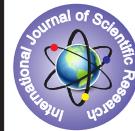


## A comparison of the prevalence and clinical features of depression in HIV-positive and HIV-negative elderly patients in Uganda



### Health Sciences

**KEYWORDS:** Clinical features; Depression; Elderly; HIV/AIDS; Uganda

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### ABSTRACT

**Background** Depression is a leading contributor to the burden of disease worldwide, a serious co morbidity and critical barrier to Human Immunodeficiency Virus (HIV) care and prevention especially in Sub-Saharan Africa. It is unclear if among elderly HIV/ Acquired Immune Deficiency Syndrome (AIDS) positive individuals the characteristics of the illness presents different as compared to elderly HIV/AIDS negative individuals. We thus set out to compare the prevalence and clinical features associated with depression among elderly HIV positive and elderly HIV negative patients in Mulago Hospital. **Methods** This was a comparative cross sectional study of HIV positive and HIV negative individuals aged  $\geq 60$  years. They were enrolled from the Assessment Centre and the AIDS clinic in Mulago Hospital. The Geriatric Depression Scale was used to screen for depression, any individual score of  $\geq 10$ , had the diagnosis of depression confirmed using the Mini-International Neuropsychiatric Interview. Data was entered using ACCESS data -base and analyzed using STATA version 11.0 software. Cross tabulations were done for the two groups using means, chi-squares and frequencies. Univariate, logistic regression, and multivariate analysis were done to determine clinical features associated with depression. **Results** Of 940 elderly patients screened, 238(26.4%) had depression symptom scores  $\geq 10$ . The mean age was 66.8, SD 6.07. The prevalence of major depression was higher among the HIV positive elderly (57%) compared to the HIV negative elderly individuals (22%). However, the prevalence of Dysthymia and adjustment disorder with depressed mood were higher among the HIV negative compared to the HIV positive elderly (68.9% versus 50.4%) and (8.4% versus 1.7%) respectively. The HIV positive depressed were more likely to report suicidal ideation ( $p < 0.04$ ), sleep problems ( $p < 0.03$ ), feeling tired ( $p < 0.04$ ) and feelings of worthlessness ( $P < 0.01$ ). **Conclusion** The clinical presentation of depression differs among HIV positive and HIV negative elderly individuals. This requires a difference in approach and care strategies related to HIV and depression in the elderly. These findings call for routine screening and treatment of depressive illnesses in all HIV infected elderly individuals especially the late onset depressive illness

### INTRODUCTION

Approximately 2.8 million HIV positive individuals are aged 50 years and older<sup>(1)</sup> Older people know less about HIV/AIDS because they have been neglected in education and prevention messages<sup>(2)</sup> with less than two thirds knowing the truth about HIV/AIDS<sup>(3, 4)</sup> In addition, older people are less likely to talk about their sex life with their doctors; similarly doctors often do not ask their older patients about sex. Depression is a major contributor to the burden of disease worldwide resulting in 12% of disability as measured by Years Lost due to Disability (YLDs)<sup>(5, 6)</sup>. It is also a critical barrier to HIV prevention and a common serious HIV co-morbidity<sup>(7)</sup>. The elderly are vulnerable to mental illness, and particularly to depression<sup>(8,9)</sup>. This often goes undiagnosed or is inadequately treated. Several studies have found that up to 75% of older adults who die by suicide had visited their primary care doctors within one month of their deaths<sup>(10)</sup>. Depression screening and treatment among the elderly is limited in Sub-Saharan Africa. Yet failure to recognize depression may endanger both the patient and others in the community<sup>(11)</sup>. Furthermore, older people often mistake the symptoms of HIV/AIDS and depression for the aches and pains of normal aging, so they are less likely to get reported and thus treated<sup>(12)</sup>. The prevalence of depression in the general population has been found to range between 10- 20%<sup>(13)</sup>. However the rates are even higher (25.2%) among older people admitted on medical wards<sup>(9)</sup>. The combination of HIV and depression can be severely debilitating creating a challenge for a person's ability to perform activities of daily living<sup>(7)</sup>.

