ORIGINAL ARTICLE

PREDICTORS OF DEPRESSION AND PSYCHOMETRIC EVALUATION OF THE BECK DEPRESSION INVENTORY-II (BDI-II) AMONG ADULTS ON HIGHLY ACTIVE ANTIRETROVIRAL THERAPY IN MAIDUGURI, NORTH-EASTERN NIGERIA

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ABSTRACT

Background: Depression is the commonest neuropsychiatric disorder among people living with HIV (PLHIV) but it remains highly underdiagnosed among this vulnerable group due mainly to low index of suspicion on the part of clinicians and the lack of brief, reliable and valid screening instruments in the very busy clinics of sub-Saharan Africa. **Objective:** This study assessed the predictors of depression among adults on highly active antiretroviral therapy (HAART) at the University of Maiduguri Teaching Hospital (UMTH) as well as evaluated the psychometric properties of the shorter version Beck Depression Inventory (BDI-II) among the subjects. **Methods:** This was a two-staged cross sectional survey conducted on 303 adults on HAART who were selected through the systematic random sampling technique at the ART clinic of the UMTH. In the first stage, anonymous sociodemographic questionnaire and the BDI – II were administered, while in the second stage, subjects who met the cut off score of 18 together with 30% of those with lower scores were administered the depressive disorder module of the composite international diagnostic interview (CIDI) as the gold standard. Bivariate and logistic regression analyses were used to determine the predictors of depression while Cohen's Kappa, Cronbach's alpha and the validity coefficients were computed to determine the psychometric properties. **Results:** Over 20% of the subjects were depressed. Female gender, past history of psychiatric illness, family history of psychiatric ailment and short duration of HIV seropositivity were significant predictors of depression with the following odds ratios; O.R. = 2.820, p = 0.006, O.R. = 23.420, p = <0.001, O.R. = 7.872, p = 0.002 and O.R. = 0.332, p = <0.001 respectively. The psychometric properties were excellent with Kappa and Alpha values of > 0.9 each, sensitivity and specificity of > 90% each, with positive and negative predictive values of > 91% each. **Conclusions:** Depression affects one out of every five HIV+ subjects and the BDI – II is a valid instrument for the detection of depression in this group. We therefore recommend the routine screening of depression among adults on HAART with vulnerability factors using this instrument.

KEYWORDS: Depression, Psychometric properties, Beck Depression Inventory, Highly Active Antiretroviral Therapy (HAART).

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INTRODUCTION

Clinical depression is one of the leading causes of disabilities in individuals afflicted by it because of its association with a spectrum of complications ranging from physical, cognitive, social and/or role functioning impairment.[1] The World Health Organization (WHO) estimated in the year 2000 that depression accounted for 4.5% of Disability Adjusted Life Years (DALY), thus making it the fourth highest

determinant of the global burden of diseases. Major Depression is also the second leading cause of disability, as it accounted for 12.1% of Years Lived with Disability (YLD) in Europe and North America and it was projected that depression will be the leading cause of disabilities in the low income regions of the globe, predominantly sub-Saharan Africa, by the year 2020. [2] The figures highlighted above were for depression as a single clinical entity, however, this condition commonly co-exists with many chronic disorders including Human Immunodeficiency Virus (HIV) infection whose status has changed from a rapidly fatal disease to a chronic one due to the introduction of the antiretroviral medications. [3 - 9] The prevalence of depression in HIV infected clinic populations varies widely from 22% in the United States, 28.7% in Nigeria, 38.7% in South Africa, and up to 54.3% in Kampala, Uganda.[10 - 13] Ciesla and Roberts in 2001 conducted a meta-analysis of data from 10 studies that examined the prevalence of depression among HIV infected individuals and it revealed a two-fold increase in the prevalence of depression when compared with the HIV-negative individuals. [14] Research evidences have also shown that depression in the context of HIV infection may be responsible for additional illness burden, reduction of adherence to the antiretroviral medications (ARVs) and thus acceleration of progression to AIDS as well as reduction in the quality of life of the patients. [15 - 19] Poor adherence is directly associated with poor medical outcomes and can also result in the development of viral mutations, which can lead to drug resistance. [20, 21]

