ORIGINAL ARTICLE

Effects of Anxiety on Neurocognitive Performance in HIV Positive Adults

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ABSTRACT

Objective: To examine the effects of anxiety on neuropsychological performance among HIV positive adults in Lusaka, Zambia.

Design: A cross-sectional study with a sample of 263 participants of who 107 (40.7%) were males and 156 (59.3%) were females.

Measures: The International Neurobehavioural Test Battery and Beck Anxiety Inventory were used to assess cognitive performance and anxiety levels respectively.

Results: Severe anxiety showed a weak positive correlation (r=.148, p=0.472), but the result did not reach statistical significance. Participants who were not able to perform instrumental activities of daily living independently were more likely to be anxious (p<0.05).

Conclusion: Results obtained from this study imply that there are minimal differences in performance between non anxious and anxious HIV positive individuals on neurocognitive performance. However, anxiety showed an effect on instrumental activities of daily living of the participants.

INTRODUCTION

It is important to recognise and treat anxiety in the HIV positive population because it has been associated with poor treatment compliance, disease progression leading to increased use of the health care services.[1] Anxiety takes up cognitive capacity and leaves less attention resources for tasks leading to poor cognitive performance.[2] High arousal of anxiety may lead to mental problems such as, slowing, scrambled or blocked thoughts and words, and memory failure which can interfere with one's performance on neuropsychological assessment.[3] This can disturb the patient's ability in almost all areas of cognitive functioning[3,4] attributed this to the general worry associated with anxiety which impairs attention on demanding tasks. However, little is known regarding the relationship between anxiety and cognitive functions and that the reported observations are inconclusive.[5] Moreover, the literature is mixed.[6] There is a knowledge gap regarding cognitive functions. Therefore, this study will seek to extend the current literature by clarifying nature on neurocognitive functioning in a medical sample, aid in the management of HIV positive individuals as the associated anxiety will be recognised and treated, and determine effects of anxiety on instrumental activities of daily living (IADL).

Therefore, this study will be carried out to explore the role of HIV related anxiety on neurocognitive functioning aimed at examining the effects of HIV infection and HIV related anxiety on neuropsychological performance. The specific objectives were to identify neurocognitive deficits associated with HIV related anxiety and determine effects of HIV related anxiety and cognitive performance on Instrumental activities of daily living.

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METHODS

Participants

A total of 263 participants were recruited from the antiretroviral clinic across Lusaka (Matero main, Matero reference, Chipata, Kalingalinga, Chilenje and Kabwata clinics) with permission from the Ministry of Health. Inclusion criteria was a minimum of 5 years of education, age range of 18 to 65 years, no neurological impairment as determined by the neurobehavioural medical screen and no history of alcohol abuse. Participants were identified by the nurses at the respective clinics after which a verbal and written consent was obtained by the researcher.

MEASUREMENTS

Clinical Assessment

A medical Doctor was assigned to conduct clinical assessments that included physical examinations to determine the WHO staging of the participants and rule out neurological disorders that could have had an impact on neurocognitive performance.

Neuropsychological Assessment

Ten graduate students assessed the participants using the neurobehavioural medical screen, Beck Anxiety Inventory, Activities of Daily Living questionnaire, substance use history and behavioural notes prior to administering the International Neurobehavioural Test Battery (**Table 1**).

Table 1: Neuropsychological Domains and Tests

Cognitive Domain	
Speed of Information Processing	WAIS-III Digit Symbol WAIS-III Symbol Search Trail Making Test Part A
Learning and Delayed Recall *(2 domains)*	Hopkins Verbal Learning Test, Revised -II) Brief Visuospatial Memory Test Revised
Attention/Working Memory	Paced Auditory Serial Addition Test Category fluency test (Animals, Action) WMS-III Spatial Span
Language	Word Sound Fluency Category Fluency
Abstraction/Executive Functioning	Wisconsin Card Sorting Test (64 -item version) Color Trails Stroop Color Word Test **Category Tests – Computer version**
Motor	Grooved Pegboard
Screening for Effort	Hiscock Memory Test
Medical Screening Interview	Behavioral Notes Summary Academic Skills Questionnaire Zambia Achievement Test

Ethical Considerations

Ethical approval was obtained from University of Zambia, Biomedical Research Ethics Committee (UNZABREC). Confidentiality was maintained by storing identifying data separately from the data. Both written and verbal informed consent were obtained from the participants before the tests were administered.

Data Analysis and Management

Statistical Package for Social Sciences (SPSS) version 16 was used for data analysis. The raw data obtained from the study was converted into T- Scores to correct for age, education and gender to ensure effects seen were not due to any of these factors.

RESULTS

Participants

The participants consisted of 107 (40.7%) males and 156 (59.3%) females. Participants' educational level ranged from 5 to 20 years. The ages ranged from 21 to 65 years old with a mean age of 40.78 and SD of 8.9. The majority of the participants were in stage III WHO staging (45.4%), followed by 28% in WHO stage I, 20.3% in stage II while 6.3% were in WHO stage IV. A total of 66.5 % (175) did not show impairment on cognitive performance whilst 33.5 % (88) were impaired.