In the context of HIV/AIDS, depressive disorder in the elderly is often overlooked yet it can influence not only quality of life, relationships, employment, and adherence to medical care, but also survival<sup>(14, 15)</sup>. The disorder is associated with isolation, the absence of pleasure, social, vocational disengagement and premature death through suicide or co- morbidity with other illnesses. There is failure to maintain a proper diet and exercise regimen and to adhere to medical care<sup>(14, 15)</sup>. In a study that compared depression among adult HIV positive and HIV negative individuals, there were less appetite ch--a-ng-e-s( $p=0.017$ ) but more sleep problems ( $p=0.020$ ) for the HIV positive group(16). There are few studies examining the prevalence and factors associated with depression more so among the elderly<sup>(17)</sup>. This study focused on determining the prevalence and clinical presentation of depression symptoms in HIV positive and HIV negative elderly individuals.

### Methods

This was an analytical comparative cross- sectional study conducted at the Mulago hospital general outpatients' department also known as the Assessment Center and at the AIDS Clinic of Mulago hospital.

Mulago hospital is Uganda's National Referral Hospital and also the teaching hospital for the College of Health Sciences, Makerere University. The Hospital offers both in- patient and out- patient services to patients referred from the entire country. The Assessment Centre attends to over 480,000 outpatients annually.

The Mulago Immune suppressive syndrome (Mulago-ISS) clinic

within the Mulago hospital complex is one of the 30 HIV/AIDS clinics supported by the Makerere University Joint AIDS program. At the time of the study, there were 8,745 registered active patients at the clinic, 5019 (57%) of whom were on antiretroviral therapy (ART).

The study enrolled elderly patients who presented with significant depression symptoms during the study period, February – April 2013. All patients on ART as well as those who were ART naïve were interviewed.

Patients were included in the study if they had given informed consent to participate and were aged 60 years and above.

Patients were excluded if they had delirium, were currently being treated for depression, scored below 50 on the Karnofsky scale, and were of unknown or unascertainable age.

Patients were approached by the principal investigator (CB) or by a research assistant who informed them about the purpose of the study. Their consent to participate in the study was sought and recruitment conducted consecutively from the two study sites till proportional numbers of HIV positive and HIV negative depressed elderly individuals were attained. Institutional permission to carry out this study was sought from all the relevant hospital authorities. Ethical approval for the conduction of the study was given by the School of Medicine Institutional Review board and the Uganda National Council of Science and Technology.

#### Measurements

**A. Structured Socio- demographic questionnaire:** This collected identification information as well as other patient variables, it was developed by the principal investigator after looking at what we needed to measure.

**B. The Geriatric Depression Scale (GDS)(18):** This is a 30-item self-report assessment used to identify depression in the elderly. The scale was first developed in 1982 by J.A. Yesavage and others. It is commonly used as a routine part of a comprehensive geriatric assessment. The GDS questions are answered "yes" or "no", the simplicity enables the scale to be used with ill or moderately cognitively impaired individuals. One point is assigned to each answer and the cumulative score is rated on a scoring grid. The grid sets a range of 0-9 as "normal", 10-19 as "mildly depressed", and 20-30 as "severely depressed". This scale has been used in various studies; however it has not been validated in Uganda.

#### C. The Mini-International Neuropsychiatric Interview

**(M.I.N.I.P.L.U.S.)<sup>(19)</sup>:** This is a brief structured interview designed to determine psychiatric disorders. It has been not been validated in Uganda but has been used in a number of studies.<sup>(16)</sup>

**D. The Mini-Mental State Examination (MMSE) or Folstein test<sup>(20)</sup>:** This is a brief 30-point questionnaire test that is used to screen for cognitive impairment. It is commonly used in to medicine screen for dementia. This scale has not been validated in Uganda but it has been used in various studies.<sup>1</sup>

Any score greater than or equal to 25 points (out of 30) is effectively normal. Below this, scores can indicate severe ( $\leq 9$  points), moderate (10-20 points) or mild (21-26 points) cognitive impairment<sup>(20)</sup>. For the purpose of this study the adjusted form that caters for the level of education and age as suggested by Crum et al.<sup>(21)</sup> Was used as follows; 0-19= severe impairment, 20-23= mild to moderate impairment and 24-30= normal.