Despite the negative impacts of comorbid depression on the clinical parameters of patients with chronic medical conditions, depressive disorders remain largely underdiagnosed particularly in persons living with HIV (PLHIV) in the African sub-continent. The lack of a valid, easy-to-administer and brief screening tool for the detection of this clinical condition might be responsible for the underdiagnosis. Though, the Beck Depression Inventory (BDI) has been used widely in both clinical and non-clinical samples, its suitability and utility among HIV-infected adults in sub-Saharan Africa have not been well documented. The determination of the degree of concordance and the validity coefficients of an instrument as propounded by Stewarts are mostly adapted for such purposes. [22]

This study determined the predictors of depression and evaluated the psychometric properties of the shorter version of the Beck Depression Inventory (BDI-II) as a screening tool against the depressive disorder module of the Composite International Diagnostic Interview (CIDI) as the 'gold standard' in the diagnosis of clinical depression.

MATERIALS AND METHODS

This study was conducted at the outpatient antiretroviral (ART) clinic of the University of Maiduguri Teaching Hospital (UMTH) in Northeastern Nigeria. At the time of data collection, the ART clinic had 5, 574 registered subjects with 3, 594 of them already placed on treatment with the HAART regime. [23] The sample size was calculated using a prevalence of depression of 35% among HIV+ subjects in Northern Nigeria obtained by Shehu et al [24] and was set at 95% confidence interval and 0.05 degree of freedom. The computation yielded a representative sample of 350 subjects. The 350 subjects enrolled into the

study were selected using the systematic random sampling technique (n^{th} sampling) and a sampling ratio of 1:10 was adopted. Hence, the sampling interval was every other tenth patient until the total number of 350 patients was reached. The list of all patients in the clinic constituted the sampling frame and the starting point on the list was chosen at random using the random number tables.

The inclusion criteria were: (a) all consenting adults on HAART and (b) those on HAART between the ages of 18 and 65 years. The exclusion criteria were: (a) those with marked cognitive impairment, (b) those with comorbid chronic or severe physical illnesses capable of impairing their response, and (c) non-consenting adults.

For the purpose of detecting subjects with cognitive impairments, all of them were screened by a single investigator by carrying out a simple cognitive functioning assessment. Thus, the patients were assessed for orientation in time, place and person, attention and concentration, as well as the immediate, recent and remote memories. Based on the outcome of this clinical test alone, those respondents found to have impairments on any of these cognitive domains were excluded.

Ethical Consideration

The study was approved by the hospital's institutional review board. In order to ensure confidentiality, codes were used for data entry and analysis.

Study instruments

The following instruments were used in the study: An anonymous socio-demographic questionnaire: This was designed by the authors soliciting for the age, sex, occupational status of the respondents using the social class stratification by Borofka and Olatawura. [25] This system classified individuals based on their occupations into: social class I, (consisting of highly skilled professionals like Doctors, Lawyers, etc.), social class II (consisting of intermediate skilled professionals like, Technicians, nurses, etc.), social class III (consisting of low skilled respondents like junior clerks, drivers, junior military and paramilitary officers, etc.), social class IV (consisting of unskilled respondents like petty traders, messengers, etc.) and social class V (consisting of unemployed respondents). Other critical information such as marital status, years of education, family history and past history of psychiatric illness were also incorporated into the questionnaire.

Basic clinical information such as the duration of the ailment since diagnosis, CD4 counts and the CDC staging of the disease were obtained from the respondents' medical records.

