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COGNITIVE FUNCTION ASSESSMENT IN PERSONS WITH CHRONIC EPILEPSY: AN OBSERVATIONAL STUDY

Running title- **COGNITIVE FUNCTIONS- PERSONS WITH CHRONIC EPILEPSY**

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Abstract

Epilepsy is a disorder of the brain characterized by an enduring predisposition to generate epileptic seizures and by the neurobiological, cognitive, psychological and social consequences of this condition . Chronic epilepsy is when the seizures are occurring for 5 or more years after the initiation of therapy. Cognitive impairments, as well as mood and behavioural problems, represent very common comorbidities of epilepsy. Present study is designed to assess the effect of chronic epilepsy on cognitive functions in study participants with chronic epilepsy. Cognitive assessment is done using 2 of the validated scales - ADDENBROOKE'S COGNITIVE EXAMINATION–ACE-III and FRONTAL ASSESSMENT BATTERY SCALE (FAB).

Objective-

To assess the socio-demographic profile, epilepsy disease and treatment related characteristics of study population. To assess and compare the cognitive function using two different scales in study participants.

Methods and Material- An observational study was conducted at a tertiary care centre in Bhopal. Those with established history of chronic epilepsy in the age group of 18 years and above included in study. Tools used for cognitive function assessment are ADDENBROOKE'S COGNITIVE EXAMINATION–ACE-III and FRONTAL ASSESSMENT BATTERY- Questionnaire for Similarities.

Results and Conclusion- In present study middle age male participants were more with lesser participants with any kind of addiction. Mono-therapy, aura and premonitory symptoms were common among study participants. ACE-III tool revealed that only 21% participates had cognitive function decline while FAB score revealed 43% participants had cognitive function decline. Present study concludes that some degree of decline is there in chronic epilepsy patients. An early assessment of cognition and intervention can help these patients to live a productive life

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Introduction

According to ILAE'S definition, "Epilepsy is a disorder of the brain characterized by an enduring predisposition to generate epileptic seizures and by the neurobiological, cognitive, psychological and social consequences of this condition.[1] Chronic epilepsy is when the seizures are occurring for 5 or more years after the initiation of therapy.[2]

Epilepsy is one of the most common neurologic conditions, with an incidence of approximately 50 new cases per year per 100,000 population.[3] Data from recent studies in India reported prevalence of 3-11/1000 and incidence of 0.2- 0.6/1000.[4]

Seizures can produce various symptoms and signs that depend on the site of origin of the seizure and its connections.[5] Cognitive impairments, as well as mood and behavioural problems, represent very common comorbidities of epilepsy. In chronic epilepsies, cognitive deficits are observed in about 70-80% of patients.[6,7] It is generally accepted that cognition in epilepsy is multifactorial determined by structural brain lesions, the active epilepsy, its treatment, and individual reserve capacities.[8,9] Whereas ictal and postictal cognitive dysfunction is reversible.[10] Several factors may have an impact on cognition such as type of epilepsy syndrome, age of onset, disease duration, seizures/inter-ictal activities, sleep quality, brain development in children, brain aging in adults, antiepileptic treatments (drugs, surgery) and etiology.[11]

Deteriorating memory and cognitive abilities have been described in chronic epilepsy, but it remains controversial whether mental decline is related to persistent seizures, and whether cessation of seizures can stop or even reverse the process of deterioration.[12] Present study is designed to assess the effect of chronic epilepsy on cognitive functions of patients using specific tools for cognitive function assessment.

Methods

Present study is an observational study conducted at a tertiary care centre in Bhopal. Those with established history of chronic epilepsy in the age group of 18 years and above were included in study. All chronic epilepsy patients attending General Medicine and Neurology OPD of associated hospital between March 2021to Dec 2021.

The clinical profile of patient's evaluated, cognitive functions was assessed by using the ADDENBROOKE'S COGNITIVE EXAMINATION–ACE-III Questionnaire for attention, memory, fluency, language, and visuo-spatial skills and frontal skills like abstract thinking. Total score in ACE-III questionnaire is 100, score between 0-82 is taken as decline in cognitive function whereas score of 83-100 categorised as normal.

Another scale used for cognitive function assessment was FRONTAL ASSESSMENT BATTERY- Questionnaire for Similarities, Lexical fluency, motor series ―Luria Test, Conflicting instructions, Go- No-Go, Prehension Behaviour. Out of total 18 score a score of 0-17 is categorised as cognitive function decline, whereas 18 is categorised as normal cognitive function. Direct interview method was used to for data collection.