**E.) The CAGE<sup>(22)</sup>:** This questionnaire has been extensively validated for use in identifying alcohol problems over the life time, with one study determining that CAGE test scores  $\geq 2$  had a sensitivity of 93% and a specificity of 76% for the identification of problem drinkers<sup>(23)</sup>. Two positive responses are considered a positive test. It has been used in previous studies in Uganda<sup>(24)</sup>.

**F.) The WHO clinical staging for HIV/AIDS(25):** The clinical staging and case definition of HIV for resource-constrained settings were developed by the WHO in 1990 and revised in 2007<sup>(6)</sup>. Staging is based on clinical findings that guide the diagnosis, evaluation, and management of HIV/AIDS.

**G) The Karnofsky Performance Scale Index(26):** This instrument allows for determining of functionality of an individual. It is intended to assist clinicians and caretakers in gauging a patient's functional status and ability to carry out activities of daily living.

The enrolled patients were physically examined to ascertain physical health. Medical records were reviewed by the principal investigator/ research assistant to determine if the patients had other medical conditions that required attention, assess past psychiatric illness and family history of psychiatric illness. The process took place in consultation rooms at the two units and it lasted 45 minutes.

#### Laboratory evaluations

Samples taken off for HIV serology for patients at assessment centre were analyzed from assessment center laboratory following Uganda Ministry of Health HIV diagnostic algorithm and the results were given to the patients on the same day. Samples for CD4 cell count were performed at the Mulago National referral Hospital Central laboratory for analysis and the results were communicated to the patients within two weeks. The elderly patients (age  $\geq 60$  years) who were recruited from the Assessment and were found to be HIV positive were not included in the study but were referred for care at treatment centres of their choice.

#### Data Management and Analysis

Pre-testing and standardization of questionnaires was done to test the applicability and sequencing of evaluations using five patients. The investigator checked each filled questionnaire for completeness, consistency and accuracy. Descriptive analysis was performed using frequencies and their corresponding percentages. Bivariate Pearson's chi-square test was used to compare categorical variables and logistic regression technique was used to calculate crude odds ratios (COR). Multivariate logistic regression was used to calculate adjusted odds ratios (COR, AOR). For both analyses, the corresponding 95% confidence intervals (CI) was used to evaluate the association between the patient characteristics and HIV Status group. Confounding influence was taken care of by performing a multivariate logistic regression that adjusts for potential confounders identified in the descriptive analysis. The confounders were those patient characteristics that were identified as statistically significant ( $p < 0.05$ ) at descriptive analysis. All statistical analyses were performed using Stata 12.0 and all tests were performed at the 5% level of significance, with OR, P-value and corresponding 95% Confidence interval (CI). The outcome variable was the presence of depression as determined by the GDS score of  $\geq 10$ .

#### RESULTS

A total of 940 elderly patients were screened at the two study sites. Of these, 238 patients (26.4%) were diagnosed with depression. Of the eligible study participants 119 were HIV-positive and 119 were HIV-negative. The sociodemographic characteristics of the study participants are represented in table 1. Of the 238 patients, 60.0% were female, the mean age for all participants was 66.7 years ( $SD = \pm 6.07$  years). The HIV positive individuals were younger with mean age 65.2  $SD \pm 4.7$  compared to HIV negative individuals with mean age of 68.2  $SD \pm 6.8$ . More than half of the participants 55.4% had a Karnofsky score of  $> 90$ %.

Using the Geriatric Depression Scale, there were similar proportions for those with mild depression (10-19) for the HIV positive group 106(95.5%) and HIV negative group 115(97.5%). Severe scores (20-30) were higher in the HIV positive group 13 (4.5%). The HIV positive individuals were more likely to be married  $p < 0.001$ , though generally the majority of participants were not married in both groups. HIV negative individuals were more likely to have attained primary

education,  $p < 0.001$ , but were mostly unemployed,  $p < 0.001$ .