Beck Depression Inventory, 2nd edition (BDI-II): It is a 21 – item instrument and one of the most widely used for screening and analysing the intensity of Depression. It assesses 4 components of Depression, viz.; cognitive, behavioural, affective and somatic. [26,27] Each item is scored on a scale of 0 to 3 and the ratings are summed up to yield a total score that can range from 0 to 63. The higher the total score, the severer, the depressive symptoms. It is widely used and has been validated for use in Nigeria and a score of 18 and above indicates a depressive disorder. [28, 29, 30] The BDI-II has been positively correlated with the Hamilton Depression Rating Scale (HDRS) with a Pearson r of 0.71, showing good agreement. It also has high test-retest

reliability (Pearson r = 0.93) and high internal consistency (r = 0.91). [31,32]

The depressive disorder module of the Composite International Diagnostic Interview – World Mental Health Version 3.0 (CIDI – WMH 3.0): It is a highly structured clinical interview designed with the property of generating diagnosis according to both the International Classification of Diseases 10th Revision (ICD 10) and the Diagnostic and Statistical Manual 4th Edition (DSM IV) criteria. The interviews of CIDI are presented in a modular form thus permitting the selective investigation of a diagnosis of interest to the exclusion of other diagnostic groups. Independent studies that compared the degree of concordance between the depressive module of the CIDI and clinician's diagnosis of depression using either the DSM-IV or the ICD-10 criteria have consistently shown acceptable degrees of concordance with Kappa values (K) in the range of 0.71 to 0.93 across different samples thus making it a valid module for the detection of depression in both clinical and non-clinical samples. [33, 34] The world mental health survey conducted in Nigeria in 2004 used this instrument. The Ibadan center of the African regional office (AFRO) of the World Health Organization (WHO) trained three of the investigators and granted permission for its use.

Data Collection Procedure

This was a two-staged cross-sectional study. In the first stage, the sociodemographic questionnaire and the BDI – II were administered to all the subjects. The BDI II was used a screening instrument in this study. The subjects were interviewed separately in different rooms in order to ensure confidentiality. In the second stage, all subjects with BDI – II scores of equal to or greater than 18, which is the recommended cut-off value for this environment were selected. Seventy two respondents (representing 30%) of those with BDI - II scores below 18 were also randomly selected for this stage of the study. The choice of 30% of those with scores below the recommended cut-off was to correct for the misclassification rate. In this stage, the depressive disorder module of the CIDI which was used as the 'gold standard' was administered to all the subjects by different interviewers who were blinded to the outcome of the initial assessment. All interviews were conducted at one sitting in order to reduce the rate of attrition. Diagnosis of Depression was made using the ICD-10 criteria by matching the symptoms generated by CIDI with the ICD-10 diagnostic criteria. All interviews were conducted in English; however the interviewers used the Hausa version that was translated using the iterative back translation method for those respondents who do not understand English. Precise semantic and idiomatic equivalents were maintained as much as possible in the translation process.

Statistical Analyses

The data generated were analysed with the SPSS version 16. Descriptive statistics were used to assess the BDI-II – diagnosis of depression as well as the sociodemographic and clinical correlates of depression among the subjects. Bivariate analyses were used to examine the correlates of depression. Factors found to be statistically significant were subjected to logistic regression with the BDI diagnosis as the dependent variable and the factors

as the covariates to determine their combined effects on depression among the subjects. Diagnostic concordance between the BDI-II and CIDI was calculated using the Kappa statistics which controls for chance agreement. [35, 36] In interpreting the Kappa, value greater than 0.75 is interpreted as excellent agreement beyond chance, significant value of 0.40 and below indicates poor agreement, and values in between represent fair to good agreement. [37] Item analysis was performed to determine the internal consistency of the overall BDI-II scale. Cronbach's α values of $\geq$ 0.7 are considered good to excellent, values of $0.6 \leq \alpha < 0.7$ are considered acceptable, while values < 0.6 are considered poor. [38]

The validity co-efficients of the BDI –II among the adults on HAART were then determined by categorizing each respondent as either a case or non-case following the CIDI criterion interview across a range of threshold values from 15 to 21 in order to give a range of +3 and -3 around 18 which was earlier reported to be the best cut-off for this environment by Awaritefe. [30] The definition of the Stewart's components [22] of the validity co-efficients of the BDI-II were based on the following assumptions:

1. Sensitivity: The proportion of positive (correct) BDI-II diagnosis of depression among those with CIDI diagnosis based on ICD-10 criteria among the subjects.
2. Specificity: The proportion of negative (no) BDI-II diagnosis of depression among those without CIDI diagnosis.
3. Positive predictive value: The proportion of positive CIDI diagnosis of depression among those with a BDI-II diagnosis.
4. Negative predictive value: The proportion of negative (non-CIDI) diagnosis of depression among those without a BDI-II diagnosis.
5. False positive rate: 1 – Specificity
6. Misclassification rate: The proportion of total subjects that were wrongly classified.

