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Hepatitis B Infection in People Living with HIV/AIDS; A Retrospective Study of the Effia Nkwanta Regional Hospital

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Authors' contributions

This work was carried out in collaboration among all authors. Authors RA, RKDE, RCB and BCE designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors BCE and RKDE managed the analyses of the study. Authors BCE, KOD, JPKN and CO managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Comorbidities among people living with HIV/AIDS (PLWHA) increases with disease severity. This may be attributed to highly active antiretroviral therapy (HAART) toxicity and HIV/AIDS-related infections.
Aim: We investigated the presence of comorbidities among PLWHA and reported their clinical and biochemical characteristics.

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Methods: This study was conducted at the Effia Nkwanta Regional Hospital (ENRH) in the South-Western part of Ghana. A retrospective data of 500 participants (134 males and 366 females) was collected from HIV/AIDS patients on HAART (January 2012 to January 2016). Sociodemographic characteristics and laboratory data of patients were retrieved from patients' clinical files and laboratory database respectively. Data was analyzed with SPSS for both descriptive and inferential analysis.

Results: A total of 96 (19.2%) comorbidities were recorded (N=500). The most prevalent comorbidity was hepatitis B virus infection (34.4%). Among the 96 HIV/AIDS patients who had comorbidities, 27 (28.1%) were males and 69 (71.9%) were females. The systolic blood pressure (SBP) of the HIV/AIDS patients with comorbidities was similar to that of those without comorbidities (113.84 ± 16.73 vs 115.32 ± 15.68). Majority of the participants with comorbidities 59 (61.5%) and those without comorbidities 227 (56.2%) were found to be on the same therapy combination (TDF+3TC+EFV). The decreased CD4 cell count, estimated glomerular filtration rate (eGFR), serum potassium and creatinine were similar in the participants (those with comorbidities and those without comorbidities). None of the demographic, clinical and biochemical parameters were associated with the presence of comorbidities.

Conclusion: The total prevalence of commodities was 19.2% and the most prevalent commodity was HBV (34.4%). The comorbidities were common among females, the married and old people living with HIV/AIDS. Early and regular screening will be a key prevention and control strategy for the HIV/AIDS-associated commodities.

Keywords: Comorbidities; HIV/AIDS; demographic; clinical; biochemical.

1. INTRODUCTION

The Human Immunodeficiency Virus (HIV), which has been of immense concern over the years, is associated with several communicable diseases and non-communicable diseases [1]. Comorbidities can be defined as the existence of additional distinct disease entities during the clinical course of a patient who has the index disease under study [2]. The index disease in this instance is HIV/AIDS and those infected have been shown to develop comorbidities such as cardiovascular, renal, pulmonary, hepatic and mental diseases as well as non-HIV/AIDS defining malignancies at an earlier age than the uninfected [3]. The HIV/AIDS infection itself greatly compromises immunity and pre-existing chronic medical conditions could also be exacerbated contributing to the comorbidities [2]. Furthermore, the toxicity of the antiretroviral drugs and the interaction between the drugs for the management of the comorbidities and highly active antiretroviral therapy (HAART) contributes to comorbidities in people living with HIV/AIDS (PLWHA). Therefore, the presence of organ damage in patients receiving antiretroviral treatment is not only the expression of treatment toxicity, but also a complex interaction between individual risk factors, HIV/AIDS correlated effects, and antiretroviral drug toxicity. As PLWHA grow older, they also become more susceptible to developing physical and mental diseases [4]. Individuals with HIV/AIDS have higher prevalence of multimorbidity [4] including cardiovascular complications such as coronary artery disease, hypertension, hypercholesterolemia, and diabetes mellitus [5] as well as cancer and diseases of the liver, kidney, bone (e.g., osteopenia), and nervous system [6].

Opportunistic infections are common among PLWHA who are highly susceptible to various comorbidities in both developed and developing countries [7].

However, the characteristics of PLWHA on HAART with comorbidity are not well described in Ghana. This study sought to investigate the presence of comorbidities among PLWHA and report their clinical and biochemical characteristics.