HIV positive patients were less likely to have a family member with mental illness,  $p < 0.001$  and were more severely cognitively impaired (59.7%),  $p$ -value of 0.001. While mild cognitive impairment was more likely to occur in the HIV negative individuals'  $p < 0.001$  as represented in table 2.

Major Depressive Disorder was more common among HIV positive individuals 57 (47.9%) as compared to HIV negative individuals 27

(22.7%). While Dysthymia and adjustment disorders were more common among HIV negative individuals 82 (68.9%) and 10(8.4%) vs. 60(50%) and 2 (1.7%) respectively as shown in table 3.

After adjusting for age and gender, HIV positive elderly individuals were more likely to have suicidal ideations, sleep problems, feelings of tiredness and feelings of worthlessness as compared to HIV negative individuals with  $p < 0.04$ ,  $p < 0.03$ ,  $p < 0.04$  and  $p < 0.01$  respectively as showed in table 4.

**Table 1: Table showing socio demographic characteristics**

Characteristic	Attribute	Frequency	Percent
Gender	Male	96	40.3
	Female	142	59.7
	Total	238	100.0
Age group	60 - 69	158	66.4
	70+	80	33.6
	Total	238	100.0
Marital Status	Married	81	34.0
	Not Married	157	66.0
	Total	238	100.0
Education	Primary	179	75.2
	Post Primary	59	24.8
	Total	238	100.0
Religion	Christian	162	68.1
	Others	76	31.9
	Total	238	100.0
Occupation	Employed	53	22.3
	Unemployed	185	77.7
	Total	238	100.0
Family member with mental illness	Yes	52	21.9
	No	186	78.2
	Total	238	100.0

**Table 2: Table showing patient characteristics**

Characteristic	Attribute	Frequency	Percent
Taking medicine before depressive symptoms	Yes	25	10.5
	No	213	89.5
	Total	238	100.0
Lost a sexual partner	Yes	71	29.8
	No	167	70.2
	Total	238	100.0
Loss of interest	Yes	74	31.1
	No	164	68.9
	Total	238	100.0
Appetite change	Yes	126	52.9
	No	112	47.1
	Total	238	100.0
Sleep problems	Yes	99	41.6
	No	139	58.4
	Total	238	100.0

Slowed down	Yes	116	48.7
	No	122	51.3
	Total	238	100.0
Feeling tired	Yes	72	30.3
	No	166	69.8
	Total	238	100.0
Feeling worthless	Yes	60	25.2
	No	178	74.8
	Total	238	100.0
Difficulty concentrating	Yes	106	44.5
	No	132	55.5
	Total	238	100.0
Suicidal ideation	Yes	24	10.1
	No	214	89.9
	Total	238	100.0
KS	>=90	132	55.1
	80 - 89	83	34.9
	70 - 79	23	9.7
	Total	238	100.0
Cognitive impairment	Severe	120	50.4
	Mild	63	26.5
	No impairment	55	23.1
	Total	238	100.0

Table showing types of depression

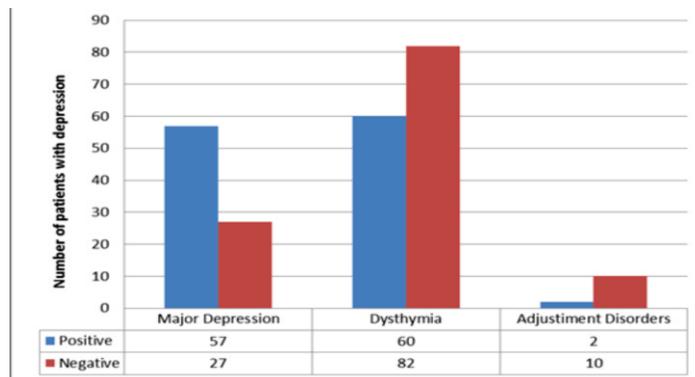


Table 3: table showing distribution of patient characteristics by HIV Positive and Negative groups