Finally, a Receiver Operating Characteristic (ROC) analysis was done and the curve plotted with the sensitivity on the vertical axis and 1 – specificity (False positive rate) on the horizontal axis across the range of thresholds from 15 to 21 in order to determine the value with the best discriminant ability which corresponds to that with the largest Area Under the Curve (AUC).

RESULTS

Of the 350 subjects who were recruited for the study, the data of only 303 respondents (86.6%) were finally analyzed. The data of the 47 patients that were not analyzed included those who declined to give informed consent (n=17), those with comorbid debilitating physical illnesses and severe cognitive impairment that affected their response (n=11) and those whose questionnaires could not be analyzed due to missing data (n=19).

Prevalence of Depression and the sociodemographic profile of the subjects

Of the 303 subjects on HAART, Sixty two (62) representing 20.2% of the respondents had the BDI – II diagnosis of depression and 60(19.8%) met the ICD-10 diagnostic criteria based on CIDI – generated data. Out of the 303 patients on antiretroviral therapy, 164 (54.1%) were males and 139 (45.9%) were females. The ages of the respondents ranged from 18 to 54 years with a mean age of 35years $\pm$ 8.20 and 70%

of the respondents were less than 40 years of age. One hundred and ninety seven (65%) of the subjects had less than 12 years of education with a range of 0 to 18 years and a mean ± SD of 8.45 ± 6.149. Over 64% of the subjects belonged to the lower social classes (classes IV and V) and about 41% of the total subjects were married. Bivariate analysis revealed that of all the sociodemographic variables, only female gender was found to have a statistically significant relationship with the diagnosis of depression as over 72% of the depressed respondents were females ($\chi^2 = 22.39$, df = 1, p = < 0.001). The findings are illustrated in table 1.

The clinical variables of the subjects as predictors of depression

The Clinical profiles of the subjects revealed that the mean ± SD of the duration of the disease since diagnosis was 2.8 ± 1.792 years, with a range of 1 – 8 years and 70% had lived with it for ≤ 3 years. The mean ± SD of the CD4 count of the subjects was 278.78 ± 142.76/μL with a range of 45 to 912/μL and over 80% had CD4 count ≤ 399/μL. Over 90% of the subjects belonged to CDC stages III and IV disease. Sixteen of the 18 subjects with past history of psychiatric ailment also had depression while 17 of the 22 subjects with family history of psychiatric ailment also met the criteria for the current diagnosis of depression in the context of the HIV infection. The following clinical variables, namely; the duration of the disease since diagnosis, the CD4 count at the time of the study, past history of psychiatric ailment and the family history of psychiatric disorder were found to have statistically significant relationships with the diagnosis of depression with the following findings: $\chi2 = 48.333$, df = 2, p = < 0.001, $\chi2 = 16.568$, df = 1, p = < 0.001, $\chi2 = 55.055$, df = 1, p = <0.001, and $\chi2 = 47.43$, df = 1, p = <0.001 respectively. These findings are presented in table 2.

Outcome of logistic regression analysis of variables

Logistic regression analyses of the variables found to have statistically significant relationship with the diagnosis of depression on bivariate analyses, namely; female gender, shorter duration of disease, lower CD4 count, past history of psychiatric ailment, and family history of psychiatric illness showed that only the CD4 count did not have significant relationship with depression on further analysis. The odds ratios as expressed by the Exp (B) and the p values for the variables were: O.R. = 2.82, p = 0.006; O.R. = 23.420, p = <0.001; O.R. = 7.872, p = 0.002; and O.R. = 0.332, p = < 0.001 for sex (female gender), past history of psychiatric ailment, family history of psychiatric illness and the duration of seropositivity respectively. The findings are depicted in table 3.

