IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 14, Issue 8 Ver. VIII (Aug. 2015), PP 10-13
www.iosrjournals.org

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

Dr.E. Ramachandra Rao[1], Dr. Archana.V[2]
[1]*Asst.Prof. of Psychiatry,* [2]*Resident specialist in psychiatry*
Department of Psychiatry, Rangaraya Medical College, Kakinada, Andhra Pradesh, India

Abstract: *There is an increase in HIV-Tuberculosis co-infection cases which might affect the severity of the cognitive impairment in HIV positive individuals due to the impact of tuberculosis on HIV. This study is designed to evaluate and compare the cognitive function in HIV seropositive individuals with and without Tuberculosis.50 HIV seropositive individuals with Pulmonary Tuberculosis and 50 HIV seropositive individuals without tuberculosis are the study subjects.Cognitive function was evaluated using International HIV Dementia Scale.There is significant difference in recall and psychomotor speed score and total score in IHDS among two groups.The total score of <10 was found in 76% of cases and 58% of controls which is significant for cognitive impairment. Early and periodic neuropsychological screening of HIV positive asymptomatic individuals is a must in future to spot the cognitive deficits at an early stage.The current study shows the impact of Tuberculosis on HIV and its cognitive function. Hence the assessment and treatment strategies should consider the Tuberculosis co-infection.*

Key Words: *cognitive function, HIV infection, psychomotor speed, recall, treatment, Tuberculosis*.

I. Introduction

Human Immune Deficiency Virus (HIV) enters the central nervous system (CNS) early during the infection [1]. Neurocognitive impairments in overall HIV population appear to be nearly 50% [2]. The wide range of neurocognitive complications of HIV are grouped under the name of HAND(HIV associated neurocognitive disorders) and depending on the degree of the impairment, there are three categories; progressing in disabilities from asymptomatic neurocognitive impairment (ANI) to HIV associated mild neurocognitive impairment (MND) and to HIV associated dementia (HAD). Since the introduction of HAART in 1996, the incidence of moderate or severe dementia fell from about 7% in 1989 to only 1% in 2000[3].

HIV - TB co infection**:** According to World Health Organisation (WHO), there were an estimated 1.1 million HIV positive new Tuberculosis (TB) cases globally in 2011[4]. HIV and TB affect each other's clinical course and increase each-others progression [5-9]. The higher mortality is due to the progression of AIDS rather than TB probably due to the fact that MTB increases viral replication [24].There are inadequate studies on cognitive function in HIV –TB co-infection. There is an increase in HIV-TB co-infection cases which might affect the severity of the cognitive impairment in HIV positive individuals due to the impact of tuberculosis on HIV.Hence this study is designed to evaluate and compare the cognitive function in HIV seropositive individuals with and without Tuberculosis.

HIV-Associated Neurocognitive Disorders In India: In studies done by Satischandra et al., [10] in 2000; Wadia et al., [11] in 2001; the prevalence of HIV-Associated Dementia (HAD) is estimated to be less than 6%.In a study done by Riedel et al., [12] in 2006, 35% of HIV individuals scored in the impaired range on the International HIV Dementia Scale vs.15% of controls. Neurocognitive impairment rates > 55% in participants with advanced disease in a study done by Yepthomi et al., [13] in 2006 and across disease stages in a study by Gupta JD et al., [14] in 2007.

II. Objective

The objective of the study is to compare the cognitive function in HIV seropositive individuals with and without Pulmonary Tuberculosis.

III. Methodology

50 HIV seropositive individuals who are diagnosed of Pulmonary Tuberculosis (maintaining the inclusion and exclusion criteria) are the Cases in the study. Controls for the study are 50 HIV seropositive individuals without tuberculosis and matched with respect to age, sex and education to the study subjects.

Inclusion criteria: 1) Patients with Diagnoses of HIV and Pulmonary Tuberculosis. Those who were newly diagnosed and started on ART and DOTS treatment from 1 month,2) Patients with minimum of primary school

education,3) Both male and female patients,4) Age group between 18 and 50 years,5) Those who gave the consent.

Exclusion criteria:1) Patients with past history of psychiatric illness not attributable to either HIV or Tuberculosis, 2) Patients having other medical disorders like Diabetes mellitus (DM), Hypertension (HTN), thyroid and other endocrine disorders and renal disorders and other chronic debilitating medical conditions known to cause cognitive impairment, 3) Patients with substance dependence, 4) Individuals suffering from any sensory impairment that is visual or hearing impairment or learning disability which may serve as hindrance in performing the test,5) Patients who refused to give consent.

Cognitive function was evaluated using International HIV Dementia Scale (IHDS) after assessing inclusion and exclusion criteria.IHDS consists of three subtests (i) timed finger tapping (ii) timed alternating hand sequence test, and (iii) recall of four items in 2 minutes. The IHDS is now used in many studies as a screening test to detect dementia in HIV patients. Total International HIV Dementia Scale Score. This is the sum of the scores on items 1-3. The maximum possible score is 12. A patient with a score of ≤10 should be evaluated further for possible dementia [15].

