Original Research Article

The Use of Mini Mental Status Examination For The Diagnosis of HIV Associated Neurocognitive Disorder with Special Reference To The Duration of HIV Infection And Antiretroviral Therapy

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Abstract

Background: Mini Mental Status Examination can be used as a tool to detect cognitive, motor and behavioural changes seen in HIV associated neurocognitive disorders with special reference to the duration of symptoms and duration of antiretroviral therapy.**Aims and objectives:** To describe the prevalence of HIV associated neurocognitive impairment by using Mini Mental Score. To correlate the prevalence of HIV associated neurocognitive impairment with the duration of HIV. To assess the effect of antiretroviral drug therapy on neurocognitive decline seen in HIV patients. **Material and methods**: 100 HIV positive patients visiting the ART outpatient department were included, Mini Mental Status Examination was conducted, the scores were correlated with the duration of symptoms and the duration of antiretroviral therapy.**Results and Conclusion**: In our study, out of 100 patients, 77.2% of study participants did not have any cognitive impairment (MMSE Score ≥24) while 22.8% of participants had mild cognitive impairment (MMSE Score 18-23). A significant decline in the mini mental status examination score was found as the duration of symptoms. It also declined with the duration of antiretroviral therapy but this could be a confounding factor. A decline in the MMSE scores was also observed with a lag in starting antiretroviral therapy, from the onset of symptoms.

Keywords: HIV, antiretroviral therapy, MMSE

Introduction

For the past 30 years HIV has been a major health problem. Although with the advent of antiretroviral therapy it has morphed into a more chronic one with increase in life expectancy in those compliant with medication, it remains more prevalent in developing countries.

There are multiple neurological problems that the developing countries face due to delay in starting antiretroviral therapy, that include opportunistic infections like crytococcal meningitis, toxoplasma encephalitis, tubercular meningitis and progressive multifocal leukoencephalopathy. In this study we have taken into account neurocognitive disorders that occur in HIV that have been observed in later stages of infection.(1)

A consensus research definition was articulated for hiv associated neurocognitive disorder (HAND) in 2006 in Frascati, Italy which subclassified HAND into asymptomatic neurocognitive impairment (ANI), mild neurocognitive disorder (MND), and HIV associated dementia (HAD).(2)

In contrast to cortical dementia, HIV associated neurocognitive disorder or HIV encephalopathy is a subcortical dementia characterized by deficits in short term memory and executive function along with motor and behavioural abnormalities.

There are no recognized fool proof tools yet that can be used for the diagnosis of hiv associated neurocognitive disorder, in our study we going to use the MINI MENTAL SCORE EXAMINATION scale to screen patients, who are documented to be HIV positive, for neurocognitive decline keeping in mind the duration of the patient's symptoms and the duration for which they have been taking antiretroviral therapy.

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Aims and Objectives

- To describe the incidence of HIV associated neurocognitive impairment by using Mini Mental Score
- To correlate the incidence of HIV associated neurocognitive impairment with the duration of HIV
- To assess the effect of duration of antiretroviral drug therapy on neurocognitive decline seen in HIV patients.
- To assess the effect of the time lag between the onset of symptoms and the beginning of antiretroviral therapy.

Materials and Methods

This study was carried out in the Antiretroviral therapy (ART) Centre of JAH, Gwalior on an outpatient basis from January 2021 to June 2022.

The present study was seropositive patients who are attending ART outpatient department(OPD).

Study Place: ART OPD Jayarogya hospital & Kamla raja hospital and Department of Medicine

Duration of study: January 2021 to June 2022

Study design: The study was a hospital based ambispective observational study which will include seropositive patients attending ART OPD.

Sample size: The study comprises of 100 patients who attended ART OPD of J.A. Group of Hospitals, Gwalior

Sample size was found as 21% (Kumar et al) at 5% level of significance and 8% absolute error, sample size calculated using

formula:

$$(n) = \frac{Z^2_{\alpha/2}PQ}{d^2} = \frac{(1.96)^2 \times 21 \times 79}{(8)^2} = 100$$

Inclusion criteria:
- Seropositive patients
- Age above 18 years

Exclusion criteria:
- Age below 18 years.
- Cases of neurocognitive impairment due to any organic cause
- Known cases of psychiatric illness
- Subjects who do not provide consent for the study.

Method of collection of data:-

In all cases written informed consent was obtained from each subject. A detailed clinical history and physical examination were done and findings were recorded. Mini mental status examination.

Observation and Results

This study included patients of all age groups above the age of 18. More than 70% of study participants were educated upto high school. 14% participants were illiterate, 11% graduates and only 1% of the study population was post graduate.

Table 1: Distribution of study participants according to MMSE Score

MMSE Score	Frequency	Percent
0-17	0	0.0
18-23	23	22.8
24-30	78	77.2
MMSE Score (Mean ± SD)	25.81 ± 3.05	
Total	101	100%

In our study, 77.2% of study participants did not have any cognitive impairment (MMSE Score ≥24) while 22.8% of participants had mild cognitive impairment (MMSE Score 18-23). Mean MMSE Score of study participants was 25.81.

Table 2: Distribution of study participants according to duration of symptoms

Duration of symptoms	Frequency	Percent
≤12 Months	14	13.9
13-60 Months	27	26.7
61-120 Months	39	38.6
>120 Months	21	20.8
Duration of symptoms (Mean ± SD)	74.92 ± 47.84	
Total	101	100%

In our study 14% of study participants had a history of symptoms for less than one year, 27% from one to five years, 39% from 5-10 years and 21% had a history of symptoms for more than 10 years. Mean duration of symptoms in study participants was 74.92 months.