Psychometric properties of the BDI-II among the HIV+ respondents

The diagnostic concordance between the BDI-II and the depressive module of the CIDI revealed an outstanding Cohen Kappa value of 0.927, p = < 0.001. The internal consistency of the instrument as measured by the Cronbach's α was 0.911. Estimation of the validity coefficients of the instrument across the range of threshold values revealed that a cut-off value of 18 had the optimal outcomes, with a sensitivity of 0.95, specificity of 0.97, false positive rate of 0.03, and a misclassification rate of 0.04. At lower values between 15 and 17, the ranges were from 0.77 to 0.89, 0.62 to 0.69, 0.19 to 0.31, and 0.11 to 0.24 for the sensitivity, specificity, false positive and misclassification rates respectively. While for higher values between 19 and 21,

the ranges for the sensitivity, specificity, false positive and misclassification rates were 0.46 to 0.74, 0.69 to 0.90, 0.10 to 0.31, and 0.18 to 0.38 respectively. These findings are depicted in table 4.

Analysis of the Receiver Operating Characteristic (ROC) curve also showed that the value of 18 had the largest area under the curve of 0.93. This was done by determining the threshold value with the greatest perpendicular distance from the diagonal on the ROC curve. The threshold of 21 had the least AUC of 0.65 while 17 had the second greatest AUC of 0.89. These are illustrated in figure 1.

TABLE 1: Sociodemographic Characteristics of the Respondents

Variable	Non-depressed Freq (%)	Depressed Freq (%)	Total Freq (%)	Statistics
		N = 303		
Sex				
Male	147(61.0)	17(27.4)	164(54.1)	**χ^2 = 22.390, df = 1, p = < 0.001****
Female	94(39.0)	45(72.6)	139(45.9)	
Age grouping [Mean ± SD = (35 ± 8.204), Range = 18 – 54]				
≤ 19	6(2.5)	0(0.0)	6(2.0)	**χ^2 = 2.698, df = 3, p = 0.441**
20 – 29	53(22.0)	17(27.4)	70(23.1)	
30 – 39	107(44.4)	29(46.8)	36(44.9)	
≥ 40	75(31.1)	16(25.8)	91(30.0)	
Years of education [Mean ± SD = (8.45 ± 6.149), Range = 0 – 18]				
≤ 12	152(63.1)	45(72.6)	197(65.0)	**χ^2 = 1.961, df = 1, p = 0.161**
> 12	89(36.9)	17(27.4)	106(35.0)	
Occupational class				
Class I	21(8.7)	5(8.1)	26(8.6)	**χ^2 = 5.135, df = 4, p = 0.274**
Class II	36(14.9)	5(8.1)	41(13.5)	
Class III	36(14.9)	5(8.1)	41(13.5)	
Class IV	82(34.0)	25(40.3)	7(35.3)	
Class V	66(27.4)	22(35.5)	88(29.0)	
Marital status				
Single	52(21.6)	11(17.7)	63(20.8)	**χ^2 = 4.080, df = 4, p = 0.396**
Married	97(40.2)	26(41.9)	123(40.6)	
Widow	75(31.1)	18(29.0)	93(30.7)	
Separated	4(1.7)	0(0.0)	4(1.3)	
Divorced	13(5.4)	7(11.3)	20(6.6)	