Ethical permission was taken from institutional ethics committee Registration number LNMC&RC/Dean/2021/Ethics/274 with letter number ECR/1190/INST/MC/2019 dated 18/02/2021.

INCLUSION CRITERIA -Person with Chronic Epilepsy more than 18 years of age or lesser age with valid consent attending Medicine and Neurology OPD is on medication. EXCLUSION CRITERIA- Patients having 1. Epilepsy syndromes. 2. Patient with comorbid major psychiatric illness. 3. Developmental delay of milestones. 4. Patient not giving consent. All patients who visited at the study centre during the duration of study were included in the study.

Data was analysed using Microsoft excel statistically. Analysis was done in the form of percentages, proportions and represented as tables, charts, graphs wherever necessary.

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Results

The peak prevalence of chronic epilepsy in the present study of 86 patients is seen in 19 to 50 years age group, accounting for ~90% of the total patients. The prevalence in the age group of 19-30 years is 47%, 31 to 50 years is 44%.

Out of the 86 patients in the study, 64% were males and 36% were females, as is expected in chronic epilepsy where it is said to occur more commonly in males. Most of the patients are married (58%). Participants were almost equally distributed in urban (54%) and rural (46%).

Socioeconomic status of participants had a variable distribution in various classes like in upper lower class (29%), 24% in lower middle class, 19% in lower class, 16% belonging to upper middle class, 12% in upper class of socioeconomic status.
On probing about addiction (alcohol, tobacco or combination of both) 64% participants responded as no addiction rest 36% had some kind of addiction.

Table-1 Socio-demographic details of study participants

Variable	Category	Frequency (%) n=86
Age (in years)	18 or less	2(2%)
	19-30	40(47%)
	31-50	38(44%)
	51 or more	6(7%)
Gender	Male	55(64%)
	Female	31(36%)
Marital status	Married	50(58%)
	Unmarried	36(42%)
Residence	Rural	40(36%)
	Urban	46(54%)
Socio-economic status	Lower	16(19%)
	Lower-middle	21(24%)
	Upper-lower	25(29%)
	Upper-middle	14(16%)
	Upper	10(12%)
Addiction	Tobacco	19(22%)
	Alcohol	5(6%)
	Tobacco and alcohol	7(8%)
	No addiction	55(64%)

Table-2 Epilepsy disease and treatment related particulars of study participants

S.N.	Epilepsy related particulars	Frequency(%) n=86
1.	Frequency of seizure per year	
	0-1	55(64%)
	2-3	27(31%)
	=>4	4(5%)
2.	Sleep pattern	
	Normal	66(77%)
	Disturbed	20(23%)

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3.	Premonitory Symptoms	
	Absent	36(41%)
	Present	50(59%)
4.	Aura symptoms	
	Absent	29(34%)
	Present	57(66%)
5.	Anti-epileptic Drug therapy	
	Mono-therapy	49(57%)
	Multi drug therapy	37(43%)

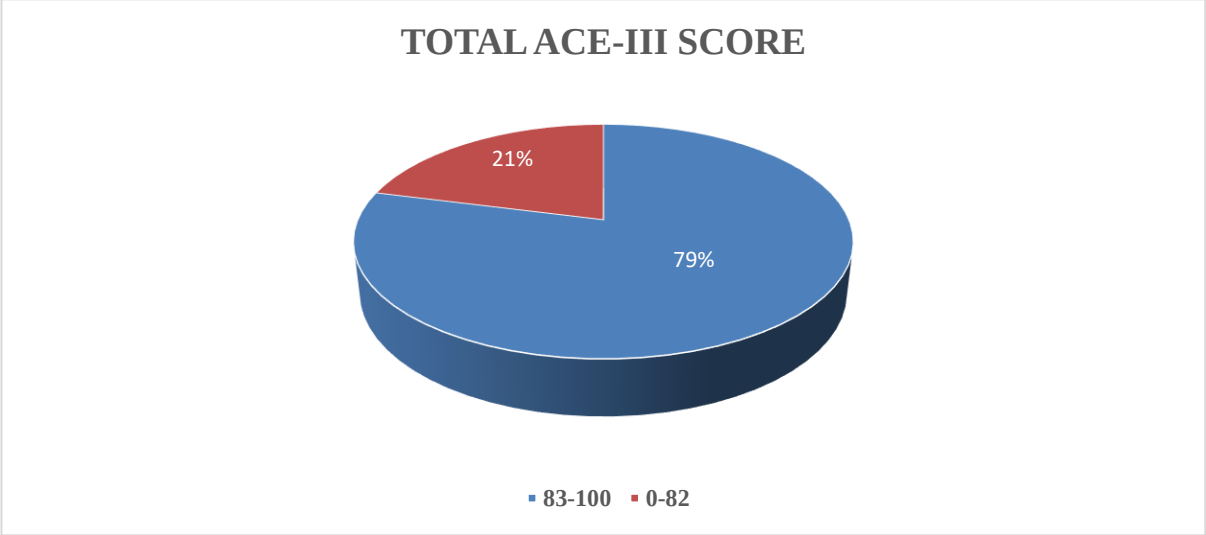
On asking about seizure frequency 64% patients had 0-1 seizure per year while 31% had 2-3 seizure per year and only 5% participants experienced >= 4 seizure per year. Sleep disturbance was seen in about 23 % participants. Premonitory symptoms were reported by about 59% participants. More than half participants (66%) experienced aura symptoms off and on.

