Validity of Beck's depression inventory and alcohol use disorders identification test in Nigeria's Niger Delta region

D. C. Chukwujekwu, C. U. Okeafor, P. O. Onifade[1]

Department of Mental Health, University of Port Harcourt, Rivers State, [1]Department of Drug Admission and Treatment, Neuropsychiatric Hospital Aro, Abeokuta, Ogun State, Nigeria

Abstract

Background: The Beck's Depression Inventory (BDI) and Alcohol Use Disorder Identification Test (AUDIT) have been validated for use in the study of alcohol related psychiatric disorders in the developed world as well as in Western Nigeria, but not in the Niger Delta Region.

Aim: To ascertain the psychometric properties of BDI and AUDIT for use in this part of the world using psychiatric out-patients at the University of Port Harcourt Teaching Hospital.

Methods: Four hundred and seventy (470) subjects were enlisted into the study using systematic sampling technique. The BDI and AUDIT were administered to each of them. One hundred and eighty five (185) subjects met the criteria for the second stage viz; a score of 18 and above on the BDI and/or a score of 5 and above on the AUDIT. Diagnoses of Depression and Alcohol Use Disorder were made using the Composite International Diagnostic Interview (CIDI). The data were analyzed using the statistical package for social sciences (SPSS) version 16.0

Results: The sensitivity and specificity of the BDI were 96.3% and 58.8% respectively. The positive and negative predictive values of BDI were 86% and 85.7% respectively. Also, the sensitivity and specificity of the AUDIT were 100% and 92.1%. Furthermore, the positive and negative predictive values of the AUDIT were 85.5% and 100% respectively.

Conclusion: The BDI and AUDIT have excellent psychometric properties; hence they are valid for carrying out studies on alcohol related psychiatric disorders.

Keywords: Alcohol, Beck, depression, disorder, psychometric, test, validity

Introduction

Alcohol abuse and alcohol dependence have a major impact on public health.[1,2] Alcohol use disorders (AUDs) are among the most prevalent mental disorders worldwide and rank high as a cause of disability burden in most regions of the world.[3] Depression, on the other hand, has been ranked among the top five leading causes of years of life lived with disability.[4] In spite of the fact that it is well documented that the average riverside dweller enjoys taking Alcohol as part of his daily routine, the use and abuse of alcohol has not been accorded significant attention by the government of our country, especially in the Niger Delta region.

Instruments for accurately recording, objectively measuring and the study of AUDs and depression in this population are urgently needed for clinical practice and research purposes.

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The alcohol use disorders identification test (AUDIT) is a self-rated 10-item questionnaire with each item scored 0–4, giving a total score of 40. Studies have shown its validity and reliability in the detection of hazardous drinking, alcohol abuse, and dependence. It has been reported that a score of 5 provides a good tradeoff between sensitivity and specificity.[5-7] It has been revalidated and used in Western Nigeria.[8]

The Beck's depression inventory (BDI) is a 21-item self-report inventory.[9] It is one of the most widely used instruments for screening and estimating the intensity of depression. It has been revised in the second edition, to reflect the Diagnostic and Statistical Manual Fourth Edition (DSM-IV) diagnostic criteria.[10]

In terms of its psychometric properties, the second edition of BDI has been positively correlated with the Hamilton depression rating scale with a Pearson coefficient (δ) of 0.71, showing good agreement. The test was also shown to have high test-retest reliability ($\delta = 0.93$) and a high internal consistency ($\delta = 0.91$).[11]

Each item has four statements, and the patient chooses that which applies best to their feeling over the previous 2 weeks. A value of 0–3 is assigned to each answer, and then the total is computed to determine the severity of depression. The scores range from 0 to 63.[12] The questionnaire can be completed in 5 min. It has been revalidated and used in Western Nigeria and a score of 18 and above has been shown to be indicative of depressive disorder.[13,14]

Nevertheless, the validity of these two instruments (AUDIT and BDI) has not been ascertained in the Niger Delta of Nigeria. The purpose of this study, therefore, is to evaluate the sensitivity and specificity of these screening instruments among patients with comorbid AUD and depression attending the University of Port Harcourt Teaching Hospital (UPTH).