** **Statistically significant finding**

TABLE 2: Clinical Profile of the Respondents

Variable	Non-depressed Freq (%)	Depressed Freq (%)	Total Freq (%)	Statistics
		N = 303		
Duration of seropositivity [Mean ± SD = 2.80 (± 1.792), Range = 1 – 8 years]				
≤ 1 year	50 (20.8)	41 (66.1)	91 (30.0)	**$\chi 2 = 48.333$, df = 2, p = < 0.001****
2 – 3 years	109 (45.2)	12 (19.4)	121 (40.0)	
≥ 4 years	82 (34.0)	9 (14.5)	1 (30.0)	
CD4 Count/μL [Mean ± SD = 278.78 (± 142.759), Range = 45 – 912]				
< 200	71 (29.5)	15 (24.2)	86 (28.4)	**$\chi 2 = 16.568$, df = 1, p = < 0.001****
200 - 399	120 (49.8)	46 (74.2)	166 (54.8)	
≥ 400	50 (20.7)	1 (1.6)	51 (16.8)	
CDC Stage of disease				
Stage I	2 (0.8)	0 (0.0)	2(0.7)	**$\chi 2 = 5.817$, df = 3, p = 0.121**
Stage II	18 (7.5)	1(1.6)	9(6.3)	
Stage III	136 (56.4)	31(50.0)	167(55.1)	
Stage IV	85 (35.3)	30 (48.4)	115 (37.9)	
History of psychiatric illness				
Absent	239(99.2)	46(74.2)	285(94.1)	**$\chi 2 = 55.055$, df = 1, p = <0.001****
Present	2(0.8)	16(25.8)	18(5.9)	
Family history of psychiatric illness				
Absent	236(97.9)	45(72.6)	81(92.7)	**$\chi 2 = 47.43$, df = 1, p = <0.001****
Present	5(2.1)	17(27.4)	22(7.3)	

** **Statistically significant findings**

TABLE 3: Logistic Regression Analysis of Variables With Significant Relationship With Depression

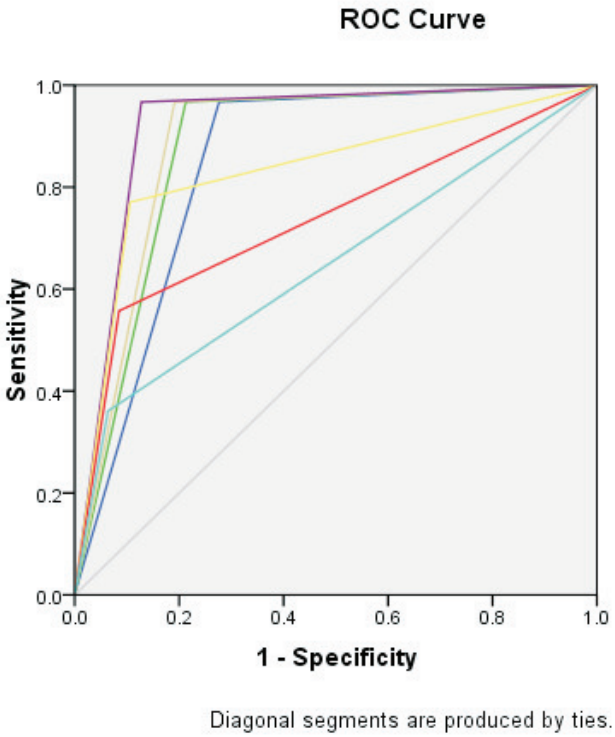
Variable	B	S.E.	Wald	df	Sig	Exp (B)	95% C.I. for Exp (B)
Sex	1.037	0.374	7.675	1	0.006**	2.820	1.354 – 5.870
Past history of Psych illness	3.154	0.892	12.488	1 s	<0.001**	23.420	4.074 - 134.650
Family history of Psych illness	2.063	0.677	9.283	1	0.002**	7.872	2.088 - 29.684
CD4 Count	0.180	0.288	0.392	1	0. 531	1.198	0.681 - 2.107
Duratn of HIV Seropositivity	1.103	0.272	16.467	1	<0.001	0.332	0.195 - 0.565

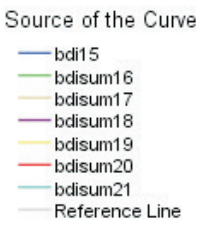
TABLE 4: Validity Coefficients of the BDI-II at Cut-off Scores of 15-21 For the Adults on Haart Screened (N=303)

