Sociodemographic Characteristics of Patients with Advanced HIV Disease in Enugu, South-east Nigeria: A Retrospective Analysis of Program Data

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Abstract:-
Background: Advanced Human Immunodeficiency Virus disease is militating against the gains made in HIV care and treatment programs, especially in sub-Africa. Even with broadened access to antiretroviral therapy, HIV patients develop advanced HIV disease due to re-emerging opportunistic infections. This study x-rayed the sociodemographic characteristics of patients with advanced HIV disease in order to facilitate HIV program designs that focus on the prevention, care, and treatment of advanced HIV disease.
Methods: This was a retrospective analysis of program data of patients diagnosed with advanced HIV disease, based on their CD4 cell counts, between April 2022 and March 2023. A descriptive statistical analysis of their sociodemographic variables was done using SPSS version 22. The statistical correlations between the socioeconomic status and results of the Lateral Flow-Lipoarabinomannan and cryptococcal antigens tests, ART adherence, and patients living status were computed. The observations were presented with tables and charts.
Results: Advanced HIV disease concentrated in the 31 to 45-year age group with observable preponderance for female patients and people of lower socioeconomic status. There was no significant association between patients' socioeconomic status and results of tuberculosis screening tests (95% CI; p = 0.425) and ART adherence (95% CI; p = 0.847); patients' gender and CD4 cell count at the time of AHD diagnosis.
Conclusion: The findings that advanced HIV disease is common among female HIV-positive patients and people from lower socioeconomic status signal the design of the AHD package of care around these vulnerable populations.

Keywords:- *Militating; Gains; Re-Emerging; Retrospective; Lower Socioeconomic Status; Vulnerable Population.*

I. INTRODUCTION

Advanced HIV disease (AHD) is defined as HIV in under-five children, a CD4 cell count < 200 cells/mm3, or stage three and four diseases in adults and adolescents with HIV[1]. Globally, TB, severe bacterial infections, cryptococcal disease, histoplasmosis, toxoplasmosis, and Pneumocystis jirovecii pneumonia are the opportunistic infections (OIs) commonly implicated in morbidity and mortality among people living with HIV (PLHIV)[2]. In 2016, the Ministry of Health of Nigeria adopted the Treat-All approach, which is the immediate commencement of antiretroviral therapy for all adults and children diagnosed with HIV infection[3]. Even with the introduction of tests and treat-all, the risk of death is high in patients with AHD even after ART initiation, especially at low CD4 count level[4]. Tuberculosis (TB) is the leading cause of morbidity and mortality among people living with HIV, while severe bacterial infection is responsible for a third of hospitalization among PLHIV worldwide[5-6]. The use of prophylactic antimicrobial agents with judicious use of antiretroviral drugs in patients diagnosed with advanced HIV disease resulted in clinical improvement in patients in the first week of therapeutic intervention[7]. Although there have been significant advances in the design of care around PLHIV and breakthroughs in the development of novel antiretroviral medications, AIDS-related death is rising due to AHD[5]. Worldwide, over 38 million people are living with HIV and about 28 million patients are continuing with treatment. However, over 680, 000 AIDS-related deaths were recorded in 2021 alone[8]. In Nigeria, the prevalence of AHD is not known. However, a data review from the National Data Repository (NDR) in 2019 showed that 1 in 3 had immunologic AHD and an AIDS-related death rate of 0.22 per 1000 deaths[9]. Over a quarter of patients diagnosed with HIV have severe outcomes after admission, highlighting the significance of post-discharge referral of patients for ART interventions[10].

Recognizing AHD requires astute clinical review, CD4 cell estimation, and screening for notorious opportunistic infections. CD4 cell testing is a good predictor of AHD as these cells proportionately decline with HIV disease progression. Measuring CD4 cell counts is critical in the diagnosis and periodic assessment of patients, as it provides information about the status of immune function. Periodic measurement of CD4 cells guides healthcare workers in determining the need for screening for and prophylaxis for common opportunistic infections. It is recommended that CD4 cell counts be monitored at the initiation of therapy, three months after therapy has started, and every 12 months, depending on the patient's clinical status[11].

