Hepatitis B infection is the most common comorbidity in People living with HIV/AIDS; A retrospective study of the Efia Nkwanta Regional Hospital

Abstract

Background: Comorbidities among people living with HIV/AIDS (PLWHA) increases with the disease severity. This prevalence maybe attributed to highly active antiretroviral therapy (HAART) toxicity and HIV/AIDS related infections.

Aim: This study investigated the prevalence of comorbidities among PLWHA and their clinical and biochemical characteristics.

Methods: This study 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) were collected from HIV/AIDS patients on HAART (January 2012 to January 2016). Sociodemographic and laboratory data of patients were retrieved from the laboratory database while clinical information was also retrieved from the patients' clinic files.

Analysis: Data were analyzed with SPSS for both descriptive and inferential analysis. Chisquare test was used to compare association between categorical variables and independent t-test was used to compare the mean value of some laboratory parameters and socio-demographic. One-way ANOVA was also employed to compare the mean scores of more than two groups ($P<$ 0.05).

Results: A total of 96 (19.2%) comorbidities were recorded (N=500). The most prevalentcomorbidity was hepatitis B virus infection 33 (34.4%). Among the 96 HIV/AIDS patients whohad comorbidities, 27 (28.1%) were males and 69 (71.9%) were females. The systolic bloodpressure (SBP) of the HIV/AIDS patients with comorbidities was similar to that of those withoutcomorbidities (113.84 ± 16.73 vs 115.32 ± 15.68). Majority of the participants withcomorbidities 59 (61.5%) and those without comorbidities 227 (56.2%) were found to be on thesame therapy combination (TDF+3TC+EFV). The decreased CD4 cell count, estimatedglomerular filtration rate (eGFR), serum potassium and creatinine were similar in the participants(those with comorbidities and those without comorbidities). None of the demographics, clinicaland biochemical parameters were associated with presence of comorbidities.

Conclusion: The total prevalence of commodities was 19.2% and the prevalent commodity was HBV 33 (34.4%). The comorbidities were common among the females as well as married and old people living with HIV/AIDS. None of the comorbidity associated factors was found to be significant among HIV/AIDS patients on HAART with comorbidities.

Keywords: Comorbidities, HIV/AIDS, Demographic, Clinical, Biochemical**.**

Background

The Human Immunodeficiency Virus (HIV) has been of immense concern over the years and it is reported to be associated with several communicable diseases and non-communicable diseases (Aantjes, 2015). 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 (Cahill &Valadéz, 2013). 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-AIDS defining malignancies at an earlier age than the uninfected (ref). The HIV/AIDS infection itself greatly compromises immunity and pre-existing chronic medical conditions could also be exacerbated contributing to the comorbidities (Cahill &Valadéz, 2013). Furthermore, toxicity of the antiretroviral drugs and the interaction between the drugs for the management of the comorbidities and HAART contributes to comorbidities in HIV/AIDS patients. 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 people living with HIV/AIDS (PLWHA) grow older, they also become more susceptible to developing the physical and mental diseases (Olisah, 2011). Individuals with HIV/AIDS have higher prevalence of multi- morbidity (Olisah, 2011) including cardiovascular complications such as coronary artery disease, hypertension, hypercholesterolemia, and diabetes (Rodriguez-

Penney *et al*., 2013) as well as cancer and diseases of the liver, kidney, bone (e.g., osteopenia), and nervous system (Deeks& Phillips, 2009).

Opportunistic infections are claimed to be common among PLWHA who are highly susceptible to various comorbidities in both developed and developing countries (Ndu*et al*., 2011).

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.

Method

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

Setting

The hospital offers both general and specialist care services in internal medicine, general surgery, paediatrics, obstetrics and gynaecology, dental and eye care and serves as the main referral facility for the western parts of the country. The hospital admits over 7500 –10,000 patients annually.

Study population

The study retrospectively sampled the records of a total number 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.

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.

Inclusion and exclusion criteria

The study 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.

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 in this study. 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.

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). Chisquare test was used to compare association between categorical variables and independent t-test was used to compare the mean value of some laboratory parameters and socio-demographic.

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.

Results

The data shows that males were older than the 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 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, anemia, amnesia and paresthesia were the lowest comorbidities (Table 2).

Among the 96 HIV/AIDS patients who had 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 32 (33.3%) and majority of them were also married 48 (50.0%). An equal number of the HIV/AIDS patients with comorbidities 79 (82.3%) have had the HIV/AIDS and had also been on medications less than 5 years. The 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). 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, 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).

None of the urinalysis parameters was found to be significant among HIV/AIDS patients on HAART with and without comorbidities (Table 4). The decreased CD4 cell count, eGFR, potassium and creatinine in patients with comorbidities than those without comorbidities were not significant (Table 5). None of the demographics, clinical and biochemical parameters were associated with presence of comorbidities (Table 6).

