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Depression and its relationship with Motor Ability, Set Shifting, Working Memory, Visuo- Construction and Visual Memory

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ABSTRACT

The present study examines the relationship of depression and the neuropsychological function of motor ability, set shifting ability, visuo-construction and memory and working memory among individuals with HIV/AIDS. 200 subjects who were HIV/AIDS positive (100 males and 100 females) and were within age range of 20 to 50 years and minimum education level of 8th standard were taken. The result indicates that Depression has no relationship with function of motor ability, set shifting ability, visuo-construction and memory and working memory among individuals with HIV/AIDS.

Keywords: motor ability, set shifting, visual construction, visual memory, working memory

INTRODUCTION

The first HIV positive case was detected in Manipur in February, 1990 (MACS, 2002). [14] Manipur is a small state having a population of 22, 93,896 (2001 Census) in the North East India. The nearness of Manipur to Myanmar (Burma) and therefore to the Golden Triangle drug trade, has made it a major transit route for drug smuggling with drugs easily available. HIV prevalence among injecting drug users is above 20% and the virus is no longer confined to this group but has spread further to the female sex partners of the drug users and their children (NACO, 2007). [15] The latest surveillance report of HIV infection in Manipur indicates that as on January 2011, of the 3, 93,006 individuals screened for HIV infection 31,256 were found to be HIV positive (MACS, 2011). [16] In the North-Eastern region, particularly in Manipur, HIV infections are mainly found among injecting drug users (UNAIDS, 2004). [17] Studies show that the geographical presence of IDUs correlates clearly with the path of the National Highway 39 in Manipur (Sarkar et al., 1995). [18]

Depression has become a mental health epidemic. Approximately 6 million American men and 12 million American women suffer from clinical depression (Bhatia & Bhatia, 1999). [136] HIV/AIDS and depression are projected to be the world's two leading causes of disability by 2030 (Mathers & Loncar, 2006). [138] Worldwide, 33 million people are currently living with HIV. In 2009, there were an estimated 2.6 million new HIV infections and 1.8

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million deaths due to AIDS (UNAIDS, 2010).[139] Depression, on the other hand, affects 121 million people globally (World Health Organisation). Importantly, HIV/AIDS and anxiety/depression are interlinked. People suffering from depression are interlinked. People suffering from depression may be more likely to engage in risky sexual behaviour, and they are therefore at greater risk of contracting HIV (Gupta et al., 2010).[140] Conversely, an HIV diagnosis may trigger symptoms of anxiety and depression (Boarts et al., 2009), [143] which could once again lead to risky sexual behavior and the spreading of the virus. In addition, studies have shown that people suffering from depression are less likely to adhere to treatment- treatment for both mental illness and for antiretroviral treatment (ART).[145] Depression may therefore lead to non-adherence to ART and result in poorer health. Unfortunately, more than half of the HIV+ population that suffer from depression have not received an official diagnosis of their depression (Asch et al., 2003). [146]

Cognitive impairment and depression frequently coexist in HIV (Atkinson et al., 2008). [147] Despite this, few neuropsychological studies of HIV positive individuals in developing countries have included adequate measures of depression. Depression can adversely influence performance on cognitive tests due to poor effort, slowed processing speed, psychomotor retardation, or a combination of these factors (Lezak et al., 2004).[148] While some evidence points to lack of an association between depression and medical outcome (Ammassari et al., 2004), [149] other studies (Chandra et al.,1998) [150] have reported that presence of depression disorder could result in neglect of psychological distress and immune system function in HIV spectrum disease. Psychological distress has been associated with decreased number of helper cells and B cells at low levels of viral burden (Gonzalez et al., 2004). [152]

Cysique *et al.,* (2007) [161] reported that neurocognitive impairment and major depression should be considered as two independent processes. Moreover, studies have demonstrated that neuropsychological abnormalities observed in HIV infection are distinct and cannot be attributed to depression (Perkins et al., 1994). [159] It has been shown that depressed patients with HIV-1 infection may exhibit deficits in learning and memory (Claypoole et al., 1998), [166] but the contributions/involvement of depression to the impairment and severity of the neuropsychological functioning appear to be minimal.