The AHD package of care is recommended for people presenting with advanced HIV disease and it includes screening, prophylaxis, and/or treatment for the commonly implicated opportunistic infections, rapid ART initiation, and patient-centered adherence support[12]. In order to successfully implement the AHD package of care to bend the mortality curve due to AHD, there needs to be a widespread in-country supply of AHD commodities, training of healthcare staff on the management of AHD, and an efficient AHD surveillance system. The Federal Ministry of Health, Nigeria rolled out the first phase of the AHD package of care interventions in 28 high-volume healthcare facilities across four priority states, adopting the hub–and–spoke model to ensure that patients diagnosed with AHD in a peripheral healthcare facility are referred to the tertiary facilities that have the capacity to manage the patients' complications[13]. The unavailability of diagnostic tests for OIs like Lateral Flow-lipoarabinomannan (TB LF-LAM), and Cryptococcal antigen (CrAg) in addition to healthcare capacity gaps militate against the rapid implementation of the AHD package of care[14]. Experts have also called for the integration of the three work streams necessary for a better quality of life among PLHIVs: scale-up of antiretroviral treatment through outpatient programs[15], intentional implementation of the WHO-recommended AHD package of care to reduce mortality[16] and institutionalization of comprehensive patient-centered palliative care model for people living with HIV8. Although the effectiveness of palliative care has been demonstrated in the management of patients with chronic conditions, its use in the care of AHD patients is unpopular. The evolution in HIV therapeutics has replaced high mortality associated with HIV leading to improved life expectancy and a high disease burden on patients, families, and healthcare[17].

Several pieces of literature have documented that caregivers' socioeconomic status (SES) impacts health outcomes, especially in chronic illnesses like HIV/AIDS[18]. The SES of caregivers impacts the health outcomes of children[19]. There are myriads of literature on AHD, however, there is a paucity of information on the sociodemographic identities of patients diagnosed with AHD in our clime. There is a need to characterize patients with AHD in our setting to facilitate future risk stratification and planning for patients that would need an AHD care package. This study x-rayed the socio-demographic characteristics of people living with advanced HIV disease.

II. METHODOLOGY

This is a retrospective descriptive study on patients diagnosed with AHD between April 2022 to March 2023 in ART centers in Enugu state, southeast Nigeria. We extracted data from the electronic medical records (EMR) for 342 patients who were diagnosed with and received care for AHD during the period. The patients' data extracted were sociodemographic variables (age, gender, education, and occupation), CD4 cell count at AHD diagnosis, TB LF-LAM, CrAg screening test results, and OIs treatment status. For children and adolescents, the SES of the parents or caregivers was ascertained. The information on participants' education and occupation was collected during clinic visits and via phone calls. Patients' ART adherence was calculated using patients' self-report validated by EMR entries. The ART adherence rate was calculated by: Number of pills doses taken ÷ number of pills doses prescribed x 100 (where the number of pills taken = the number of pills prescribed – number of pills missed). The adherence was classified as optimal and suboptimal if ART adherence was above and below 95% respectively. The patients' socioeconomic status was calculated using the revised Scoring Scheme for the Classification of Socioeconomic Status in Nigeria[20]. The tool classified socioeconomic status into upper, medium, and lower based on the average educational attainment and occupation score of both parents and caregivers. It is graded on a score of 1 to 6; 1 being the highest and 6 being the lowest. The average score of the two variables is calculated. A person with a score of 1 to 2 belongs to the upper socioeconomic class, and a score of 3 to 4, and 5 to 6 belong to the middle, and lower socioeconomic classes, respectively. The data were coded and inputted in the Statistical Package for Social Sciences (SPSS) version 22 for analysis. Descriptive statistics were used to describe patients' sociodemographic characteristics while inferential statistics were used to determine the association between sociodemographic variables and AHD diagnosis. The observations were presented in tables and charts.