IV. Results

TABLE 1. International Hiv Dementia Scale

	Groups	Sample Size	Min	Max	Means	SD	t value	df	P value
Motor Speed	Cases	50	03	04	3.84	0.37	1.23	98	P > 0.05
	Controls	50	03	04	3.92	0.27			
Recall	Cases	50	02	04	3.32	0.62	2.97	98	P < 0.01
	Controls	50	02	04	2.92	0.72			
Psychomotor Speed	Cases	50	01	04	1.96	0.81	2.84	98	P < 0.01
	Controls	50	01	04	2.5	1.05			
Total Score	Cases	50	08	12	9.16	1.13	2.26	98	P< 0.05
	Controls	50	08	12	9.68	1.30			

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	38 (76.00)	12 (24.00)	50 (100.0)
controls	29 (58.00)	21 (42.00)	50 (100.0)
Total	67	33	100

x^2 Test value is 7.18 with 1 d.f. $P < 0.01$.The total score of <10 was found in 76% of cases and 58% of controls which is significant for cognitive impairment.

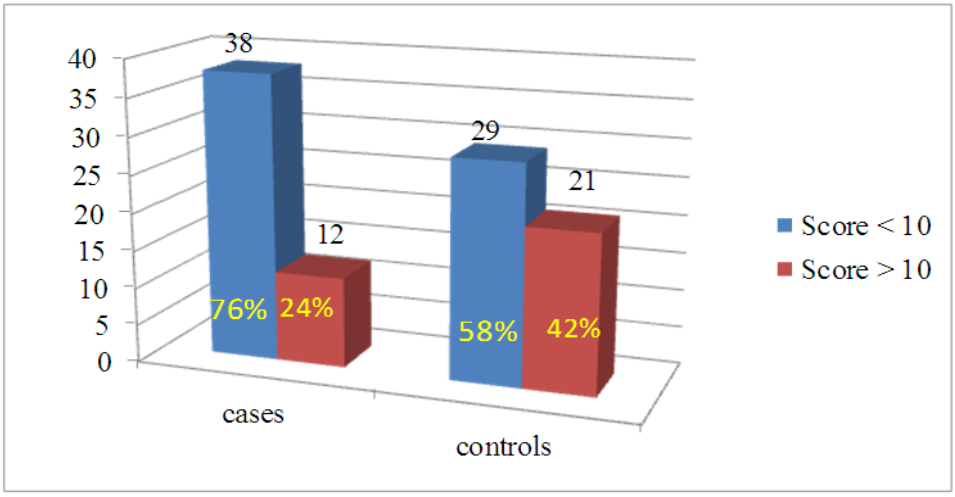

Figure 1: Ihds Total Score

V. Discussion

The human immunodeficiency virus (HIV) is frequently accompanied by progressive and severe cognitive loss referred to as the acquired immune deficiency syndrome (AIDS) dementia complex [16].Cognitive impairment is believed to be due to the direct effects of the retrovirus on the brain rather than to secondary complications of immunosuppression [17].The presence of dementia will interfere with ART treatment. [18].

This study has revealed that there is statistically significant difference in cognitive impairment in HIV-TB co-infected individuals as compared to HIV seropositive individuals without tuberculosis.

The International HIV Dementia scale(IHDS) is the sensitive test used to asses cognitive function in HIV positive individuals in many studies[19,20].In the present study there was statistically significant difference ($p<0.01$) in recall and psychomotor speed score in IHDS among two groups. The total score <10 is significant for cognitive impairment. This was found in 76% individuals of cases and 58% of controls. There was statistically significant difference ($p<0.05$) in the mean total score of IHDS among two groups. The mean total score in cases is 9.16 and in control group is 9.68.

These results were similar to other studies conducted in India. KarthigaipriyaMuniyandi et.al, [21] study showed the International HIV Dementia Scale was the most sensitive instrument and 63.6% the patients had abnormal scores in this scale.Riedel [12] has administered the IHDS scale to the asymptomatic HIV positive population in Pune and found that 35% of them have abnormal scores in this test.

The significant difference in impairment of cognitive function in HIV-TB co-infected individuals to HIV seropositive individuals might be because of the impact of TB on HIV infection. Studies show that TB causes increase in viral replication and impaired immunity status in HIV –TB co-infected individuals.

Early and periodic neuropsychological screening of HIV positive asymptomatic individuals is a must in future to spot the cognitive deficits at an early stage. This may help us in arresting the progression of the disease by early institution of ART therapy as HIV dementia is an indication for ART. The current study shows the impact of Tuberculosis on HIV and its cognitive function. Hence the assessment and treatment strategies should consider the Tuberculosis co-infection.

VI. Conclusion

Cognitive impairment was higher in patients of HIV with Pulmonary Tuberculosis than in patients with HIV infection alone.The limitations of the study are sample size is small and it is a cross sectional study. A longitudinal study would enable to determine stability of the cognitive deficits Hence, it is imperative that cognitive impairment should be recognized early in HIV positive patients to enhance drug compliance to ART. This will improve quality of life, increase longevity of life, and arrest further deterioration of brain function.