Discussion

The HIV/AIDS greatly compromises immunity to make the body susceptible to other diseases. Pre-existing chronic medical conditions are also exacerbated by HIV/AIDS infection. This study sought to investigate the presence of comorbidities among PLWHA and report their clinical and biochemical characteristics.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 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*., (2011) in Nigeria, who reported a modal age range of 31- 40 years (38.7%).Again, in this study, 400 (80%) HIV/AIDS infected person were found to have been infected for duration more than 5 years as at the time of the study. However, an Institution based cross-sectional study by Tesfaw*et al*., (2016) inEthiopia showed that 390 out of 417 (93%) of the participants had acquired the virus over 2 years as at the time of their study.

The present study recorded the highest commodities among the HIV/AIDS married group whilethat of Ndu*et al*., (2011) recorded the highest comorbidities among the divorced group.

However, their study was done among all HIV/AIDS patients, irrespective of their employmentstatus while the former study was done among HIV/AIDS workers only attending infectiousdiseases clinic. Ideally, marriage provides economic and social stability necessary for goodhealth Ross *et al*., (1990). Therefore, the high prevalence of comorbidities among marriedpopulation in this study could have resulted from the inclusion of the non- working marriedHIV/AIDS population. On the contrary, divorce which is common among HIV/AIDS discordantcouples provides a fertile ground for the development of medical comorbidities as seen in presentstudy (Porter *et al*., 2004).

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 anemia 1 (1%) and amnesia 1 (1%) were the less common comorbidities. These findings are at variance with the previous studies conducted by Ndu*et al*., (2011), Schouten *et al*., (2014) and Hargu*et al*., (2012). A cross-sectional descriptive study conducted by Ndu*et al*., (2011), 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 Hargu*et al*.,(2012) reported on the magnitude and determinants of non-communicable diseases in 30,000 PLWHA. They reported the highest prevalence comorbidity in HIV/AIDS patients to be cardiovascular diseases. The difference between the findings in this study and the review study by Hargu*et al*., (2012) 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 lower prevalence of HBV (3.5%) comorbidity in HIV/AIDS patients in Netherlands.

Again, a prospective Swiss cohort study conducted by Greud*et al*., (2000) among 3111 HIVinfected 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*., (1990) in the United States America. The latter study revealed that, among persons withHIV/AIDS, the prevalence of Kaposi's sarcoma was 15% (13 616). On the other hand, theprevalence of tuberculosis recorded in this study (5.7%) was again lower than the previousfindings by Tesfaw*et al*., (2016), (12%) in Ethiopia. The lower prevalence of HCV, Kaposisarcoma and tuberculosis observed in our study could be associated with retrospective nature ofthe study, the sample size and the study setting.

Our investigation in this study showed co-existence of diabetes and HIV infection. Theprevalence of diabetes among the HIV/AIDS patients on HAART was 6 (6.3%). This finding isnot consistent with a large prospective cohort study conducted by De Wit *et al*., (2008) among

33,389 HIV positive patients followed at 212 clinics in Europe, the U.S., Argentina, and Australia. In their study, the prevalence of diabetes among the HIV/AIDS patients was 952(2.85%). The difference in the prevalence between these two studies could be due the samplesize as well as the geographical locations.

A greater proportion 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 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*., (2013) 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, majority of the HIV/AIDS patients 59 (61.5%) with comorbiditiesused the drug type TDF+3TC+EFV. Makers for renal impairment such as serum urea, creatinine,potassium and sodium showed no significant association between HIV/AIDS patients onHAART with and without comorbidities. None of the HIV/AIDS patients had renal dysfunctionin this present study. These findings are contrary to a cohort study conducted by Crum-Cianflone*et al*., (2010) in California who reported a prevalence of 22 (3%) of renal dysfunction among 717HIV/AIDS patients on HAART. According to the latter study, the occurrence of the renaldysfunction was associated with duration of tenofovir use.

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

Conclusion

In conclusion, the prevalent comorbidity was hepatitis B virus infection. The comorbidities were more common among the females than the males as well as married and old people living with HIV/AIDS. Early and regular screening remains to be the key prevention and control strategy

forthe HIV/AIDS associated commodities. The findings warrant coordination of HIV/AIDS and itsrelated commodities in Ghana. A prospective cohort study should consider extensive evaluation of personal life style factors that contribute to the development of comorbidities in PLWHA

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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) 1(5.2)	50 (89.3)	56 (11.2)	
Obese		19 (100)	19 (3.8)	

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

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605 **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		
HBV	33	34.4
HCV	2	2.1
Herpes zoster	2	2.1
Chronic diarrhea	5	5.2
Diabetes	6	6.3

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
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

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619 **Table 3: Demographic association with Comorbidities among HIV/AIDS patients on**
620 **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)	

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622 **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)	

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

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