2. MATERIALS AND METHODS

This retrospective hospital-based study was conducted from January 2012 to December 2016 among PLWHA who visited the HIV/AIDS clinic at the Effia Nkwanta Regional Hospital (ENRH) in Takoradi in the South-Western part of Ghana.

2.1 Setting

The hospital offers both general and specialist care services in internal medicine, general

surgery, paediatrics, obstetrics and gynaecology, dental and eye care and also serves as the main referral facility for the South-western parts of the country. The hospital admits over 7500 –10,000 patients annually.

2.2 Study Population

We retrospectively sampled the records of 500 HIV/AIDS patients receiving HAART in ENRH. Due to the completeness of data within the study period, 134 males and 366 females with HIV/AIDS at the HIV/AIDS clinic of the Effia Nkwanta Teaching Hospital were recruited.

2.3 Ethical Considerations

The study was approved by the Institutional Review Board of the University of Cape Coast (IRB-UCC) and the authorities of Effia Nkwanta Regional Hospital for approval. Besides, all data were anonymized before analyzed.

2.4 Inclusion and Exclusion Criteria

We included HIV/AIDS patients on HAART and excluded HAART naïve HIV/AIDS patients. Also, HIV/AIDS patients whose folders did not contain adequate information within the stipulated period for the study were excluded.

2.5 Collection of Data

Retrospective data of 500 HIV/AIDS patients on HAART (134 males and 366 females) were retrieved from the laboratory database and hospital folders. Data of the participants from January 2012 to December 2016 were included. Demographic and laboratory data (biochemical and serological findings) of patients were retrieved from the laboratory database. Also, past medical history, family history, social class and clinical examination information were retrieved from the patients' clinic files.

Names of antiretrovirals: zidovudine (AZT), lamivudine (3TC), efavirenz (EFV), nevirapine (NVP), tenofovir (TDF), stavudine (d4T).

2.6 Statistical Analysis

Data was analyzed with SPSS version 16 (SPSS Inc. Chicago). Descriptive statistics were computed with standard methods and were presented as mean and standard deviations (SD). Chi-square test was used to compare the association between categorical variables and independent t-test was used to compare the mean value of some laboratory parameters and socio-demographics. One-way ANOVA was also employed to compare the mean scores of more than two groups and $P < 0.05$ was interpreted as statistically significant.

3. RESULTS

The data showed that male participants were older than females ($P = 0.004$) (Table 1). Majority of the participants were married 257 (51.1%) and had been with the condition [400 (80.0%)] and on medication [403 (80.6%) for less than 5 years. SBP ($P = 0.358$) and DBP ($P = 0.882$) were similar among the participants. Majority of the HIV/AIDS patients 292 (58.4%) had normal BMI, 133 (26.6%) were underweight, 56 (11.2%) were overweight and 19 (3.8%) were obese.

A total of 96 (19.2%) comorbidities were recorded among the participants. The most prevalent comorbidities were hepatitis B virus infection 33 (34.4%), arthralgia 7 (7.3%), sickle cell disease (SCD) 6 (6.3%), diabetes mellitus 6 (6.3%), jaundice 6 (6.3%), chronic diarrhea 5 (5.2%) and visual changes 5 (5.2%) while tuberculosis (TB), insomnia, Kaposi sarcoma, pneumonia, skin rash, slow mentation, anaemia, amnesia and paresthesia were the least prevalent comorbidities (Table 2).

Among the 96 HIV/AIDS patients with comorbidities, 27 (28.1%) were males and 69 (71.9%) were females. A higher proportion of the participants with comorbidities were found within the age group 30 - 39 years 32 (33.3%) and the majority were also married 48 (50.0%). An equal number of HIV/AIDS patients with comorbidities 79 (82.3%) were PLWHA and had also been on medications for less than 5 years. The SBP of PLWHA with comorbidities was similar to that of those without comorbidities (113.84 ± 16.73 vs 115.32 ± 15.68). Most of the HIV/AIDS patients with comorbidities had normal BMI (53.1%) and a smaller number of them were obese 5 (5.2%). Also, the majority of the participants with comorbidities 59 (61.5%) and those without comorbidities 227 (56.2%) were found to be on the same therapy combination (TDF+3TC+EFV) (Table 3).