References

[1] Xia C, Luo D, Yu X, Jiang S, Liu S. HIV-associated dementia in the era of highly active antiretroviral therapy (HAART). Microbes and Infection 13 (2011) 419-25.
[2] Valcour V, Sithinamsuwan P, Letendre S, Ances B: Pathogenesis of HIV in the Central Nervous System. Curr HIV/AIDS Rep. 2011;8 : 54-61
[3] SacktorN,Tarwater PM, Skolasky RL, Mc Arthur JC, Selnes OA, Becker J, Cohen B,Miller EN: CSF antiretroviral drug penetrance and the treatment of HIV associated psychomotor slowing. Neurology 2001; 57:542-544.
[4] World Health Organization 2013.HIV – Associated TB Facts 2013:http://www.who.int/tb/challenges/hiv/
[5] Harries A, Maher D, Raviglione M, Nunn P, Praag EV. TB/HIV, A clinical manual. 2nd ed. Geneva: WHO Library cataloguing-in-publication data; 2004.

[6] Toossi Z. Virological and immunological impact of tuberculosis on human immunodeficiency virus type 1 disease. J Infect Dis. 2003; 1881, 146-55.
[7] Grange J, Zumla. Tuberculosis. In: Cook G, Zumla A, editor(s). Manson's tropical diseases. London: Saunders; 2003. p. 995-1052.
[8] Sharma SK, Mohan A, Kadhiravan T. HIV-TB co-infection:Epidemiology, diagnosis & management. Indian Journal of Medical Research. 2005 ;(April):550-567.
[9] Gray SM. Tuberculosis and HIV. In: Rom WM, Gray SM, editor(s). Tuberculosis. Boston: Little Brown and Company Inc; 1996. p. 443-465.
[10] Satishchandra, P., Nalini, A., Gourie-Devi, M., Khanna, N., Santosh, V., Ravi, V., Desai, A., Chandramuki, A., Jayakumar, P. N., and Shankar, S. K. (2000). "Profile of neurologic disorders associated with HIV/AIDS from Bangalore, south India (1989-96)". Indian J. Med. Res.111: 14–23.
[11] Wadia, R. S., Pujari, S. N., Kothari, S., Udhar, M., Kulkarni, S., Bhagat, S., and Nanivadekar, A. (2001). "Neurological manifestations of HIV disease". J. Assoc. Physicians India49: 343–8
[12] Riedel D, Ghate M, Nene M, Paranjape R, Mehendale S, Bollinger R, et al.Screening for Human Immunodeficiency Virus (HIV) dementia in a HIV clade C infected population in India. J Neurovirol 2006; 12:34-8.
[13] Yepthomi T, Paul R, Vallabhaneni S, Kumaraswamy N, Tate DF, Solomon S,Flanigan T. Neurocognitive consequence of HIV in southern India: a preliminary study of Clade C virus. J Int. NeuropsycholSoc 2006; 12(3): 424-430.
[14] Gupta JD, Satishchandra P, Gopukumar K, Wilkie F, Waldrop-ValverdeD,Ellis R, et al. Neuropsychological deficits in human immunodeficiency virus type 1 Clade C-seropositive adults from South India. J Neurovirol 2007; 13:195-202.
[15] Sacktor NC, Wong M, Nekarujja N, Skolasky RL, Selnes OA, MusisiS,et al. The international HIV dementia scale: A new rapid screening test for HIV dementia. AIDS 2005; 19:1367-74.
[16] Robertson KR, Nakasujja N, Wong M, Musisi S, Katabira E, Parsons TD, Ronald A, Sactor N. Pattern of neuropsychological performance among HIV positive patients in Uganda. BMC Neurology 2007:7-8.
[17] Wilkie FL, Eisdorfer C, Morgan R, Lowenstein DA, Szapocznik J. Cognition in early human immuno deficiency virus infection. Archives of Neurology 1990; 47:433-440
[18] Ferrando S, Van Gorp W, McElhiney M, Goggin K, Sewell M, Rabkin J, et al. Highly active ART in HIV infections; benefits for neuropsychological function. AIDS 1998; 12:65-70.
[19] Robbins RN, Remien RH, Mellins CA, Joska JA, Stein DJ. Screening for HIV-associated dementia in South Africa: potentials and pitfalls of task-shifting. AIDS patient care and STDs. 2011;25(10):587–593
[20] Njamnshi AKDVP, Fonsah JY, Yepnjio FN, Njamnshi DM, Muna WE. The International HIV Dementia Scale is a useful screening tool for HIV-associated dementia/cognitive impairment in HIV-infected adults in Yaoundé-Cameroon. J Acquir Immune DeficSyndr. 2008;49(4):393–397
[21] Muniyandi K, Venkatesan J, Arutselvi T, Jayaseelan V. Study to assess the prevalence, nature and extent of cognitive impairment in people living with AIDS. Indian J Psychiatry. 2012; 54:149–153. doi: 10.4103/0019-5545.99534.