Anxiety and Neurocognitive Functioning

A weak positive correlation (r=0.148, p=0.472) was seen between severe anxiety and neurocognitive performance using Pearson correlation coefficient, though the strength of the relation was small and not statistically significant. Anxiety, age, WHO staging and CD4 count were included in the standard multiple regression analysis as they can also impact on neurocognitive performance. Anxiety did not reach statistical significance (p>0.05) on cognitive performance, indicating that anxiety did not make a unique contribution to neurocognitive performance. However, age reached statistical significance on verbal fluency (p=0.046), learning (p=0.011), and the recall domain, meaning it made a unique contribution on cognitive performance. CD4 count also reached statistical significance on speed of information processing (0.037) and the global mean (0.007). However, WHO staging

(p>0.05) did not reach statistical significance on any of the seven cognitive domain assessed (speed of information processing, working memory, language, executive functioning, learning, delayed recall and motor domain), indicating that it had no effect on cognitive functioning.

Anxiety and Neurocognitive Functioning on Instrumental Activities of Daily Living

A total of 91.7 % (188) were able to perform IADLs independently while 8.3 (17) needed help with IADLs. Results from a logistic regression to determine the effects of anxiety and neurocognitive functioning on IADLs reached statistical significance on cognitive performance (**Table 2**). The result revealed that those who had problems with IADL were more likely to be anxious.

Table 2: Anxiety and Neurocognitive Performance on IADLs

	B	SE	Wald	Df	P	Odds Ratio
Global Mean	-.017	.047	.133	1	.715	.98
Anxiety	.039	.017	5.391	1	.020	1.04
Executive Functioning	-.022	.040	.299	1	.585	.98
Anxiety	.040	.017	5.536	1	.019	1.04
Verbal Fluency	.050	.036	1.883	1	.170	1.05
Anxiety	.039	.017	5.489	1	.019	1.04
Working Memory	.037	.031	1.392	1	.238	1.04
Anxiety	.041	.017	5.890	1	.015	1.04
Learning	-.009	.031	.089	1	.766	.99
Anxiety	.039	.017	.427	1	.020	1.04
Recall	-.19	.031	.349	1	.555	.98
Anxiety	.040	.017	5.508	1	.019	1.04
Motor	-.058	.027	4.502	1	.034	.94
Anxiety	.035	.017	4.511	1	.034	1.04
SIP	-.037	.038	,963	1	.326	.96
Anxiety	.039	.017	5.394	1	.020	1.04

DISCUSSION

Anxiety did not have an effect on the performance on any of the seven cognitive domains assessed, despite 43 % of the participants showing anxiety. This result could have occurred due to participants over reporting the anxiety symptoms which was assessed using a self administered questionnaire. Previous studies have shown that when one does not view the assessment as a threat, cognitive dysfunction may not be seen. [8] The threat was responsible

for distracting the participants leading to poor performance as it impaired participant's attention and concentration on the task. A weak positive correlation (r=.148, p= 0.478) was seen, but did not reach statistical significance and was of a small strength. It can thus be said that these findings appear consistent with previous studies[8]. reported a similar result, which did not show a significant effect of anxiety on cognitive performance but *suggested that severe anxiety was associated with worse cognition. A*nxiety had an effect on cognitive performance when the task was complex .[9] The adverse effects of anxiety increase as the task complexity increases and impair response time and not the accuracy[10]. These results could have differed with the current study in that not all the tests used in the current study were time oriented which seems to be affected by anxiety but were based on accuracy which has been reported not to be affected by anxiety. On the contrary,[5] reported that anxiety and mild depression showed significant deficits in episodic memory functioning and impaired executive functioning. The result could have been attributed to the presence of comorbid depression which could have accounted for the poor cognitive performance. Although the results obtained from this study seem not to imply that there may be some cognitive deficits associated with HIV related anxiety, literature has shown that it is important to recognise and treat anxiety in the HIV positive population because it has been associated with poor treatment compliance, high risk behaviours, disease progression and increased use of the health care services.[1] Anxiety has also been reported to take up cognitive capacity leaving less attentional resources for the tasks which in turn lead to poor cognitive performance.[2] Based on this information, it is proposed that HIV patients are screened for anxiety and appropriate intervention taken.

This study revealed that anxiety contributed significantly to one having problems with performing IADL on all domains (p<.05). This is in line with previous studies that revealed similar findings. A study done showed that anxiety and cognition were significant on the IADL (p= 0.024)[11]. This result however, could have occurred because the participants were also depressed and physically ill which could have further impacted on their cognitive abilities. Anxiety disorder was associated with an increased risk of incident IADL limitation (p=0.048).[12] IADL limitations could have been as a result of

participants' age. Results obtained from this study cannot be generalized as the sample size for participants who were IADL dependent was small (n=17). Further studies need to be done on a larger sample to determine the effects of HIV related anxiety and cognitive performance on IADL. However, this study has confirmed that HIV related anxiety is a strong predictor of one being IADL dependent, it is therefore important that anxiety in HIV is considered in the assessment and treatment of HIV positive individuals.

CONCLUSION

Results obtained from this study imply that HIV related anxiety has no effect on cognitive performance, though severe anxiety showed a weak positive correlation (r = .148) of small strength. Hence, it is expected that anxious and non anxious patients will perform the same on the test battery. However, it is recommended that HIV patients are screened for anxiety as this study revealed that anxiety was a strong predictor on one's IADL status and reached statistical significance (p<.05) which can have an implication on one's daily functioning.

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