

A Study of Cognitive Impairment in HIV-TB Co-Infection

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ABSTRACT

Background: The impact of TB on HIV has led to an increase in HIV-Tuberculosis co-infection cases, which may have an impact on the severity of cognitive impairment in HIV positive people.

Aims & Objectives: The study's goal is to examine cognitive performance in HIV-positive people with and without pulmonary tuberculosis.

Methods and Materials: In this study, the cognitive function of HIV-positive people with and without tuberculosis will be assessed and compared. The study's participants are 60 HIV-positive people with pulmonary tuberculosis and 60 HIV-positive people without the disease. Using the International HIV Dementia Scale, cognitive function was examined.

Results: In the IHDS, there is a big difference between the two groups in terms of memory, psychomotor speed, and overall score. In 73.33% of cases and 56.66% of controls, the total score was less than 10, which is significant for cognitive impairment. Future neuropsychological testing of HIV-positive, asymptomatic people is required to detect cognitive impairments at an early stage.

Conclusion: The outcomes of the current investigation demonstrate how HIV's cognitive function is impacted by tuberculosis. Therefore, the co-infection with tuberculosis should be taken into account in the assessment and treatment plans.

Keywords: cognitive function, HIV infection, psychomotor speed, recall, treatment, Tuberculosis

1. INTRODUCTION

Early in the infection, Human Immunodeficiency Virus (HIV) reaches the central nervous system (CNS) [1]. Nearly 50% of the HIV population generally appears to have neurocognitive deficits [2]. HAND (HIV associated neurocognitive disorders) refers to the diverse range of neurocognitive side effects of HIV. Depending on the severity of the impairment, there are three categories: asymptomatic neurocognitive impairment (ANI), HIV associated mild neurocognitive impairment (MND), and HIV associated dementia (HAD). The incidence of moderate or severe dementia has decreased after the introduction of HAART in 1996, from about 7% in 1989 to only 1% in 2000[3]. HIV-TB co-infection: In

2011, there were reportedly 1.1 million new Tuberculosis (TB) cases worldwide that tested positive for HIV, according to the World Health Organization (WHO)[4]. HIV and TB influence one other's clinical developments and speed up one another's advancement [5–9]. The greater mortality is likely caused by the advancement of AIDS rather than TB since MTB speeds up viral replication [24]. Studies on cognitive function in HIV-TB co-infection are insufficient. Due to the effects of tuberculosis on HIV, there is a rise in occurrences of HIV-TB co-infection, which may have an impact on how severely HIV positive people suffer from cognitive impairment. Therefore, the purpose of this study is to assess and compare cognitive performance in HIV-positive people with and without tuberculosis. Neurocognitive disorders linked to HIV in India: Studies conducted in 2000 and 2001 by Satischandra et al. [10] and Wadia et al. [11] estimate that less than 6% of people have HIV-associated dementia (HAD). In a 2006 study by Riedel et al. [12] compared to 15% of controls, 35% of HIV-positive people scored in the impaired range on the International HIV Dementia Scale. In a research by Yephthomi et al. [13] in 2006 and a study by Gupta JD et al. [14] in 2007, subjects with advanced illness had neurocognitive impairment rates > 55%.

2. METHODOLOGY

The study's Cases include 60 HIV-positive people with a diagnosis of pulmonary tuberculosis (while still meeting the inclusion and exclusion criteria). 60 HIV-positive persons without tuberculosis who were matched to the study subjects' age, sex, and educational levels served as controls for the study. inclusion standards: 1) Patients with HIV and pulmonary tuberculosis diagnoses. Newly diagnosed patients who began receiving ART and DOTS treatment after a month, patients with at least a primary school education, male and female patients, patients between the ages of 18 and 50, and patients who provided consent were all eligible. Patients with a preexisting history of mental disease unrelated to either HIV or tuberculosis are excluded. 2) Patients suffering from other chronic debilitating ailments known to impair cognition, such as Diabetes mellitus (DM), hypertension (HTN), thyroid and other endocrine problems, renal disorders, etc. 3) Substance-dependent patients, 4) People with any sensory impairment, such as a vision or hearing impairment or a learning disability, who may find it difficult to complete the test; 5) Patients that resisted giving their permission. During an evaluation of the inclusion and exclusion criteria, cognitive function was assessed using the International HIV Dementia Scale (IHDS). IHDS consists of three subtests: recall of four things in two minutes, timed finger tapping, and timed alternating hand sequence test. In numerous research nowadays, the IHDS is utilised as a screening tool to identify dementia in HIV patients. Total score on the international HIV dementia scale. This represents the overall score for items 1-3. There is a maximum score of 14. A patient with a score of less than 10 needs to have their dementia potential thoroughly assessed [15].