Table 3: Cognitive function assessment using ACE-III and FAB scores in chronic epilepsy patients

Total ACE-III score	Frequency
0-82(decline in cognitive function)	18(21%)
83-100(Normal cognitive function)	68(79%)
Total FAB score	
0-17(Decline in cognitive function)	37(43%)
18(Normal cognitive function)	49(57%)

Assessment of cognitive functions using ACE-III score revealed that out of total 86 patients, 21% patients showing decline in cognitive function whereas 79% showing normal cognitive functions.

On using FAB score for cognitive function assessment about 43% patients showing decline in cognitive function whereas 57% showing normal cognitive functions.



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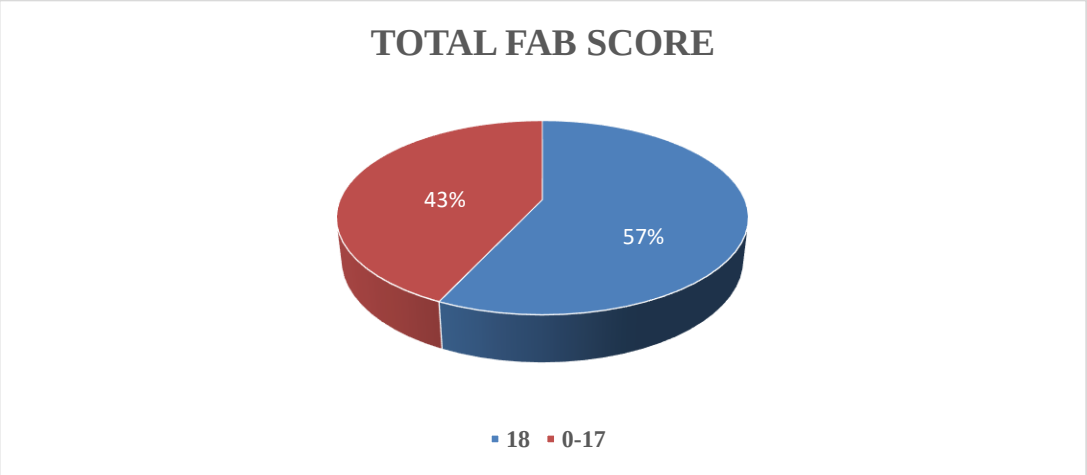

Discussion and conclusion

In present study, majority of participants are aged between 19-30 years and 31-50 years group. This finding is supported by majority of studies from India which reported a higher prevalence during the 2nd decade of life, (Mani KS et al[13] , Banerjee TK et al[14] , Das SK et al[15], Radhakrishnan K et al[16]) while a recent estimate from Raina et al.[17], have reported a higher prevalence in the 4th decade of life. Present study have majority (64%) of patients were male and rest were female- (36%). A study from India mehta et al[18], conducted at Tamil Nadu also showed similar results in terms of male female distribution. This finding has been replicated in several epidemiologic studies conducted internationally. (McHugh and Delanty, 2008[19] Hauser et al., 1993; [20] Jallon et al., 1997, 1999, 2001; [21] Dogui et al., 2003; [22] Christensen et al., 2007) [23] In a population-based study of the Danish National Hospital Register, arguably the largest sample available, a heightened male prevalence was present in most age groups (Christensen et al., 2007).[23] Although other studies have found either no gender difference (Carlson et al., 2014) [24] or increased prevalence in females (Mullins et al., 2007).[25]