Methodology

This validity study was conducted at the General Outpatient Clinic of UPTH over a 6-month period from February 2011 to July 2011. The study took place in two phases. In the first phase, the AUDIT and BDI instruments were administered to 470 subjects.

Sample size calculation

The sample size was calculated using the formula for comparison of proportions:

$$N = 2 \times Z^2 \, pq/d^2$$

Where,

$N =$ Minimum sample size,

$Z =$ Normal standard deviation (this corresponds to the desired confidence level of the study for 95% confidence interval which equals 1.96),[15]

$p =$ proportion or prevalence of 18.4% (0.184) for depression among those with AUDs (alcohol abuse and dependence),[8,16,17]

$q = 1 -$ prevalence,

$d =$ precision $= 0.05$,

$$N = 2 \times (1.96)^2 \, (0.184) \, (1 - 0.184)/(0.05)^2$$

$$N = 461.43,$$

Attrition $= 10\% \, (46)$,

Final sample size: $-461 + 46 = 507$

The sample size for this study was upgraded to 507 to make up for those who may drop out of the study. Nevertheless, only 470 subjects were available and were therefore studied.

A systematic sampling technique was used to select the subjects. Every fourth eligible patient registered at the General Outpatient Clinic for the day was selected from the medical records register. Ballot method was used to select the first patient for the day from the eligible patients registered for a particular session: Subsequently, every fourth from the position selected by ballot was selected until the end of the clinic session. Consenting patients were recruited as described above on each clinic day until the required sample size was achieved.

Diagnosis of major depression was made according to the DSM-IV diagnostic criteria using the Composite International Diagnostic criteria (CIDI). One hundred and eighty-five subjects met the criteria for the second stage, namely, a score of 18 and above on the BDI and/or a score of 5 and above on AUDIT.

Formulae for calculating sensitivity, specificity, and predictive values

- Sensitivity: (true positives/total number diseased) × 100%
- Specificity: (true negatives/total number diseased) × 100%
- Positive predictive value: (true positives/total number who tested positive) × 100%
- Negative predictive value: (true negatives/total number that tested negative) × 100%.

The research instruments

a. The AUDIT is a self-rated 10 item questionnaire with each item scored 0–4, giving a total score of 40[4-6]
b. The BDI is a 21 item self-report inventory. A score of 18 and above has been shown to be indicative of a depressive disorder[12,13]

c. The World Mental Health CIDI (the paper and pencil version, 3.0) was used to make diagnosis of AUD and major depression.[18] The interviewer administered the CIDI himself.

Before the commencement of this study, approval of the ethical committee of the UPTH was sought and informed consent obtained from the subjects to be involved in the research.

The data were analyzed using the Statistical Package for Social Sciences, version 16.0 (233 South Wacker Drive, 11th Floor, Chicago, Illinois 60606-6412), at 5% level of significance and 95% confidence interval. The BDI and AUDIT scores were compared with the Student's *t*-test, which was the reference test for this validity study.

Results

A total of 185 subjects met the criteria for the second stage, namely, a score 18 and above on the BDI and/or a score of 5 and above on AUDIT. A total of 150 subjects scored 18 and above on the BDI out of which 129 were diagnosed with major depression according to the DSM-IV diagnostic criteria using the CIDI. Twenty-one of them did not meet the diagnostic criteria. The five other subjects whose score on BDI was <18 met the diagnostic criteria for major depression [Table 1]. The sensitivity, specificity, positive predictive value, and negative predictive values for BDI at cutoff of 18 was 96.3%, 58.8%, 86.0%, and 85.7%, respectively.

The sensitivity, specificity as well as the positive and negative predictive values of both the BDI and AUDIT are as calculated below:

$$\text{Sensitivity } = \frac{129}{134} \times 100 = 96.3\%$$

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$$\text{Positive predictive value } = \frac{129}{150} \times 100 = 86\%$$

$$\text{Negative predictive value } = \frac{30}{35} \times 100 = 85.7\%$$

Sixty-nine subjects scored 5 and above on AUDIT out of which 59 was diagnosed with AUD according to the DSM-IV criteria using the CIDI while ten of them did not meet the diagnostic criteria. None of the subjects who scored <5 on the AUDIT met the criteria for AUD according to the DSM-IV criteria [Table 2].