Table 1. Demographic and clinical characteristics of HIV/AIDS patients on HAART

Characteristics	Male (n = 134)	Female (n = 366)	Total (n = 500)	P-value
Age (years)	39.81 ± 10.97	36.52 ± 11.31	37.40 ± 11.30	**0.004**
Age group n (%)				**0.001**
< 20	1 (12.5)	7 (87.5)	8 (1.6)	
20-29	28 (22.2)	98 (77.8)	126 (25.2)	
30-39	35 (19.6)	144 (80.4)	179 (35.8)	
40-49	43 (39.8)	65 (60.2)	108 (21.6)	
50-59	22 (39.3)	34 (60.7)	56 (11.2)	
≥ 60	5 (21.7)	18 (78.3)	23(4.6)	
Marital status				0.860
Single	39 (26.2)	110 (73.8)	149 (29.8)	
Cohabiting	3 (27.3)	8 (72.7)	11 (2.2)	
Married	70 (27.2)	187 (72.8)	257 (51.1)	
Separated	1 (50.0)	1 (50.0)	2 (0.4)	
Divorced	13 (22.4)	45 (77.6)	58 (11.6)	
Widowed	8 (34.8)	15 (65.2)	23 (4.6)	
Duration of condition				**0.013**
< 5 years	117 (29.2)	283 (70.8)	400 (80.0)	
≥ 5years	17 (17.0)	83 (83.0)	100 (20.0)	
Duration on medication				**0.022**
< 5 years	117 (29.2)	286 (71.0)	403(80.6)	
≥ 5years	17 (17.5)	80 (82.5)	97 (19.4)	
Blood pressure (mmHg)				
SBP	113.84 ± 16.73	115.33 ± 15.68	114.93 ± 15.96	0.358
DBP	73.59 ± 10.99	73.78 ± 12.57	73.73 ± 12.16	0.882
BMI (Kg/m^2)	19.75 ± 2.40	20.90 ± 4.07	20.60 ± 3.73	**0.002**
BMI n (%)				**0.001**
Underweight	36 (27.1)	97 (72.9)	133 (26.6)	
Normal	92 (31.5)	200 (68.5)	292 (58.4)	
Overweight	5 (8.9)	50 (89.3)	56 (11.2)	
Obese	1(5.2)	19 (100)	19 (3.8)	

SBP=Systolic Blood Pressure, DBP=Diastolic Blood Pressure, BMI=Body Mass Index

Table 2. Prevalence of comorbidities among HIV/AIDS patients on HAART

Comorbidities	Frequency	Percentage (%)
Presence of Comorbidities		
Yes	96	19.2
No	404	80.8
Comorbidities		
Hepatitis B virus (HBV)	33	34.4
Hepatitis C virus (HCV)	2	2.1
Herpes zoster	2	2.1
Chronic diarrhea	5	5.2
Diabetes	6	6.3
Sickle Cell Disease (SCD)	6	6.3
STI	3	3.1
Syphilis	3	3.1
TB	4	4.2
Insomnia	3	3.1
Jaundice	6	6.3
Kaposi sarcoma	2	2.1
Pneumonia	2	2.1
Skin rash	3	3.1

Comorbidities	Frequency	Percentage (%)
Slow mentation	2	2.1
Anaemia	1	1.0
Amnesia	1	1.0
Arthralgia	7	7.3
Paresthesia	3	3.1
Visual Changes	5	5.2

None of the urinalysis parameters was found to be significant among HIV/AIDS patients on HAART with and without comorbidities (Table 4). Decreased CD4 cell count, eGFR, potassium and creatinine patients with comorbidities were similar in patients with and without comorbidities (Table 5). None of the demographic, clinical and biochemical parameters was associated with the presence of comorbidities (Table 6).