METHODS

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SAMPLE:

The sample of the present study was collected from different drop-in-centre of Manipur located at Imphal. Based on purposive sampling technique, 200 subjects who were HIV/AIDS positive (100 males and 100 females) and were within age range of 20 to 50 years were taken. The subjects with minimum education level of 8^{th} standard were taken. Subjects with any other co-morbid illness were excluded.

TOOLS:

The following tools were used in the present study:

1) **History taking proforma especially designed for present study:**

   Semi-structured proforma scale was administered for collecting socio-demographic and economic data of the subjects which was developed by the researcher for the present study. Subjects were asked to provide details of their age, gender, educational qualification, marital status, religion, and monthly income, duration of HIV tested and duration of starting ART.

2) **Beck's Depression Inventory-II (BDI-II) (**Beck **et al., 1996):363**

   The Beck Depression Inventory is a 21 multiple-choice self-report inventory, one of the most widely used instruments for measuring the severity of depression. There are three versions of the BDI-the original BDI, first published in 1961 and later revised in 1978 as the BDI-IA, and the BDI-II, published in 1996. The original BDI, first published in 1961, consisted of 21 items about how the subject has been feeling in the last week. Each question has a set of at least four possible choices, ranging in intensity. When the test is scored, a value of 0 to 3 is assigned for each answer and then the total score is compared to a key to determine the depression's severity. The standard cut-offs are as follows: 0-9: indicates minimal depression, 10-18: indicates mild depression, 19-29: indicates moderate depression and 30-63: indicates severe depression.

3) **NIMHANS Neuropsychological Battery (**Rao et al., 2004)**:** 366

   The NIMHANS Neurological Battery consists of a series of tests aimed to assess various aspects of cognitive function including motor speed, attention, memory, language, visual-spatial ability and executive functions. The profile of the Neuropsychological assessment will indicate the patient's deficits and adequacies in different area. The factorial validity of this test is 0.4 which indicates the value is high and is suggestive of adequate reliability of the tests.

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The tests selected for the present study are:

A) Finger Tapping Test (Lezak, 1995) **[367]:**

Finger tapping Test is used to measure motor speed. It measures the speed with which the index finger of each hand can tap. Tapping speed of each hand is tested separately. The subject taps the tapping key with the index finger of either hand, with his or her preferred hand being tested first. S/he is instructed to tap the key as fast as s/he can, without moving either body or shoulder. The subject is given a total of 5 trials lasting 10 seconds each. Three such consecutive trials are followed by a brief pause of 30 seconds. After the pause, 2 more trials are given for the same hand. A similar procedure is followed for the other.

B) Wisconsin Card Sorting Test (Milner**, 1963)[371]:**

WCST measures set shifting ability. This test examines concept formation, abstract reasoning and the ability to shift cognitive strategies in response to changing environments. The test consists of 128 cards. Stimuli of various forms are printed on the cards. The stimuli vary in terms of three attributes: colour, form and number. The stimuli are geometrical figures of different forms (triangle, star, Cross, circle), in different colours (red, green, yellow, blue) and in different numbers (one, two, three, four), which are presented on each card. The pack of 128 cards consists of two sets of 64 cards each. In addition to these 128 cards, there are 4 stimulus cards. Out of those four stimulus cards, the first card consists of 1 red triangle, the second consists of 2 green stars, the third consists of 3 yellow crosses and the fourth consists of 4 blue circles. There are multiple score in this test.

C) Complex Figure Test (Meyers & Meyers, 1995) **[374]:**

This test measures visuo constructive ability and visual memory. Visuo constructive ability requires attention, visuo spatial perception, visuo motor coordination, planning and error correction abilities. An abstract and complex design is copied followed by recall of the same. The subject is asked to recall the figure twice: the first time is an immediate recall three minutes after the copying is completed, and the second time is a delayed recall 30 minutes later. The number of facts correctly reproduced on each occasion forms the score.

D) Verbal N-Back Test (I&II) (Smith & Jonides, 1999) **[369]:**

This test measures externally guided working memory. In the verbal condition consonants are randomly ordered and spoken aloud. There is 1 back and 2 back task. In the 1 back task the subject responds whenever a consonant is repeated consecutively. In the 2 back task the subject responds whenever a consonant is repeated after an intervening consonant. Hits and errors in each condition/task combination form the score.