III. RESULTS

There were 342 patients diagnosed with advanced HIV disease between April 2022 to March 2023 in Enugu. The mean age of the AHD patients was 38 years (SD ±12.8). The modal age was 41 years while the minimum and maximum ages were 2 years and 83 years respectively (Table 1). The patient ages were further categorized into five-year age groups. Laboratory parameters for advanced HIV disease were common among the 30-40, 41-45, and 31- 35-year age groups and less common among the extreme age groups (Fig 1).
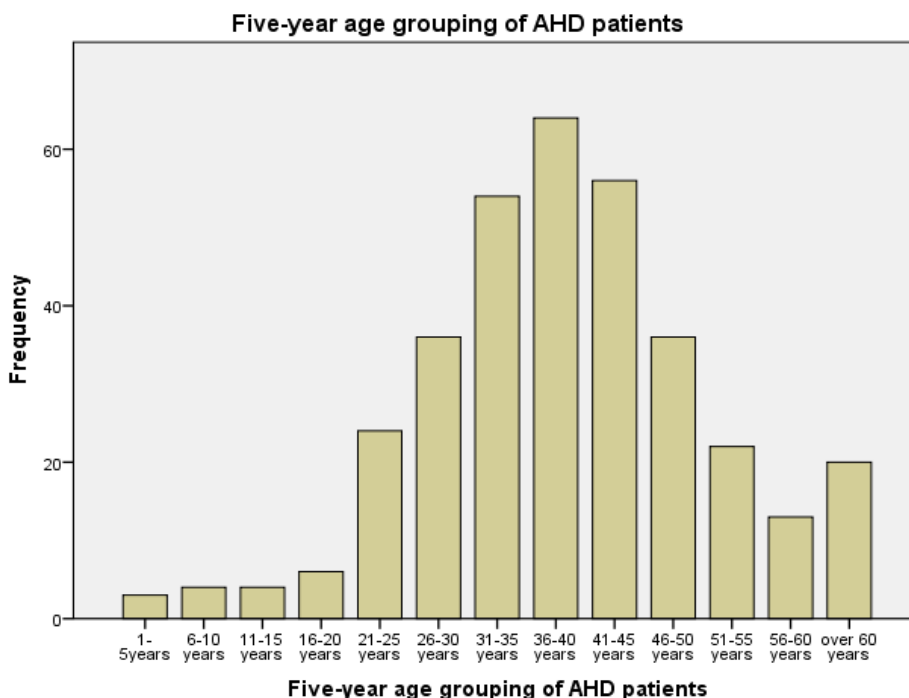
Fig 1: Chart distribution of the age groups of AHD patients based on CD4 cell counts between April 2022 to March 2023.

Table 1: Sociodemographic variables of AHD patients.

Variable	Frequency(n)	(%)
Age group (years)	[N=342]	
1-5years	3	1
6-10 years	4	1.2
11-15 years	4	1.2
16-20 years	6	1.8
21-25 years	24	7.0
26-30 years	36	10.5
31-35 years	54	15.8
36-40 years	64	18.7
41-45 years	56	16.4
46-50 years	36	10.5
51-55 years	22	6.4
56-60 years	13	3.8
>60 years	20	5.8
Mean ± SD	38.9±12.75 years	
Median	38 years	
Maximum	83 years	
Minimum	2 years	
Gender		
Male	133	39
Female	209	61
Socioeconomic status		
Upper	13	4
Middle	70	20
Lower	259	76
Survival Status		
Alive	321	94
Dead	21	6

There were 209 (61%) and 133 (39%) female and male AHD patients respectively between April 2022 and March 2023 (Table 1). Two hundred and fifty-nine (76%) were from the lower socioeconomic class, while 70 (20%) and 13 (4%) were from the middle and upper socioeconomic classes (Table 1). The mortality rate among AHD patients was 6% (Table 1). A total of three hundred (88%) and 217 (64%) AHD patients underwent CrAg and TB LAM tests respectively during the period under review while Tuberculosis and Cryptococcal antigen positivity rates among those that had the tests were 39% and 5% respectively (Table 2). A negative Pearson's association was observed between SES and TB LF-LAM (N =342; r = -0.004) and ART adherence (N =342; r = -0.007); TB LF-LAM results and ART adherence (N =342; r = -0.013) (Table 3). The Pearson's Chi-Square tests did not reveal any significant association between patients' SES and the TB LF- LAM test (95% CI; p = 0.425); ART adherence and TB LAM result (95% CI; p = 0.796); patients' gender and TB LF-LAM results (95% CI; p = 0.793) (Table 4).