Characteristic	Attribute	Comparison Groups			
		Positive	Negative	Total	p-value
Gender	Male	60	36	96	0.002
	Female	59	83	142	
Age	60 - 69	97	61	158	0.000
	70+	22	58	80	
Marital status	Married	30	51	81	0.004
	Not Married	89	68	157	
Religion	Christians	108	54	162	0.000
	Others	11	65	76	
Occupation	Employed	36	17	53	0.004
	Not Employed	83	102	185	

Family member with mental illness	Yes	10	42	52	0.000
	No	109	77	186	
Taking medicine before depressive symptoms	Yes	8	17	25	0.063
	No	111	102	213	
Lost a sexual partner	Yes	61	10	71	0.000
	No	58	109	167	
Loss of interest	Yes	45	29	74	0.026
	No	74	90	164	
Appetite change	Yes	72	54	126	0.020
	No	47	65	112	
Sleep problems	Yes	61	38	99	0.003
	No	58	81	139	
Slowed down	Yes	69	47	116	0.005
	No	50	72	122	
Feeling tired	Yes	46	26	72	0.005
	No	73	93	166	
Feeling worthless	Yes	20	40	60	0.003
	No	99	79	178	
Difficulty concentrating	Yes	64	42	106	0.004
	No	55	77	132	
Suicidal ideation	Yes	16	8	24	0.091
	No	103	111	214	
KS	>=90	37	95	132	0.000
	80 - 89	66	17	83	
	70 - 79	16	7	23	
Cognitive impairment	Severe	71	49	120	0.001
	Mild	21	42	63	
	No impairment	27	28	55	
Types of depression	Major depression	57	27	84	0.000
	Dysthymia	60	82	142	
	Adjusted disorders	2	10	12	

Table 4: Table showing Crude and Adjusted Odds ratios of associations of HIV Status with patient characteristics

Factors independently associated HIV Status	Characteristic	Attribute	Crude Analysis			Adjusted Analysis		
			COR	95% CI	p-value	AOR	95% CI	p-value
Gender		Male	1.000			1.000		
		Female	0.427	0.2508 - 0.7254	0.002	0.071	0.0083 - 0.6089	0.016
Age		60 - 69	1.000			1.000		
		70+	0.239	0.1328 - 0.4286	0.000	0.039	0.0059 - 0.2555	0.001
Marital status		Married	1.000			1.000		
		Not Married	0.449	0.2592 - 0.7794	0.004	0.162	0.0289 - 0.9038	0.038
Education		Primary	1.000			1.000		
		Post Primary	2.665	1.4326 - 4.9573	0.002	4.825	0.94 - 24.7663	0.059
Religion		Christians	1.000			1.000		
		Others	0.085	0.0413 - 0.1734	0.000	0.020	0.0023 - 0.1661	0.000