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PROCESS

To proceed with the study, necessary permission was sought from the concerned authorities of different NGO's. They were thoroughly explained about the research programme and the concerned subjects were also informed about the nature of the research study and informed consent is also taken from them to undergo the research. They were also informed that confidentiality will be maintain regarding their HIV status and identification like name will not be appeared in any part of the study. A prepared script was read out providing an overview of the study aims and risks and benefits to each subject approached for participation. After this all the subjects were asked to sign the informed consent form if they agree to participate in the study. They have the rights to seek clarification and information about the aspect of the research work. They have the freedom to refuse answer to any particular question and can withdraw the test at any point of time. Once the consent is obtained, brief history of socio-demographic, socio-economic and other relevant data of each subject was elicited on proforma made for the study. The subjects were instructed beforehand regarding the assessment tool.

RESULTS

Table1: Correlation between Finger Tapping Test and Depression of Individuals with HIV/AIDS

VARIABLES	**Correlation Co-efficient**
Right Hand	-0.011
Left Hand	0.037

Table1: It is observed from this table that there is no relationship found between depression and the two types of scores of finger tapping test. This indicates that depression has no role over motor ability.

Table2: Correlation between WCST and Depression of Individuals with HIV/AIDS

VARIABLES	**Correlation Co-efficient**
Number of Trials Administered	-0.074
Total number of correct	-0.047
Total number of Error	-0.019

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Percent Error	-0.019
Perseverative Responses	-0.033
Percent Perseverative Responses	-0.031
Perseverative Error	-0.033
Percent Perseverative Error	-0.036
Non Perseverative Error	-0.012
Percent Non Perseverative Error	0.026
Conceptual Level Responses	-0.023
Percent Conceptual Level Responses	0.029
Number of Categories Completed	-0.006
Trials to Complete the 1st Category	-0.055
Failure to Maintain Set	-0.006

Table 2: It is observed from this table that there is no relationship found between depression and the various types of scores of WCST. This indicates that depression has no role over adapting to changing environment/WCST.

Table 3: Correlation between Complex Figure Test and Depression of Individuals with HIV/AIDS

VARIABLES	**Correlation Co-efficient**
Copy	-0.032
Immediate Recall	-0.062
Delayed Recall	-0.049

Table 3: It is observed from this table that there is no relationship found between depression and the various types of scores of CFT. This indicates that depression has no role over visuo-construction and visual memory (CFT).

Table 4: Correlation between Verbal N Back Test and Depression of Individuals with HIV/AIDS

VARIABLES	**Correlation Co-efficient**
1 Back Hit	0.072
2 Back Hit	0.095

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1 Back Error	-0.086
2 Back Error	-0.084

Table 4: It is observed from this table that there is no relationship found between depression and the various types of scores of Verbal N Back Test. This indicates that depression has no role over working memory/Verbal N Back Test.

DISCUSSION

Findings of the present study reveal that there is no relationship between depression and the two types of scores of Finger Tapping Test. This indicates that Depression has no role over motor speed. Findings also revealed that depression has no link with the function of adapting to changing environment (WCST), visuo-construction and visual memory (CFT) and working memory (Verbal N Back test). Other studies have found similar results where Cysique *et al*., (2007) [161] and Goggin *et al*.,(1997) [168] reported that depression did not affect neuropsychological function in HIV infected individuals. Studies of Lawler *et al*., (2010) [351] also shows that depression did not affect the total score or any of the three subscales of the International HIV Dementia Scale (IHDS) which reveals that neurocognitive impairment and depression are independent complications of HIV. Moore *et al*., (1997) shows that no relationship was found between subjective complaints and cognitive functioning, yet a significant relationship was found between self-reported difficulties and formal measures of affect and mood. Failure to show a relationship between self-reported cognitive status and actual neuropsychological functioning in the cohort suggests that complaints of cognitive decline may be attributed to emotional factors. But, psychological distress does not account completely for neurocognitive impairment among HIV+ individuals (Bornstein et al., 1993). However, finding of Poutianen (1995), showed an association of impaired visual memory with depressive mood and with psychiatric disorders preceding the diagnosis of seropositive which suggests that factors other than HIV may explain these subjects poor visual memory. Van Grop *et al*., (1991) suggested the presence of depressed mood, independent of serostatus on actual neuropsychological impairment is associated with

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increase cognitive complaint. Such inconsistencies in findings are far from generalizability, so, more of such studies will be required in more future research to generalize the findings.

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