Table 1: Distribution of cases of depression against Beck's depression inventory score

	With depression	Without depression	Total
BDI score ≥18	129	21	150
BDI score <18	5	30	35
Total	134	51	185

BDI: Beck's depression inventory

Table 2: Distribution of cases of alcohol use disorders against alcohol use disorders identification test score

	With AUD	Without AUD	Total
AUDIT score ≥5	59	10	69
AUDIT score <5	0	116	116
Total	59	126	185

AUDIT: Alcohol use disorders identification test

The sensitivity, specificity, and predictive values are calculated as follows:

$$\text{Sensitivity } = \frac{59}{59} \times 100 = 100\%$$

$$\text{Specificity} = \frac{116}{126} \times 100 = 92.1\%$$

$$\text{Positive predictive value } = \frac{59}{69} \times 100 = 85.5\%$$

$$\text{Negative predictive value } = \frac{116}{116} \times 100 = 100\%$$

Discussion

Studies by different researchers reported sensitivity values between 77% and 91% and specificity figures between 60% and 80% for the AUDIT.[5,19-21] In this study, sensitivity value of 100% and specificity of 92.2% was got.

Furthermore, for the BDI, Kjaergaard *et al.*[22] reported sensitivity value of 85% and specificity of 58%. These results are lower than the values got in this study (96.3% and 58.8%, respectively). The same applies to the AUDIT results derived from this study compared with other reported results. It is possible that differences in sample size, as well as other methodical differences in sample selection, may account for the different results. Nevertheless, the relatively higher sensitivity values compared with specificity figures got in this study are similar to previously documented results as shown above.

The much higher sensitivity of the BDI (96.3%) compared to its specificity (58.8%) indicates that the instrument is more likely to detect depression in patients with AUD than it is to detect the absence of depression in people not suffering from AUD. The positive and negative predictive values of the BDI are similar (86% vs. 85.7%). This implies that the BDI's capacity

for predicting that one suffering from AUD is likely to have co-morbid Depression is similar to its ability to predict that one who is not suffering from AUD is not likely to have depression.

Similarly, the higher sensitivity figure compared to the specificity figure of the AUDIT (100% vs. 92.2%) means that the instrument is more likely to detect AUD among Depressed patients than it is likely to detect the absence of AUD among nondepressed patients. However, the very high sensitivity and specificity figures of 100% and 92.2% respectively show that AUDIT is less likely to yield false positive and false negative results in studies conducted with it.

The higher negative predictive value of AUDIT more than its positive predictive value (100% vs. 85.5%) means that the instrument is more accurate in predicting that someone without AUD may not have depression than it is in predicting that someone with AUD may actually suffer from depression.

The specificity and sensitivity values as well as the excellent, positive, and negative predictive values of the BDI and AUDIT underline the excellent psychometric properties of these instruments and are therefore are valid instruments for studying depression and AUDs in the Niger Delta region of Nigeria.

Looking at all the calculations, there is no notable difference between these results and previous validation results.[7,13] In other words, these results are similar to reports on the reliability and validity of these instruments done elsewhere including Nigeria.[5,6,12,13,19]

Prevalence rates of AUD (among patients attending general hospitals) ranging from 10% to 32% have been reported globally.[23,24] In Nigeria, rates of 1.7–17% have been reported.[3,16] In a 2004 report, the WHO also provided evidence that there has been a substantial increase in the incidence of alcohol-related diseases and death worldwide and concluded that the negative health consequences of alcohol equal those of smoking.[17]

For depression, prevalence rates of 1–25.3% have been reported in Nigeria.[16,25] Globally, the prevalence rate of depression has been reported to be between 1% and 19%.[26,27]

The research was conducted using clinically derived sample which obviously limits generalization to the entire population. This study was also cross-sectional in nature. This made it difficult to ascertain the temporal relationship between AUD and depression among the subjects with these disorders.

Conclusion

It should be stressed that proper investigation and assessment of AUD patients is imperative toward making the right diagnosis and instituting appropriate therapy. This will go a long way toward curtailing the myriad of psychological, psychiatric, and medical consequences that this hydra-headed monster poses to society and future generations.

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