Table 3. Demographic association with Comorbidities among HIV/AIDS patients on HAART

Characteristics	Presence of comorbidities		P-value
	Yes (n = 96)	(n = 404)	
Gender			0.744
Male	27 (28.1)	107 (26.5)	
Female	69 (71.9)	297 (73.5)	
Age group n (%)			0.902
< 20	1 (1.0)	7 (1.7)	
20-29	22 (22.9)	104 (25.7)	
30-39	32 (33.3)	147 (36.4)	
40-49	24 (25.0)	84 (20.8)	
50-59	12 (12.5)	44 (10.9)	
≥ 60	5 (5.2)	18 (4.5)	
Marital status			0.002
Single	27 (28.1)	122 (30.2)	
Cohabiting	1 (1.0)	10 (2.5)	
Married	48 (50.0)	209 (51.7)	
Separated	2 (2.1)	0 (0.0)	
Divorced	8 (8.3)	50 (12.4)	
Widowed	10 (10.4)	13 (3.2)	
Duration of condition			0.532
< 5 years	79 (82.3)	321 (79.5)	
≥ 5years	17 (17.7)	83 (20.5)	
Duration on medication			0.641
< 5 years	79 (82.3)	324 (80.2)	
≥ 5years	17 (17.7)	80 (19.8)	
Blood pressure (mmHg)			
SBP	113.84 ± 16.73	115.32 ± 15.68	0.358
DBP	73.59 ± 10.99	73.78 ± 12.57	0.882
BMI n (%)			0.351
Underweight	25 (26.0)	108 (26.7)	
Normal	51 (53.1)	241 (59.7)	
Overweight	15 (15.6)	41 (10.1)	
Obese	5 (5.2)	14 (3.5)	
Type of drug			0.875
AZT+3TC+EFV	27 (28.1)	129 (31.9)	
AZT+3TC+NVP	8 (8.3)	32 (7.9)	
d4T+3TC+EFV	0 (0.0)	3 (0.7)	
TDF+3TC+EFV	59 (61.5)	227 (56.2)	
TDF+3TC+NVP	1 (1.0)	6 (1.5)	
SEPTRIN, VITAFOL	1 (1.0)	7 (1.7)	

Table 4. Urinalysis of HIV/AIDS patients on HAART with comorbidities

Parameter	Presence of comorbidities	
	Yes (n = 96)	(n = 404)
Protein		
Positive	1 (1.0)	3 (0.7)
Negative	95 (99.0)	401 (99.3)
Glucose		
Positive	0 (0.0)	0 (0.0)
Negative	96 (100)	404 (100)
Presence of Pus cells		
Yes	3 (3.1)	6 (1.5)
No	93 (96.9)	398 (98.5)
Presence of RBCs		
Yes	0 (0.0)	3 (0.7)
No	96 (100)	401 (99.3)
Presence of EC		
Yes	3 (3.1)	6 (1.5)
No	93 (96.9)	398 (98.5)
Presence of cast		
Yes	0 (0.0)	1 (0.2)
No	96 (100)	403 (99.8)
Presence of crystals		
Yes	0 (0.0)	1 (0.2)
No	96 (100)	403 (99.8)

Table 5. CD4 count and renal function among HIV/AIDS patients on HAART with comorbidities

Parameter	Presence of comorbidities		P-value
	Yes (n = 96)	No (n = 404)	
CD4 Count cell/mm3	350.64 ± 253.58	382.40 ± 281.07	0.311
CD4 n (%)			0.795
< 200	32 (33.3)	126 (31.2)	
200-499	39 (40.6)	159 (39.4)	
≥ 500	25 (26.0)	119 (29.5)	
Sodium (mmol/L)	139.04 ± 2.12	137.97 ± 15.51	0.723
Potassium (mmol/L)	3.97 ± 0.52	5.29 ± 1.11	0.510
Urea (mmol/L)	7.08 ± 1.98	6.00 ± 0.54	0.459
Creatinine (µmol/L)	78.55 ± 23.58	117.06 ± 10.02	0.061
eGFR mL/min/1.73 m^2	93.45 ± 40.29	94.72 ± 37.83	0.856
eGFR n (%)			0.99
≥ 60	31 (86.1)	154 (86.0)	
< 60	5 (13.9)	25 (14.0)	

4. DISCUSSION

This study investigated the presence of comorbidities among PLWHA and also reported their clinical and biochemical characteristics. Our findings showed that the commonest comorbidity was hepatitis B virus infection 33 (34.4%) and the comorbidities had female dominance 69 (71.9%) over the male population 27 (28.1%).

