MICROALBUMINURIA AND IMMUNOSUPPRESSION IN TREATMENT NAÏVE HIV SEROPOSITIVE ADULTS IN FAITH ALIVE FOUNDATION HOSPITAL JOS, NIGERIA

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Abstract

Background: This study set out to determine the relationship between microalbuminuria and immunosuppression in treatment naïve HIV seropositive patients.

Patients and Methods: 200 consecutively selected, treatment naïve HIV patients seen in the HIV counseling and testing unit of the Faith Alive Foundation Hospital, Jos, were evaluated for renal disease and immunosuppression: Urinary albumin, urinary creatinine, and CD4 count were analyzed using standard methods.

Results: Of the 200 treatment naïve HIV patients evaluated, microalbuminuria was present in 39 (19.5%). The difference for the mean values of urinary albumin excretion, (182.30+54.30) p(0.006), was statistically significant. On the other hand, the mean values for the urinary creatinine, (11.70+5.20) p (0.60), was not statistically significant. The difference between the mean values of the albumin/creatinine ratio, (1.80+1.20) p (0.001), was statistically significant. The mean value of microalbuminuria in the immunosuppressed (CD4 count of <200/mm³) was 70.30%, while the mean values of immunosuppressed patients without microalbuminuria was 0.70% p (0.00) was statistically significant.

Conclusion/Recommendation: this study revealed a direct relationship between microalbuminuria and immunosuppression. The means the immunosuppressed treatment naïve HIV patients showed increased urinary albumin excretion. Therefore, HIV positive immunosuppressed patients should be more frequently screened for microalbuminuria to prevent them from progressing to end stage renal disease.

Keywords: HIV infection, microalbuminuria, immunosuppression, urinary albumin, urinary creatinine, and CD4 count

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INTRODUCTION

HIV, since its discovery about thirty years ago, continue to remain a public health challenge.¹ The estimated number of people living with HIV from 2010 to 2015 increased from 33.3 million to 36.7 million globally while the estimated number of new HIV infection decrease from 2.2 million in 2010 to 2.1 million in 2015.² Also, the number of PLHIV on ART increased from 7.5 million in 2010 to 17.0 million in 2015. Sub-Saharan Africa region is the most affected, accounting for nearly 70% all PLHIV, 65% of all new HIV infections, 71% of all PLHIV on ART and 72% of all AIDS related deaths in 2015.² Sub-Saharan Africa has been the most devastated region, accounting for about two-thirds of all infected adults.² In Nigeria, the last decade, saw a decrease in the prevalence of HIV from 4.6% in 2008 to 3.0% in 2014.

The kidney, like other major organ systems, is also affected by HIV/AIDS. This can result from common complications of the HIV/AIDS such as dehydration and sepsis or from nephrotoxic drugs commonly used in HIV/AIDS treatment.³ Recent evidence suggests a direct role of HIV and a distinct entity, HIV-associated nephropathy (HIV-AN)^{3,4} is a recognized late manifestation of HIV infection. HIV-associated nephropathy initially presents 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 focal segmental glomerulosclerosis. In the United States, HIVAN is the third leading cause of ESRD, especially among blacks.³ In Nigeria, with almost exclusively black race population, it is the third leading cause of ESRD among persons aged 20-64 years.⁴ The reason for black predilection is not clear. However, blacks have a higher incidence of renal

disease as they already have increased risks for renal diseases, including diabetes and drug abuse. Some of the drugs used in the treatment of HIV infection such as Zidovudine, Indinavir, Tenofovir are also known to cause renal disease.⁵

The renal complications of HIV infection pose a great challenge to physicians, especially that presentation is often late. However, early screening for microalbuminuria could help to detect early renal dysfunction and preventable complications of HIV infection. Although Ijoma et al.⁷ recently reported seventeen patients with HIV-associated nephropathy (HIVAN) in Enugu, the enormity of renal dysfunction among HIV infected individuals in Nigeria has not been well characterized.

Objectives: The study therefore, set out to evaluate the presence of albuminuria/urinary creatinine and determine whether there is a relationship between CD4+ counts and microalbuminuria among the patients at Faith Alive Hospital in Jos, Nigeria.

METHODOLOGY

This was a comparative cross-sectional survey of microalbuminuria and CD4+ count as a proxy indicator of immunosuppression among HIV infected treatment naïve patients. The study population comprised of individuals attending the HIV Counseling and Testing (HCT) unit of the Faith Alive Foundation Hospital Jos, Nigeria. The Hospital is a 50-bed non-governmental organization run facility situated in Jos metropolis. It provides secondary and tertiary / specialist healthcare services. Clinicians consult an average of 200 outpatients every working day in the clinic. The Patients are mostly of low- and middle-income class. The data was collected and analyzed appropriately.

