ORIGINAL ARTICLE

Comparison of microalbuminuria among treatment naïve HIV sero-positive and negative adult clients in Faith Alive Foundation Hospital, Jos

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ABSTRACT

Background: This study is to determine microalbuminuria in human immunodeficiency virus (HIV) infected patients before commencement of highly active anti-retroviral treatment (HAART). **Patients and Methods:** Consecutive patients with the HIV infection seen in the HIV counselling and testing (HCT) unit of the Faith Alive Foundation Hospital, Jos, and a similar group of healthy uninfected patients were evaluated for renal disease: Urinary albumin and urinary creatinine were analysed. **Results:** Of the 200 patients with HIV infection and 100 uninfected controls studied, increased urinary albumin excretion (UAE) was present in 39 (19.5%) of the subjects and 5.0 (5.0%) of controls. The difference between the mean values for the UAE for both subjects and controls [182.3 ± 54.3 and 163.9 ± 39.3 mg/l, respectively (P = 0.006)] was statistically significant. On the other hand the urinary creatinine for both the subjects and controls [11.7 ± 5.2 and 12.0 ± 4.8 mmol/L, respectively (P = 0.6)] was not statistically significant. The difference between the mean urinary albumin/creatinine ratio (UACR) for both subjects and controls [1.8 ± 1.2 mg/mmol and 1.4 ± 0.4 mg/mmol respectively (P = 0.001)] was statistically significant. **Conclusion/Recommendation:** Increase UAE is a common complication of HIV infection due to a number of factors other than HAART. Early screening for renal disease using microalbuminuria is very useful since the use of medications such as angiotensin converting enzyme inhibitors, which could help reverse progression to end-stage renal disease.

Key words: HIV infection, microalbuminuria, renal disease risk, urinary albumin and creatinine

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INTRODUCTION

The human immunodeficiency virus (HIV) is a retrovirus that belongs to the Lentivirus genus, the aetiologic agent of the acquired immunodeficiency syndrome (AIDS). The disease was first described in 1981[1] and HIV-1 was isolated by the end of 1983 in the United States of America[1] (USA). The HIV virus type 2 is found predominantly in West Africa[1] and gives rise to a more protracted disease course with majority of the people infected having few signs of immune deficiency. The number of people living with HIV worldwide was estimated to be 39.5 million in 2006, 2.6 million more than in 2004.[2] Sub-Saharan Africa has been the most devastated region accounting for about two-thirds of all infected adults.[2] In Nigeria, over the last decade, there has been an exponential increase in the prevalence of HIV, from less than 1% in 1986 to 5.8% in 2005, and 4.4 to 4.6 in 2008 (range 2-15%) in different communities of different states.[3] The kidney, like other major organ systems, is also affected by HIV/AIDS. This affectation can result from common complications of the disease like dehydration and sepsis or nephrotoxic drugs commonly used in AIDS.[4] Recent evidence suggests a direct role of HIV and a distinct entity, HIV-associated nephropathy (HIV-AN)[4,5] is a late manifestation of HIV infection presenting initially with proteinuria and later with a rapid progression to end-stage renal disease (ESRD) associated with kidney enlargement. It is histologically defined by a collapsing

Access this article online	
Quick Response Code:	Website: www.nigeriamedj.com
	DOI: 10.4103/0300-1652.144711

focal segmental glomerulosclerosis.[5] In the USA, HIVAN is the third leading cause of ESRD, especially among blacks.[6] In Nigeria, almost exclusively a black race is the third leading cause of ESRD among black persons aged 20-64 years.[7] The reason for black predilection is not clear; however, blacks have higher incidence of renal disease e.g. diabetic nephropathy, and drug abuse. Some of the drugs used in the treatment of HIV infections such as zidovudine, indinavir, tenofovir, etc. are known to cause renal disease. In 1984,Rao *et al*.,[8] described nephritic syndrome with focal segmental glomerulosclerosis in nine AIDS patients. The renal complications of HIV infection pose a great challenge to physicians because most cases present late. However, early assessment of renal status using microalbuminuria could help to detect early and preventable renal complications of HIV. However, the enormity of this problem is unknown as literature is scanty. Recently, Ijoma[7] reported 17 patients in Enugu seen with HIV-associated nephropathy (HIVAN).