The present study recorded the highest commodities among the HIV/AIDS married group while that of Ndu et al. [7] recorded the highest comorbidities among the divorced group. Ideally, marriage provides economic and social stability necessary for good health [8]. Therefore, the high prevalence of comorbidities among married population in this study could have resulted from the inclusion of the non-working for married HIV/AIDS population. On the contrary, divorce which is common among HIV/AIDS discordant couples provides a fertile ground for the development of medical comorbidities as seen in present study [9].

The modal age range among the HIV/AIDS patients was 30-39 years (35.8%) which is

similar to a cross-sectional descriptive study conducted by Ndu et al. [7] in Nigeria, who reported a modal age range of 31- 40 years (38.7%). In addition, 400 (80%) of our participants have been infected for more than 5 years as at the time of the study. However, an Institution based cross-sectional study by Tesfaw et al. [10] in Ethiopia showed that 390 out of 417 (93%) of the participants had acquired the virus for over 2 years as at the time of their study.

Table 6. Comorbidity associated factors among patients with HIV/AIDS on HAART

Variables	OR (95%CI)	P-value
Gender		
Male*	1	
Female	0.92 (0.56-1.51)	0.744
Age group n (%)		
< 20*		
20-29	1.48 (0.17-12.65)	0.720
30-39	1.52 (0.18-12.82)	0.698
40-49	2.00 (0.23-17.06)	0.526
50-59	1.91 (0.21-17.06)	0.563
≥ 60	1.94 (0.19-19.74)	0.574
Duration of condition		
< 5 years	1.20 (0.68-2.14)	0.533
≥ 5years*	1	
Duration on medication		
< 5 years	1.15 (0.64-2.05)	0.641
≥ 5years*	1	
BMI n (%)		
Underweight	1.09 (0.64-1.86)	0.740
Normal*	1	
Overweight	1.73 (0.89-3.34)	0.106
Obese	1.69 (0.58-4.90)	0.335
CD4 n (%)		
< 200	1.21 (0.68-2.16)	0.522
200-499	1.17 (0.67-2.04)	0.585
≥ 500*	1	
Egfr		
≥ 60*	1	
< 60	0.42 (0.12-1.44)	0.167

The prevalence of HIV/AIDS patients on HAART with comorbidities in this study was 19.2%. Majority of the HIV/AIDS patients on HAART had HBV infection 33 (34.4%) infection, whilst anaemia 1 (1%) and amnesia 1 (1%) were the least common comorbidities. These findings are at variance with previous studies conducted by Ndu et al. [7], Schouten et al. (2014) and Haregu et al. [11].

A cross-sectional descriptive study conducted by Ndu et al. [7], among 489 HIV/AIDS positive workers attending HIV clinics in Enugu (Nigeria) revealed that, 53 (44.5%), 44 (37%), 9 (7.9%), 5% had hypertension, arthritis, diabetes mellitus and HBV infection as comorbidities respectively. A systematic review of 37 studies by Haregu et al. [11] reported on the magnitude and determinants of non-communicable diseases in 30,000 PLWHA. They reported the highest prevalent comorbidity in HIV/AIDS patients to be cardiovascular diseases. The difference between the findings in this study and the review study by Haregu et al. [11] could be attributed to small sample size (n=500 in this study) against 30,000 in the previous study. Also, a cross-sectional study by Schouten et al. (2014) reported a lower prevalence of HBV (3.5%) comorbidity in HIV/AIDS patients in the Netherlands.