Majority of the patients (64%) were residing in urban area and rest 46% were from rural areas in current study. The BURNs study from Bangalore and surrounding region reported a nearly two times higher prevalence of epilepsy in rural areas as compared to the urban areas.[26] Difference might be due to the setting of study and difference in sample size in both studies• In present study majority of patients belong to upper lower class (29%), 24% belong to lower middle class, 19% belong to lower class, 16% belong to upper middle class, 12% in upper class of socioeconomic status. A recent hospital-based study on 196 cases in Karnataka has showed that more than 80% patients belonged to low socioeconomic status and were unskilled workers.[27] Another study by Heaney DC et al. showed low socio-economic status is a risk factor for the development of epilepsy.[28] Amongst the patient with chronic epilepsy, premonitory symptoms were present in 59% of total patients and 41% did not have premonitory symptoms. On reviewing the available literature nothing focused on premonitory symptoms found in patients of chronic epilepsy. Around 66% of patients had epilepsy with aura symptoms whereas 34% of total patients had episodes of epilepsy without aura symptoms. In the present study, 64% of total patients had duration of illness between 5-10 years. 16% of total patients had duration between 11-15 years, 15% of total patients had duration between 16-20 years. Least, around 5% of total patients had duration of more than 21 years of illness.

Sleep Pattern- In the present study sleep pattern was normal in 77% of total patients, while rest of the patients- (23%) had disturbed sleep pattern. In a study done by Anna et al in epilepsy patients, insomnia was found more frequent (17.9%) than hypersomnia.[29] Among study participants mono-therapy was more common than multi-drug therapy.

On the basis of results, 21% of the patients with chronic epilepsy showed cognitive dysfunction based on Addenbrooke's cognitive examination- III score where as 43% of the patients with chronic epilepsy showed cognitive dysfunction based on Frontal Assessment Battery score. These findings of cognitive function assessment are supported by studies done by Kleen et al., 2012[30] Hermann B et al 2007[31] , Wang L. et al. 2020[32]. They found

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that significant cognitive impairment in epileptic patients is seen in individual areas-memory impairment, impaired executive function, impaired naming ability, and impaired visual–spatial abilities.

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References

1. Fisher RS, Boas W van E, Blume W, Elger C, Genton P, Lee P, et al. Epileptic Seizures and Epilepsy: Definitions Proposed by the International League Against Epilepsy (ILAE) and the International Bureau for Epilepsy (IBE). Epilepsia. april 2005;46(4):470-2.

2.ILAE classification of the epilepsies: position paper of the ILAE Commission for Classification and Terminology. Scheffer IE, Berkovic S, Capovilla G, et al. Epilepsia.

3. Hauser W, Hersdorffer D. 1990. Epilepsy: Frequency, causes and consequences. Demos, New York.

4. Berg AT, Berkovic SF, Brodie MJ, Buchhalter J, Cross JH, van Emde Boas W, Engel J, Glauser TA, Mathern GW, Moshe SL, et al. 2010. Revised terminology and concepts for organization of seizures and epilepsy: Report of the ILAE Commission on Classification and Terminology, 2005–2009. Epilepsia 51: 676–685.

5.Russell J Greene Norman D Harris, Pathology and therapeutics for pharmacy, third edition.148

6.Helmstaedter C, Witt JA. Clinical neuropsychology in epilepsy: theoretical and practical issues. Handb. Clin. Neurol. 2012;107:437–59.

7.Anthony JC, Eaton WW, Henderson AS. Looking to the future in psychiatric epidemiology. Epidemiol. Rev. 1995;17:240–2.

8.Elger CE, Helmstaedter C, Kurthen M. Chronic epilepsy and cognition. Lancet Neurol. 2004;3:663–72.

9.Helmstaedter CA. Prediction of memory reserve capacity. Adv. Neurol. 1999;81:271–9.

10.Helmstaedter C, Elger CE, Lendt M. Postictal courses of cognitive deficits in focal epilepsies. Epilepsia 1994;35:1073–8.

11. Jilek-Aall L. Morbus Sacer in Africa; some religious aspects ofepilepsy in traditional cultures. Epilepsia 1999; 40(3):382-86.

12.Helmstaedter C, Kurthen M, Lux S, Reuber M, Elger CE. Chronic epilepsy and cognition: a longitudinal study in temporal lobe epilepsy. Annals of Neurology: Official Journal of the American Neurological Association and the Child Neurology Society. 2003 Oct;54(4):425-32.