Table 3: Distribution of study participants according to duration of ART

Duration of ART	Frequency	Percent
≤12 Months	19	18.8
13-60 Months	23	22.8
61-120 Months	44	43.6
>120 Months	15	14.9
Duration of ART (Mean ± SD)	71.64 ± 46.77	
Total	101	100%

In this study 18.8% of study participants had been on ART treatment for less than one year. 22.8% participants were taking ART from 1 to 5 years, 43.6% participants had been taking ART for 5-10 years and 14.9% of study participants had been taking ART for more than 10 years of duration. Mean duration of ART among study participants was 71.64 months.

Table 4: Association between Duration of symptoms and MMSE score

Duration of symptoms	MMSE Score		P value
	18-23	>24	
≤12 Months	0	14	0.001
13-60 Months	2	25	
61-120 Months	11	28	
>120 Months	10	11	
Total	23	78	

A Significant decline in MMSE scores was observed with increasing duration of symptoms, in participants with a duration of symptoms of more than 5 years.

Table 5: Association between Duration of ART and MMSE score

Duration of ART	MMSE Score		Percent
	18-23	>24	
≤12 Months	1	18	0.004
13-60 Months	1	22	
61-120 Months	15	29	
>120 Months	6	9	
Total	23	78	

A Significant decline in MMSE scores was seen in participants with an increased duration of symptoms as well as increased duration of therapy.

Table 6: Association of MMSE scores with the time lag between onset of symptoms and starting of ART

Time lag between onset of symptoms and starting of ART	Average of MMSE
<2 months	29
3-6 months	27
6-9 months	23
>10 months	23

Discussion

In this study 'the use of mini mental status examination for the diagnosis of HIV associated neurocognitive disorder with special reference to the duration of symptoms and duration of ART' we have taken a total of 100 patients. The study was conducted on ART centre. The average prevalence of HAND was 50.41%.(3) In different studies published mainly from Southern and Western parts of India, a very low prevalence of HAND (<10%) is reported. But a study conducted in Chennai and Bangalore in India, showed the prevalence to be between 50 to 60%.(4)According to a study conducted by Emanuel Foca et al on 206 patients an overall prevalence of HAND of 47.1% was found. Asymptomatic neurocognitive impairment (ANI) was diagnosed in 63 (30.6%) patients, whereas 31 (15%) had mild neurocognitive disorder (MND) and three (1.5%) met criteria to be diagnosed as having HIV-associated dementia (HAD)[5] In our study, 77.2% of study participants did not have any cognitive impairment (MMSE Score ≥24) while 22.8% of participants had mild cognitive impairment (MMSE Score 18-23). Mean MMSE Score of study participants was 25.81.

Duration of symptoms and its effect on MMSE

According to a study conducted by JA Mc Combe et al, that included There was an increasing likelihood of developing HAND with advancing age (a) and longer duration of survival with HIV-1 seropositivity (b). For every year increase in age, there was a 3.27% increase in the odds of developing HAND ($P = 0.002$). For every year increase in the number of years with HIV-1 seropositivity, there was a 6.70% increase in the odds of developing sHAND ($P = 0.002$). HAD, HIV-associated dementia; MND, minor neurocognitive disorder. This study revealed results consistent with our present study.[6]

A similar observation was made by Bhaskaran and colleagues in his study in a large cohort of European patients. In their report, it was noted that patients of older age and longer HIV infection duration were at increased risk of neurocognitive disorders.[7]

In the present study 14% of study participants were having history of symptoms less than one year, 27% were having one to five years, 39% were having 5-10 years and 21% were having more than 10 years of history of symptoms. Mean duration of symptoms in study participants was 74.92 months. In our study significant rise in cognitive impairment was observed with increasing duration of symptoms.

Duration of ART and the time lapsed from the onset of symptoms, to the beginning of ART and its effect on MMSE

A study was conducted by Edwina J Wright et al to compare the effect of immediate versus deferred antiretroviral treatment (ART) on neuropsychological test performance in treatment-naive HIV-positive adults with >500 CD4+ cells/μL. It concluded that there was no difference between the immediate and deferred ART group.[8]

This is in contrast to our finding where it was observed that the people who had a delay in starting ART from the onset of symptoms had a lower MMSE score as compared to patients who started ART early on or were started on ART after incidental detection of HIV.

In our study 18.8% of study participants were on ART treatment for less than one year. 22.8% participants were taking ART from 1 to 5 years, 43.6% participants were taking ART for 5-10 years and 14.9% of study participants were taking ART for more than 10 years of duration. Mean duration of ART among study participants was 71.64 months. There was a positive correlation between cognitive impairment (as detected by MMSE) with duration of antiretroviral therapy. However this could be a confounding factor as, the duration of therapy is proportional/ parallel to the duration of disease.

Institutional bias: since we are getting only those patients who report to the hospital, since because of societal stigma people living with HIV have a relunctance to visit the hospital. Therefore it is not truly reflective of the situation.

Conclusion

As the duration of symptoms increased it was found that there was a significant decline in MMSE scores which suggests that neurocognitive decline occurs in the later stages.

At the same time a significant decline in mmse score was also seen with increased duration of antiretroviral therapy. However this could be a result of the fact that this study was conducted on patients visiting the ART OPD, therefore this does not mean that antiretroviral therapy causes dementia.

For increasing the reach of the study, larger multicentric studies, along with cross sectional society based studies may be carried out.

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