PATIENTS AND METHODS

This is a cross-sectional survey of microalbuminuria in HIV infected treatment naïve patients. The study population comprised of individuals attending the HCT unit of the Faith Alive Foundation Hospital Jos. The Hospital is a 50 bed non-governmental organisation run facility, situated in the heart of Jos city that provides secondary and some tertiary healthcare services. Specialist units include diagnosis and management of HIV/AIDS clients (counselling, testing and treatment), Ophthalmology, Obstetrics and Gynaecology, Surgery, Internal and Family Medicine. Over 200 patients are seen on the average per day as out patients. The Patients are composed of both gender and mostly of low- and middle-income class. Subjects aged between 18 and 60 years were recruited among clients who have received their HIV test results (using enzyme-linked immunosorbent assay (ELISA) and confirmed by Western Blot) and an informed consent obtained. Subjects with HIV positive result that are yet to commence HAART treatment are placed in the experimental group while subjects that tested negative are the controls.

Patients were informed of the objectives of the study after which they gave written consent. Information volunteered was treatment with utmost confidentiality. Ethical clearance was obtained from the ethical committee of the Faith Alive Foundation Hospital, Jos.

Each of the cases and controls were administered questionnaire by an interviewer and were examined. Their case notes were also reviewed to obtain socio-demographic and clinical information, anthropometric measurements (weight and height). Early morning urine specimen of 100ml was collected into a universal bottle to estimate urine albumin and creatinine. The inclusion criteria are highly active antiretroviral therapy (HAART) treatment naïve HIV-seropositive and negative adult males and females aged 18-60 years.

Patients were excluded from the study if they had hypertension, diabetes mellitus, urinary tract infection (UTI), aged <18 and >60 years, pregnant, volume depletion, documented fever (temperature >37.5°C), heart failure, patients on angiotensin converting enzymes (ACE) inhibitors and on HAART. The urinary albumin was estimated using turbidimetric method whereas the creatinine was estimated using Jaffe kinetic method.

Analytical accuracy and precision was ensured by simultaneous analysis of good quality commercially prepared controls and standards in each batch. The within batch coefficient of variation (CV) for urine creatinine was 20% whereas the between batch CV was 30%. The within batch CV for urine albumin was 36%. On the other hand, the between batch CV for urine albumin was 38%. Patients samples were also duplicated in each batch.

Data analysis

Data generated was entered into Statistical Package for Social Sciences (SPSS Incorporated Chicago Version 15.0). Socio-demographic characteristics of the case and the control groups were analysed for difference, using student's *t*-test.

The mean values and standard deviation of biochemical characteristics, proportion of cases average UACR of the case group was compared with that of the control group to identify difference. $P < 0.05$ was considered statistically significant.

RESULTS

Two hundred patients who are HIV positive confirmed by Western blot assay and 100 controls making a total of 300 were recruited into the study. There was no statistically significant difference in the mean age as well as the mean values of body weight of the experimental and the control groups [Table 1]. However, there was statistically significant difference in the mean values for body mass index (BMI) for experimental group (23.5 ± 1.8 3 kg/m^2) and controls (24.0 ± 2.3 kg/m^2) ($P = 0.04$) [Table 1].

The difference between the mean values for the UAE for both subjects and controls [182.3 ± 54.3 and 163.9 ± 39.3 mg/l respectively ($P = 0.006$)] was statistically significant. On the other hand, that of the urinary creatinine for both the subjects and controls [11.7 ± 5.2 and 12.0 ± 4.8 mmol/L respectively ($P = 0.6$)] was not statistically significant.

The difference between the mean UACR for experimental (1.4 ± 0.4 mg/mmol) and Controls (1.8 ± 1.2 mg/mmol) groups was statistically significant ($P = 0.001$) [Table 2]. Likewise, there was a statistically significant difference

in the proportion of experimental group, (19.5%) and controls (5.0%) with raised albumin/creatinine ratio [Table 3].

DISCUSSION

In this study, the prevalence of renal disease (determined by elevated UACR) in HIV-infected patients was 19.5%, which is similar to the earlier reported studies by Fabian[2] and Pardo.[5] This high prevalence may be due to the entirely Black population, a racial group known to have a high predisposition for HIVAN and other renal diseases. However, the increase in UAE (19.5%) obtained in this study may even be higher than the true prevalence of HIVAN since renal biopsy, which is cardinal to the diagnosis of HIVAN was absent. The mean age of patients with renal disease in this study was very similar to those with HIVAN found in studies conducted by Ross MJ[9], possibly because this is the peak period of sexual activity.