Two hundred (200) consecutively sampled, antiretroviral naïve HIV positive (confirmed) patients between 18 and 60 years of age were recruited into the study after an informed consent was obtained from them. The researcher identified two research assistants and trained them for one day on data collection and seeking research consent from respondents. Thereafter, the researcher administered a questionnaire to all recruited. This was followed by a clinical examination of all recruited patients. Patients' case notes were also reviewed to obtain socio-demographic and clinical information including anthropometric measurements. 100ml of early morning urine specimen was collected in a universal bottle to estimate urine albumin and creatinine, and 5ml of blood was collected for CD4⁺ enumeration from the clients. The inclusion criteria for recruitment were ART naïve HIV seropositive patients, aged 18-60 years and written consent. Patients were excluded from the study if they had hypertension, diabetes mellitus, urinary tract infection, heart failure, pregnancy, had volume depletion or documented fever (temperature >37.50C). Those on angiotensin converting enzymes (ACE) inhibitors were also excluded.

The urinary albumin was estimated using turbidimetric method whereas the creatinine was estimated using Jaffe kinetic method. The CD4 count was estimated using flow cytometric method. Patients with micro albuminuria were compared with those without it in terms of demographic characteristics and CD4 count. 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% and that of CD4 count was 14% and 18% respectively. Patient's samples were also duplicated in each batch. The data were anonymized while ethical clearance was obtained from the ethical committee of the Faith Alive Foundation Hospital, Jos.

Data generated was entered into Statistical Package for Social Sciences (SPSS Incorporated Chicago Version 15.0). Socio-demographic characteristics of the case and control groups were analyzed for difference, using student's t-test. The mean values and standard deviation of biochemical characteristics, proportion of cases average urinary albumin creatinine ratio (UA/CR) of the case group was compared with that of the control group to identify difference, $P < 0.05$ was considered statistically significant.

RESULTS

Information was collected blood sample was investigations conducted on the two hundred HIV/AIDS patients recruited for the study. They were grouped into immunosuppressed and immunocompetent based on their CD count.

In immunosuppressed patients (CD4 < 200 / mm³), microalbuminuria (UACR > 21) was found in 55% and those without microalbuminuria is 45% which is statistically significant, $p = 0.00$.

On the other hand, immuno-competent patients (CD4 > 200 / mm³), microalbuminuria (UACR > 21) was found in 0.7%

while those without microalbuminuria was found to be 99.3% and the difference was statistically significant, $p = 0.00$.

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 et al.⁵ This high prevalence may be due to the entirely Black population used for the study, a racial group known to have a high predisposition for HIVAN and other renal diseases. However, the high 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 similar to those with HIVAN found in studies conducted by Ross et al.⁹, possibly because this is the peak period of sexual activity which is a risk for HIV infection.

Twelve percent of patients with renal disease (UACR > 20 mg/mmol) in this study were males while 7.5% were females. This compares well with those of other studies.⁶ 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 is in agreement with the belief 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 Rao⁸ and Ijoma.⁷ Proteinuria may be the initial manifestation of HIVAN, a condition that affects 2-10% of AIDS patients.^{5,6} The course of HIVAN is usually a rapid progression to ESRD in the setting of normal sized or enlarged kidneys and 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 The significant statistical difference observed between the immunosuppressed patients with microalbuminuria and those without microalbuminuria shows that immunosuppression is related to increase urinary excretion.

CONCLUSION

Microalbuminuria has a direct relationship with immunosuppression from this study. This could mean that the treatment naïve HIV infected patients who are immunosuppressed (CD4 count of < 200/mm³) also were seen to have increased urinary albumin excretion. Therefore, HIV positive immunosuppressed patients should be

routinely screened for microalbuminuria to prevent them from progressing to end stage renal disease.

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Table 1: Characteristics of study population

Characteristics (n = 200)	Total
Sex	
Male	100
Female	100
Mean Age (years)	...
Mean Weight (kg)	60.7±6.1
BMI (kg/m²)	23.5±1.8

NB: Original table

Table 2: Mean values of CD4 count and microalbuminuria compared

Characteristics	Microalbuminuria (≥21UACR)	No Microalbuminuria (<20UACR)	P-value
CD4 Cell Count			
≤ 200 /mm ³	55%	45%	0.00
≥ 200 / mm ³	0.7%	99.30%	0.00

NB: Original table

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