Occupation	Employed	1.000			1.000		
	Not Employed	0.384	0.2015 - 0.7327	0.004	0.857	0.1032 - 7.1145	0.886
Family member with mental illness	Yes	1.000			1.000		
	No	5.945	2.8117 - 12.5718	0.000	38.406	3.9477 - 373.6329	0.002
Taking drugs before depressive symptoms	Yes	1.000			1.000		
	No	0.432	0.1790 - 1.0449	0.063	0.021	0.0011 - 0.403	0.010
Lost a sexual partner	Yes	1.000			1.000		
	No	0.087	0.0416 - 0.1830	0.000	0.017	0.0019 - 0.1478	0.000
Loss of interest	Yes	1.000			1.000		
	No	0.530	0.3030 - 0.9267	0.026	0.278	0.0538 - 1.4308	0.126
Appetite change	Yes	1.000			1.000		
	No	0.542	0.3240 - 0.9077	0.020	0.507	0.1239 - 2.0703	0.344
Sleep problems	Yes	1.000			1.000		
	No	0.446	0.2633 - 0.7556	0.003	0.336	0.0717 - 1.5756	0.167
Slowed down	Yes	1.000			1.000		
	No	0.473	0.2820 - 0.7935	0.005	0.740	0.1803 - 3.0335	0.675
Feeling tired	Yes	1.000			1.000		
	No	0.444	0.2508 - 0.7847	0.005	0.202	0.0421 - 0.9728	0.046
Feeling worthless	Yes	1.000			1.000		
	No	0.399	0.2162 - 0.7364	0.003	1.879	0.3246 - 10.8783	0.481
Difficulty concentrating	Yes	1.000			1.000		
	No	0.469	0.2784 - 0.7891	0.004	0.346	0.0914 - 1.3085	0.118
Suicidal ideation	Yes	1.000			1.000		
	No	0.464	0.1905 - 1.1299	0.091	0.103	0.0049 - 2.1743	0.144
KS	>=90	1.000			1.000		
	80 - 89	9.968	5.1802 - 19.1815	0.000	32.155	4.8749 - 212.0902	0.000
	70 - 79	5.869	2.2337 - 15.4194	0.000	1.289	0.1247 - 13.3273	0.831
Cognitive impairment	Severe	1.000			1.000		
	Mild	0.345	0.1823 - 0.6530	0.001	0.079	0.0138 - 0.4487	0.004
	No impairment	0.665	0.3503 - 1.2644	0.214	2.083	0.3738 - 11.606	0.402
Types of depression	Major depression	1.000			1.000		
	Dysthymia	0.347	0.1968 - 0.6105	0.000	0.135	0.0269 - 0.6784	0.015
	Adjusted disorders	0.095	0.0194 - 0.4626	0.004	0.021	0.0006 - 0.7078	0.031

## DISCUSSION

The aim of this study was to compare the prevalence and clinical features associated with depression among HIV positive and HIV negative elderly patients. While the population of the elderly generally has increased over the years so has the of elderly people with HIV/AIDS<sup>(27)</sup>.

Depression in the elderly is often missed or undertreated<sup>-(28,29)</sup>. The condition is poorly recognized not only in primary health care but also in the HIV positive population, despite its high prevalence among populations with HIV/AIDS<sup>(30)</sup>.

Depression is a life-threatening illness that markedly affects quality of life therefore diagnosis should be quickly made to alleviate suffering<sup>-(31)</sup>. Reasons for its under treatment include stigma associated to the mental illness<sup>(32)</sup> and the belief that the symptoms experienced by the elderly are a normal part of aging<sup>(33)</sup>.

Mental health is a major health problem in Uganda contributing 13% to the national disease burden<sup>(34)</sup>. Older persons comprise 4.5% of the general population,<sup>(35)</sup> however the National HIV/AIDS Policies and Plans report, does the elderly persons' specific risks and vulnerabilities. The policy does not recognize the susceptibility that older individuals may have the risk of HIV transmission like other age groups.

The results of this study have shown that major depressive disorder was more common among HIV positive individuals while Dysthymia occurred more in HIV negative individuals. Older HIV-positive patients possibly have experienced numerous life events such as divorce and loss of partners to HIV/AIDS increasing the risk for depression.

Interestingly our findings show that the HIV positive individuals were more likely to be in a current relationship in comparison to the HIV negative individuals. The onset of HIV infection usually is in the

younger population and indeed many grow with the disease and possibly may start new relationships after the demise of their spouses. On the other hand the HIV negative sample in this study tended to be older and indeed many had lost their spouses as usually happens for the elderly.

The HIV related depression was characterized by a negative family history of mental illness, as has been observed in other studies that have looked at mental illness in the HIV positive population(16). This possibly points to an association of HIV to the depression rather than the condition being a family related or an age associated illness. Indeed secondary affective disorders in HIV/AIDS have been reported in other studies<sup>(16,36)</sup>.

Compared to depressed HIV-negative patients, depressed HIV-positive patients were more likely to be < 70 years. Previous research has shown that depression increases with age, our study finding further affirms the role HIV plays in increasing the risk for depression in the elderly.

There was a high rate of unemployment among the whole study group. HIV positive individuals were less likely to be unemployed a finding we attribute to their younger age but it should also be noted that being in HIV care, they constantly interface with health workers who at times encourage increased functionality of the individuals. The use of ART has prolonged life and hence infected individuals survive and engage in gainful employment.