13.Mani KS, Rangan G, Srinivas HV, Kalyanasundaram S, Narendran S, Reddy AK. The Yelandur study: A communitybased approach to epilepsy in rural South India--epidemiological aspects. Seizure. 1998;7:281–8.

14.Banerjee TK, Ray BK, Das SK, Hazra A, Ghosal MK, Chaudhuri A, et al. A longitudinal study of epilepsy in Kolkata, India. Epilepsia. 2010;51:2384–91.

15.Das SK, Biswas A, Roy T, Banerjee TK, Mukherjee CS, Raut DK, et al. A random sample survey for prevalence of major neurological disorders in Kolkata. Indian J Med Res. 2006;124:163–72.160

16.Radhakrishnan K, Pandian JD, Santhoshkumar T, Thomas SV, Deetha TD, Sarma PS, et al. Prevalence, knowledge, attitude, and practice of epilepsy in Kerala, South India. Epilepsia. 2000;41:1027–35.

17.Raina SK, Razdan S, Nanda R. Prevalence of neurological disorders in children less than 10 years of age in RS Pura town of Jammu and Kashmir. J Pediatr Neurosci. 2011;6:103–5.

18.Mehta P, Joseph A, Verghese A. An epidemiologic study of psychiatric disorders in a rural area in Tamilnadu. Indian J Psychiatry. 1985;27:153–8.

ISSN:0975-3583,0976-2833 VOL14, ISSUE 05, 2023

19.McHugh JC and Delanty N(2008) Epidemiology and classificationof epilepsy: gender comparisons. Int Rev Neurobiol 83:11–26.

20.Hauser WA, Annegers JF, and Kurland LT (1993) Incidence ofepilepsy and unprovoked seizures in Rochester, Minnesota: 1935-1984. Epilepsia 34:453–468.

21.Jallon P, Goumaz M, Haenggeli C,and Morabia A (1997) Incidence of first epileptic seizures in the canton of Geneva,Switzerland. Epilepsia 38:547–552.Jallon P, Loiseau P, and Loiseau J(2001) Newly diagnosed unprovoked epileptic161seizures: presentation at diagnosis in CAROLE study.Coordination Active du Réseau Observatoire Longitudinal de l'Epilepsie. Epilepsia42:464–475.

22.Dogui M, Jallon P, Tamallah JB, Sakly G, Trabelsi MA, Khalifa K, Yacoub M, and Abroug S, (2003) Episousse: incidence of newlypresenting seizures in children in the Region of Sousse,Tunisia. Epilepsia 44:1441–1444.

23.Christensen J, Vestergaard M, Pedersen MG, Pedersen CB, OlsenJ, and Sidenius P, (2007) Incidence and prevalence of epilepsy inDenmark. Epilepsy Res.

24.Carlson C, Dugan P, Kirsch HE, Friedman D, and EPGP Investigators (2014) Sex differences in seizure types andsymptoms. Epilepsy Behav

25.Mullins GM, O'sullivan SS, Neligan A, McCarthy A, McNamaraB, Galvin RJ, and Sweeney BJ (2007) A study of idiopathicgeneralised epilepsy in an Irish population. Seizure

26.Gourie-Devi M, Gururaj G, Satishchandra P, Subbakrishna DK. Prevalence of neurological disorders in Bangalore, India: A 162 community-based study with a comparison between urban and rural areas. Neuroepidemiology. 2004;23:261–8.

27.Joseph N, Kumar GS, Nelliyanil M. Pattern of seizure cases in tertiary care hospitals in Karnataka state of India. Ann Indian Acad Neurol. 2013;16:347–51.

28.Heaney DC, MacDnald BK, Everitt A, et al. Socioeconomic variation in incidence of epilepsy: prospective community based study in south east England. Bmj. 2002;325:1013–6.

29.Maillard L, Vignal J. Comprendre et prendre en charge les troubles cognitifs dans les épilepsies. In: Neuropsychologie des pilepsies de l'adulte: Approche clinique et pratique. 2018. p. 13-9.149

30.Kleen JK, Scott RC, Lenck-Santini PP, Holmes GL. Cognitive and Behavioral Co-Morbidities of Epilepsy. 2012

31.Hermann B., Seidenberg M. Epilepsy and Cognition. Epilepsy Curr. 2007;7:1–6. doi: 10.1111/j.1535-7511.2007.00151.x.

32.Wang L., Chen S., Liu C., Lin W., Huang H. Factors for cognitive impairment in adult epileptic patients. Brain Behav. 2020;10:e01475. doi: 10.1002/brb3.1475.