Threshold	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Sensitivity	0.77	0.78	0.87	0.95	0.77	0.56	0.36
Specificity	0.62	0.71	0.79	0.97	0.80	0.89	0.93
Positive predictive value	0.81	0.84	0.86	0.91	0.89	0.87	0.86
Negative predictive value	0.75	0.79	0.90	0.96	0.75	0.64	0.53
False positive rate	0.38	0.29	0.21	0.03	0.20	0.11	0.07
Misclassification rate	0.14	0.11	0.10	0.04	0.18	0.29	0.39

Table 5: A Contingency Table Comparing the Beck's Depression Inventory II (BDI-II) To Depressive Disorder Module of the Composite International Diagnostic Interview (CIDI) as the Criterion

	CIDI DIAGNOSIS DEPRESSED	**CIDI DIAGNOSIS** NON-DEPRESSED	**TOTAL**
BDI DIAGNOSIS DEPRESSED	60	2	62
BDI DIAGNOSIS NON-DEPRESSED	3	69	72
TOTAL	**63**	**71**	**134**





Area Under the Curve (AUC)

Variable(s)	**Area**
bdisum15	0.735
bdisum16	0.817
bdisum17	0.898
bdisum18	0.925
bdisum19	0.834
bdisum20	0.757
bdisum21	0.649

FIGURE 1 : Receiver Operating Characteristics (ROC) Curve at BDI-II Thresholds of 15 To 21

DISCUSSION

The prevalence of depression among the subjects on HAART was 20.2% based on BD-II cut-off score of 18. This translates to about every one out of five subjects included in the study had clinical depression. This finding is similar to the prevalence rate of 21% reported by Morrison et al in the USA. [39] It is however relatively lower than the rates of 28.7% and 38.7% reported by Adewuya et al and Olley et al, in southwestern Nigeria and South Africa respectively. [11, 12] This lower prevalence may be due to the assertion by Rabkin et al [40] that the availability of HAART causes significant reduction in psychological distress among HIV seropositive subjects. The subjects enrolled for this study have also spent sometimes living with the condition; the average duration since diagnosis was 2.80±1.79 years. In this case, they have developed some adaptive coping strategies which might be protective against the development of depression, while the previous studies included patients who were newly diagnosed, yet to commence therapy and come to terms with the reality of their diagnosis. When compared with the prevalence of depression of 3.3% in the general adult population in Nigeria, [41] however, the rate reported among the subjects on HAART in this study is significantly higher. The possible reasons for the difference include; the change in status of HIV infection to a chronic disorder and the associated distresses of living with it as well as the attendant significant life events such as losses in the form of death of spouses and children. The negative impact of stigma and the neuropsychiatric side effects of some of the antiretroviral medications could also be contributory. [42]

Logistic regression analysis revealed that female gender, past history of psychiatric illness, family history of psychiatric illness and duration of HIV seropositivity were significant predictors. Similar findings have been reported in previous studies with some degree of consistency as correlates of depression in HIV+ subjects. The likelihood of developing depression was about 3 times more among females than their male counterparts. This finding is similar to that of Gureje et al [41] in which a female to male ratio of 3:1 for vulnerability to depression was reported. The conspicuous reasons for this finding are; the additional psychosocial stresses faced by women living with such a socially stigmatizing disease and the possible role of hormonal factors associated with menstrual cycles, pregnancy and menopause. In terms of the past history of psychiatric illness, out of the 18 subjects with a history of same, sixteen developed clinical depression, thus the probability of developing depression among these subjects was about 23 times more than among subjects without similar history. This is because HIV diagnosis and its attendant inter-current complications and presentations can be potent triggers for depression especially in those with prior history as reported by Buchanan et al who made similar observation.[43] Also, family history of psychiatric illness in a first degree relation was found to be a significant predictor with a likelihood ratio of 1.2 in this study. This finding is consistent with family studies which have shown that the history of depression in the first degree relations of a subject naturally increases that subject's vulnerability. Genetic studies have also revealed that the risk of developing depression is increased in the first-degree relatives of both bipolar

and unipolar probands.[44] The genetic predisposition to the development of depression in HIV+ subjects might probably be exaggerated as observed in this study. Though, the duration of HIV seropositivity had a statistically significant relationship with the development of depression among the subjects, it did not increase their vulnerability to it. It can be deduced that the shorter the duration of the disease the more the prevalence of depression among the subjects. This is because, the longer the duration the more psychologically adjusted the subjects become.