Previous research has shown that HIV positive individuals have a high rate of unemployment<sup>(16)</sup>. This conflicts with our study findings and implicates the presence of HIV in the individuals as the risk for the depression. Unemployment has also been known to compound depression among the elderly<sup>(11,37)</sup>. Previous studies have reported marriage as being protective against depression; and being single, divorced, and widowed as associated with depression and increased suicide risk<sup>(11,37)</sup>. Many of our HIV positive patients had lost a partner to HIV/AIDS and the majorities were widows/ widowers.

HIV positive patients were more likely to have had a medical illness as well as depressive symptoms and were more likely to have been taking medication including antidepressants before our interviews. It was indeed significant to note that, though not given a definitive diagnosis many of the depressed were being treated for the depressive symptoms with inadequate antidepressant medication. Similar conclusions concerning pharmacologic management have been reached in other studies of HIV related mood disorders<sup>(36)</sup>.

The HIV-positive depressed patients though generally younger in age, had significantly more severe cognitive impairment compared to the HIV-negative depressed patients a finding comparable to previous studies (16). There is evidence that the virus attacks the brain and results in cognitive impairment and this could explain this particular finding. Studies have also shown that HIV/AIDS is associated with cognitive impairment. In addition depression can cause pseudo dementia further compounding the cognitive findings in these individuals<sup>(9,36, and 38)</sup>.

**Limitations**

The Geriatric Depression Scale was not translated to the local language; this could have led to information bias. However we ensured that the training of the research assistant who was fluent in the local language was well conducted.

The patients were enrolled only when the principal investigator or research assistant was available at the study sites and this could have led to a selection bias. However we collected as many patients as possible on all clinic days at the two study sites.

**Conclusion**

This study showed that HIV-related depression among the elderly is

clinically different from the depression found in HIV-negative patients. In addition depression appears to be a secondary depressive illness as opposed to the genetically driven primary affective depressive disorder of HIV-negative patients. The HIV-related depression was characterized by negative family history of mental illness, use of medication for treating depressive symptoms, it occurred more in individuals of < 70 years and HIV positive individuals had severer cognitive impairment compared to HIV negative individuals. HIV positive elderly individuals were more likely to have suicidal ideations, sleep problems, feelings of tiredness and feelings of worthlessness as compared to HIV negative individuals.

These findings call for routine screening for depressive illnesses in all HIV infected elderly individuals especially in late onset depressive illness and in populations highly endemic for HIV/AIDS. In addition there should be effective treatment of the depression of HIV/AIDS among the elderly.

**ACRONYMS**

AIDS.....	Acquired
Immunodeficiency Syndrome	
ARVs.....	Antiretroviral drugs
ART.....	Antiretroviral Therapy
CD4.....	Cluster of
Differentiation Antigen 4	
CD4%.....	Cluster of
Differentiation Antigen 4 percentage	
CRAg.....	Cryptococcal
Reactive Antigen	
DALYS.....	Daily Adjusted Life
Years	
DSM-IV-TR.....	Diagnostic Statistical Manual of
Mental Disorders, Fourth Edition Revised Text.	
ECT .....	Electro Convulsive
Therapy	
GDS.....	Geriatric Depression
Scale.	
HAART.....	Highly Active
Antiretroviral Therapy	
HIV.....	Human
Immunodeficiency Virus	
MOH.....	Ministry of Health
MINI-PLUS.....	Mini International
Neuropsychiatric Interview	
SHSSP II .....	Support to the Health
Sector Strategic Plan II.	
VDRL.....	Veneral Diseases
Research	
Laboratory	
VCT .....	Voluntary Counseling and
Testing.	
WHO.....	World Health
Organization	
YLD .....	Years Lost due to
Disability.	

**Competing interests**

The authors declare that they have no competing interests.

**Authors' Contributions**

CB conceptualized the study and its design, analyzed data and interpreted it, and drafted the manuscript. FS participated in the conceptualization, design of the study and interpretation of the data. SM participated in the conceptualization and design of the study. NN participated in the design, interpretation of the data as well as draft of the manuscript. All authors read and approved the final manuscript.

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