3. RESULTS

TABLE 1: International Hiv Dementia Scale

| Motor Speed | Groups | Sample size | Min | Max | Means | SD | t value | df | P value |
|-------------|----------|-------------|-----|-----|-------|------|---------|----|----------|
| | Cases | 60 | 03 | 04 | 3.83 | 0.36 | 1.21 | 97 | P > 0.05 |
| | Controls | 60 | 03 | 04 | 3.91 | 0.25 | | | |

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|-------------------|----------|----|----|----|------|------|------|----|----------|
| Recall | Cases | 60 | 02 | 04 | 3.43 | 0.61 | 2.95 | 97 | P < 0.01 |
| | Controls | 60 | 02 | 04 | 2.84 | 0.73 | | | |
| Psychomotor Speed | Cases | 60 | 01 | 04 | 1.95 | 0.80 | 2.83 | 97 | P < 0.01 |
| | Controls | 60 | 01 | 04 | 2.4 | 1.04 | | | |
| Total Score | Cases | 60 | 08 | 12 | 9.18 | 1.12 | 2.24 | 97 | P < 0.05 |
| | Controls | 60 | 08 | 12 | 9.69 | 1.28 | | | |

There is significant difference in recall and psychomotor speed score ($p < 0.01$) and total score ($P < 0.05$) in IHDS among two groups. The mean total score is < 10 among both the groups.

TABLE 2: Comparison of International HIV Dementia Scale- total score

| Groups | Score <10 | Score >10 | Total |
|----------|-------------|-------------|------------|
| cases | 44 (73.33%) | 16 (26.66%) | 60 (100.0) |
| controls | 34 (56.66%) | 26 (43.33%) | 60 (100.0) |
| Total | 78 | 42 | 120 |

χ^2 Test value is 7.18 with 1 d.f. $P < 0.01$. The total score of < 10 was found in 73.33% of cases and 56.66% of controls which is significant for cognitive impairment.

4. DISCUSSION

The acquired immune deficiency syndrome (AIDS) dementia complex, also known as the acquired immunodeficiency syndrome (HIV) dementia complex, is frequently present in patients with HIV [16]. Cognitive impairment is thought to result from the retrovirus's direct brain-damaging effects rather than from the immune suppression's downstream consequences [17]. Treatment with ART will be complicated by dementia. [18]. According to this study, there is a statistically significant difference between those who have both HIV and TB and those who do not in terms of cognitive impairment. The International HIV Dementia scale (IHDS) is a sensitive tool that is used in several studies [19,20] to evaluate cognitive function in HIV positive people. In the current study, the IHDS recall and psychomotor speed scores for the two groups showed a statistically significant difference ($p < 0.01$). A total score of 10 or less indicates substantial cognitive impairment. This was discovered in 76% of case- and 58% of control-group participants. The mean total score of the IHDS differed between the two groups in a statistically significant way ($p < 0.05$). In cases, the mean total score is 9.16, whereas in the control group, it is 9.68. These findings were consistent with those of other Indian investigations. The International HIV Dementia Scale was the most sensitive tool, and 63.6% of patients had aberrant scores on it, according to a study by Karthigaipriya Muniyandi et al. [21]. The effect of TB on HIV infection may account for the notable difference in cognitive impairment between HIV-TB co-infected patients and HIV seropositive persons. According to studies, those who have both HIV and TB see an increase in viral replication and a reduction in immunity. In order to detect cognitive abnormalities at an early stage, early and routine neuropsychological screening of HIV positive, asymptomatic persons is required in the future. Given that HIV dementia is a sign that ART is necessary, this may help us stop

the disease's progression by starting it early. The results of the current investigation demonstrate how HIV's cognitive function is impacted by tuberculosis. Therefore, the co-infection with tuberculosis should be taken into account in the assessment and treatment plans.

5. CONCLUSION

When compared to people with HIV infection alone, those with pulmonary tuberculosis had a greater rate of cognitive impairment. The study's sample size and cross-sectional design are its shortcomings. A long-term investigation would allow for the stability of the cognitive abnormalities to be determined. In order to improve drug compliance to ART, it is crucial that cognitive impairment be identified early in HIV positive patients. This will lengthen longevity, enhance quality of life, and halt future loss of brain function.

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