468	<0.001

ClCr=Ceatinine clearance, Hb=Hemoglobin, FSLP=Fasting serum lipid profile, LDL=Low density lipoprotein cholesterol, HDL=High density lipoprotein cholesterol, SCr=Serum creatinine, SUP=Spot urine protein, SUCr=Spot urine creatinine, SUOsm=Spot urine osmolality, 24HUP=24-hour urine protein, SUPCR=Spot urine protein/creatinine ratio, SUPOR=Spot urine protein/osmolality ratio, 24HUCr=24-hour urine creatinine, 24HUOsm=24-hour urine osmolality, SUCOR=Spot urine creatinine/osmolality ratio, 24HUCOR=24-hour urine creatinine/osmolality ratio,

CONCLUSION

Female gender and young age are associated with HIV infection. Abnormalities of serum lipid, serum creatinine, urine protein, urine creatinine and urine osmolality are common in newly-diagnosed HIV subjects in southeast Nigeria. There in need to evaluate HIV patients, at inception, for dyslipidemia, anemia and renal damage.

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