A critical evaluation of the psychometric properties of the BDI-II in comparison to the CIDI revealed that its accuracy and effectiveness as a screening tool for depression among adults on HAART were outstanding. The degree of diagnostic concordance between the two instruments had a Kappa value of 0.93 and was statistically significant. Its internal consistency with a Cronbach's α of 0.911 was excellent and compares with the outcome of meta-analysis conducted by Beck et al [45] thus making it a reliable instrument for the detection of depression among the subjects. The validity coefficients of the instrument assessed at a cut-off score of 18 were also excellent across all parameters. The sensitivity of over 90% indicated that the BDI- II has an acceptable detection rate for depressed HIV seropositive subjects. It implies that the BDI - II can correctly diagnose 9 out of every 10 depressed HIV+ subjects. The specificity of about 97% showed that the instrument has a high capacity to discriminate those who are non-depressed from the depressed subjects. It means that if the instrument were administered to 100 non-depressed HIV+ subjects, 97 of them will have negative BDI-II diagnosis. The sensitivity value obtained was within the range of 81% to 100% reported by Myers and Winters in their systematic review while the specificity was higher than the range of 53% to 93% reported in that review.[46] The positive predictive value (PPV) of the BDI – II was 91% while the negative predictive value (NPV) was about 96%. Adapting the definitions of the PPV of a test as the proportion of subjects with positive test result who actually have the disease, and the NPV as the proportion of subjects with negative test result who do not have the disease, [47] it can be inferred hypothetically, that a subject who has a positive BDI – II diagnosis of depression has a 91% chance of actually having it while a subject without a BDI – II diagnosis has a 96% chance of not having depression. Thus, the outcomes in this study confer significant confidence on the predictive capacity of the instrument among subjects on HAART. The false positive rate (FPR) of 0.03 denoted that only 3 out of hundred HIV+ subjects that were screened with BDI – II will be falsely diagnosed as depressed while the misclassification rate of 0.04 meant that only about 4 out of 100 subjects will be wrongly classified by the instrument. Finally, based on the ROC curve analysis, 18 also had the greatest area under the curve, thus conferring on it the best discriminant ability of all the values analyzed which is in conformity with the outcome of earlier validity study conducted by Awaritefe in this environment.

Limitations of the study

The prevalence of depression among the subjects on HAART need to be interpreted with caution as other psychosocial

stressors such as the impact of stigmatization were not independently assessed. Also, the similarities between the biological symptoms of depression and some of clinical manifestations of HIV/AIDS may give higher BDI – II outcomes. Thirdly, since some of the validity coefficients of any instrument (e.g. Sensitivity and specificity) are dependent on the prevalence of the condition, there is the need for caution in the interpretation of the psychometric properties obtained in this study. Another limitation of the study is, the results are based on data that were generated cross-sectionally rather than longitudinally, hence cause and effect relationship could not be established.

CONCLUSIONS

Depression affects about one out of every five HIV+ subjects, thus making it one of the commonest psychiatric comorbidities among them. Factors that increase the vulnerability to depression include; female gender, past history of psychiatric ailment, family history of psychiatric illness as well as short duration of HIV seropositivity. From our evaluation, the BDI-II is a brief instrument that has excellent psychometric properties which make it suitable for the detection of depression among PLHIV in the busy clinics of sub-Saharan Africa. We therefore recommend the use of the BDI – II for the screening of vulnerable groups as part of their routine clinical assessments. This will enhance early detection of cases and the institution of early intervention in order to optimize patient care. ■

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