Again, a prospective Swiss cohort study conducted by Greub et al. [12] among 3111 HIV-infected patients reported a higher prevalence of hepatitis C virus infection 1157 (37.2 %). Conversely, our study showed a lower prevalence of HCV (2.1%) among the HIV/AIDS patients. Moreover, the prevalence of Kaposi's sarcoma (2.1%) in our study was lower than that of Beral et al. [13] in the United States of America. The latter study revealed that among persons, with HIV/AIDS, the prevalence of Kaposi's sarcoma was 15% (13 616). On the other hand, the prevalence of tuberculosis recorded in this study (5.7%) was again lower than that reported by Tesfaw et al. [10], in Ethiopia. The lower prevalence of HCV, Kaposi sarcoma and tuberculosis observed in our study could be attributed to the retrospective nature of the study, the sample size and the study setting.

Our study showed co-existence of diabetes mellitus and HIV/AIDS infection. The prevalence of diabetes mellitus among the HIV/AIDS patients on HAART was 6 (6.3%). This finding contradicts that of a large prospective cohort study conducted by De Wit et al. [14] among 33,389 HIV positive patients followed at 212 clinics in Europe, the U.S.A., Argentina, and Australia. In their study, the prevalence of diabetes mellitus among HIV/AIDS patients was 952(2.85%). The difference in the prevalence between these two studies could be due the sample size as well as the geographical locations.

Prevalence of hepatitis B infection in people living with HIV/AIDS in Latin America and the Caribbean was also reported by Tengan et al. [15]. HBV and HCV CO-infection among

HIV/AIDS patients in the National Hospital of Tropical Diseases, Vietnam was endorsed by Huy et al. [16]. A greater proportion of 39 (40.6%) of the HIV/AIDS patients on HAART with comorbidities in this study had a CD4 count level 200 – 499 cell/mm^3 which is in contrast with the findings from a cross-sectional study by Schouten *et al.,* (2014) among 540 HIV/AIDS patients in the Netherlands**.** This study recorded only 1 (1%) of proteinuria among the HIV/AIDS patients on HAART with comorbidities. This contrasts with previous findings by Dondo et al. [17] in Zimbabwe, Galgallo, (2006) in Kenya, Ekulu et al. (2012) in Congo and Esezobor et al. (2010) in Nigeria who recorded the prevalence of proteinuria to be 16.4%, 30%, 23.8% and 20.5% respectively. The high prevalence of proteinuria could be due to the recruitment of participants with advanced HIV/AIDS as shown by the CD4 count.

Our study also showed that the majority of the HIV/AIDS patients 59 (61.5%) with comorbidities used the drug combination TDF+3TC+EFV. Makers for renal impairment such as serum urea, creatinine, potassium and sodium showed no significant association between HIV/AIDS patients on HAART with and without comorbidities. None of the HIV/AIDS patients had renal dysfunction in this present study. These findings are contrary to a cohort study conducted by Crum-Cianflone et al. [18] in California who reported a prevalence of 22 (3%) of renal dysfunction among 717 HIV/AIDS patients on HAART. According to the latter study, the occurrence of the renal dysfunction was associated with duration of tenofovir use.

Our study, however, has two major limitations: first, it could not formally tell if the commodities were acquired either before or after the acquisition of the index disease. Finally, the use of a single centre, a retrospective design, limited descriptive information of participants, bias and confounders in our findings will also limit the scope of the outcomes.

5. CONCLUSION

In conclusion, the most prevalent comorbidity was hepatitis B virus infection. The comorbidities were more common among females than males as well as married and old people living with HIV/AIDS. Early and regular screening will be a key prevention and control strategy for the HIV/AIDS-associated commodities. The findings warrant coordination of HIV/AIDS and its related commodities in Ghana. A prospective cohort study should consider the extensive evaluation of personal lifestyle factors that contribute to the development of comorbidities in PLWHA.

CONSENT

It is not applicable.

ETHICAL CONSIDERATIONS

The study was approved by the Institutional Review Board of the University of Cape-Coast (IRB-UCC) and the authorities of Effia-Nkwanta Regional Hospital for approval. Besides, all data were anonymized before analyzed.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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