Twelve percent of patients with renal disease (UACR>20 mg/mmol) in this study were males and 7.5% were females. This compares well with the studies by various authors.[4] In a review of 200 patients with HIVAN, in the previous studies, males accounted for 70%.[6] The present study also showed a predominance of male subjects, which confirms the knowledge that male gender is a risk factor for the development of renal disease.[6] Similarly, increase in urinary albumin excretion in this study, showed a male preponderance occurring in 53.6% of males and 46.4% of females, which also confirms that male gender is a risk factor for the development of renal disease.[10] The finding of proteinuria as the most common manifestations of renal disease in this study is in keeping with those of Rao[8] and Ijoma.[7] Proteinuria may be the initial manifestation of HIVAN, a condition that affects 2-10% of AIDS patients.[4] The course of HIVAN is usually a rapid progression to ESRD in the setting of normal sized or enlarged kidneys.[6] The HIVAN is histologically defined by a collapsing focal segmental glomerulosclerosis.[6] The absence of renal biopsy in this study however, makes the presence of HIVAN in our patients speculative, as this is cardinal to its diagnosis.[5,6]

Although this study design considered other conditions that could cause proteinuria in HIV/AIDS patients,[5,8] these cannot be adequately excluded without a renal biopsy. The observed significant correlation between proteinuria and body mass index (BMI), further confirmed proteinuria as a major risk factor for renal disease and a worsening of proteinuria with the degree of renal dysfunction has been documented.[11]

CONCLUSION

In conclusion, this study has demonstrated that renal disease is more common among HIV-infected patients compared to non-HIV infected individuals. It emphasises the need for Physicians to routinely evaluate HIV-infected patients for renal disease before the commencement of HIV treatment and correct potentially reversible causes of renal disease in these patients. More significantly, there may be even greater need with HIV treatment. This is because a majority of these patients were in albuminuric stage and were therefore amenable to specific treatment with angiotensin converting enzyme inhibitor (ACE) or angiotensin receptor blocker (ARB) therapy. The HIVAN may represent an important risk factor for ESRD in our population, and its contribution to the burden and magnitude of ESRD in Nigeria will very likely overwhelm the health system.

Table 1: Mean values of characteristics of the study populations compared using *t*-test

Characteristics	Experimental group (*n* = 200)	Controls (*n* = 100)	*P*-value
Sex (M/F)	100/100	50/50	—
Age (years)	37.7±6.2	36.8±3.2	0.18
Weight (kg)	60.7±6.1	61.2±7.3	0.53
BMI (kg/m2)	23.5±1.8	24.0±2.3	0.04

P < 0.05 – Significant

Table 2: Mean values of biochemical parameters of study populations compared using *t*-test

Characteristics	Experimental group	Control group	*P*-value
Urinary albumin turbidimetric (mg/l)	182.3±54.3	163.9±39.3	0.006
Urinary albumin special strips (%+)	23.5	12	0.018
Urinary Creatinine (mmol/L)	11.7±5.2	12.0±4.8	0.63
Urinary albumin/Creatinine ratio (mg/mmol)	1.8 ±1 .2	1.4±0.4	0.001
Plasma albumin (g/l)	40.6±6.3	39.7±3.3	0.18
Plasma creatinine (µmol/l)	94.1±59.5	93.8±53.4	0.97

Table 3: Mean values of urinary albumin/ creatinine ratio among experimental and control groups compared using Chi-square test

Characteristics	Experimental *n* (%)	Control Group *n* (%)	*P*-value
UACR (mg/mmol) ≤20	161 (80.5)	95 (95)	0.0
UACR (mg/mmol) ≥20	39 (19.5)	5 (5)	0.0
Total	200 (100)	100 (100)	

P < 0.05 – Significant

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How to cite this article: Shabbal DM, Jamda MA, Dalhatu IT, Abdulrahman MB, Isichei C. Comparison of microalbuminuria among treatment naïve HIV sero-positive and negative adult clients in Faith Alive Foundation Hospital, Jos. Niger Med J 2014;55:508-11.

Source of Support: Nil, **Conflict of Interest:** None declared.