Table 2: Uptake and positivity rates of CrAg and TB LAM tests among AHD patients between April 2022 and March 2023.

Tests		Frequency	%	Positivity %
CrAg Test				
Valid	CrAg test (done)	217	64	
	CrAg test (not done)	125	36	5
	Total	342	100	
TB LF-LAM Test				
Valid	TB LAM (done)	300	88	
	TB LAM (not done)	42	12	39
	Total	342	100	

Table 3: Correlations between SES, TB LAM result, and ART Adherence status.

Variables		Socioeconomic status of AHD patients	TB LAM result	ART Adherence status
Socioeconomic status of AHD patients	Pearson Correlation	1	-.004	-.007
	Sig. (2-tailed)		.942	.900
	N	342	342	342
TB LAM result	Pearson Correlation	-.004	1	-.013
	Sig. (2-tailed)	.942		.806
	N	342	342	342
ART Adherence status	Pearson Correlation	-.007	-.013	1
	Sig. (2-tailed)	.900	.806	
	N	342	342	342

Table 4: Chi-Square Test

Variables	Value	df	Likelihood ratio	X^2 (2-sided)
ART Adherence and TB LF-LAM Result	0.457	2	0.448	0.796
SES and ART Adherence rate	0.332	2	0.332	0.847

IV. DISCUSSION

This study found that, in our setting, advanced HIV disease concentrated in the middle age group (35 to 45 years) while the younger (1 to 20 years) and older age (51 to 60 years) categories were comparatively less affected by AHD. Several studies have reported a high rate of HIV transmission among the middle age groups[21-23]. A significant number of HIV-positive people live into old age and it signals the design of an HIV intervention program that will focus on the aging population. The HIV-positive patients in the lower socioeconomic class were worst hit by AHD and it validated the findings from other studies that poverty hastens the progression of HIV disease[24]. The HIV package of care ought to include social health protection packages designed to mitigate the impact of advanced HIV disease on patients. Affordable health insurance policies guarantee universal health coverage and enable patients and families to live a quality life.

In our study, the uptake of TB LF-LAM and CrAg tests were 88% and 64% respectively for the AHD patient population. It showed that a worrisome number of patients missed the opportunity to access the package of care for the diagnosis of commonly implicated OIs like TB and Cryptococcal infections. One reason for the suboptimal uptake is that the AHD package of care is newly implemented in Nigeria with few tertiary health institutions involved in the first phase of its implementation[14]. Furthermore, there is no sustained supply of the AHD package of care commodities to the healthcare facilities. The diagnostic positivity rates for TB and Cryptococcal infections among HIV patients using TB LF-LAM and CrAG were 39% and 5%. These findings were in tandem with the global

understanding that TB is the commonest opportunistic infection implicated in AHD patients[5-6].

This study found a negative Pearson correlation between the socioeconomic status of AHD patients and the outcome of the TB LF-LAM test and it calls for proactive TB preventive measures among HIV-positive patients from lower socioeconomic status. Although HIV-positive patients who are poorly adherent to antiretroviral medications may have unsuppressed and ultimately AHD this study found no statistically significant relationship between ART adherence and the TB LF-LAM results. This study did not find any association between patients' gender and their survival status.

One drawback of this study was that the survival rates for the AHD patients were not determined. Notwithstanding, characterizing AHD patients will help public health implementers design an HIV intervention program that is focused on preventing AHD among HIV-positive patients, halting the progression of the disease, and mitigating the burden of the disease, especially among the population with the high burden.

DECLARATION OF INTEREST.
The authors have no competing interest to declare.

AUTHOR RESPONSIBILITIES.
CKO drafted the manuscript with contributions from FB, EO, AE, EGC, and JOO. CKO, EM, and OJU oversaw data analysis. The authors studied and adopted the final manuscript.

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