

A Descriptive Cross Sectional Study to Determine the Cognitive Profile in Patients with Seizure Disorders

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Abstract

Aim: To study the prevalence of cognitive profile in patients with seizure disorders.

Methods: The study was conducted in a tertiary care hospital over a period of 1yr after taking informed consent from 100 patients by random sampling after fulfilling the inclusion criteria.

Results: In our study we found Cognitive impairment in all domain of cognitive function in person with epilepsy including 11% subjects shown cognitive impairment in executive function, 61% subjects shown impairment in mental speed, 79% subjects shown impairment in visuo-spatial construction and 27% subjects shown impairment in attention, 75% subjects shown impairment in verbal learning and memory.

Conclusions: The high prevalence of cognitive impairment among epilepsy patients calls for early neuropsychological assessment soon after the diagnosis of epilepsy beyond that, the baseline screening may also guide treatment plan and serve as an early indicator for rehabilitative care.

Keywords: Cognitive impairment, Cognition, Seizures.

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Introduction

Patients with epilepsy are at significant risk for cognitive impairment and behavioral abnormalities.[1] Gradual and chronic loss of mental abilities over time is cognitive decline and it is non-reversible whereas the postictal cognitive deterioration that appears shortly, seen in partial as well as generalized seizure is reversible .[2]

Cognitive difficulties may affect multiple domains, including memory, language, attention, and executive function. Other studies have shown the effects of epilepsy on intelligence, language, attention, executive function and psychomotor speech.

Epileptic patients are plighted with limited daily activities, social dysfunction, family conflicts and cognitive impairment. [3] The latter has been reported in around 30%–40% of epileptic patients.[4] Verbal memory, language, executive functions, and attention are domains of cognitive consequences in epilepsy. Few studies focus on several domains at once. In the SANDA study, 155 newly diagnosed epileptic patients were enrolled and fared worse in 10 out of 16 items of cognitive function than the healthy group.[5]

Another study enrolled 247 newly onset untreated epileptic patients, who showed 49.4% impairment in attention or

executive function, 47.8% impairment in episodic memory, and 39.3% subjective deficits in attention and 35.2% subjective deficits in memory.[6] Therefore, it is crucial to evaluate the cognitive function of epileptic patients and to seek interventions as soon as possible.

Cognition includes the brain's response to the objective world, having range from simple perception of the people themselves and the environment, attention, judgment, to the ability of performing complex mathematical calculation, language ability, memory, space ideation, executive function, etc. [7]

There are many cognitive domains, such as mild aprosexia or memory barriers, or falling of executive function, psychomotor speed, naming ability, visual-spatial ability etc. which are the manifestations of cognitive impairment in epileptic patients.[8,9] The life quality of epileptic patients is significantly declined by these cognitive deteriorations and eventually cripple them .

Material and Methods

Study Setting:

This is a hospital based cross-sectional study, which was conducted in outpatient department of psychiatry, MGM Medical College and mental hospital Banganga, after clearance obtained institutional ethic committee of MGMMC, Indore. Patients were included after the meeting inclusion criteria and those patients who do not meet inclusion criteria are excluded from the study.

Study Design:

The study was carried out with a cross sectional observational study the as per the designed objective of the study.

Sample:

Purposive sampling technique was used. The study sample was consisted of 100 subjects of seizure.

Inclusion and exclusion criteria-

- The patients included were in the age group of 18 to 60 years of either sex and diagnosed as having epilepsy as per ILAE Classification. Patients with mental retardation, head injury, substance dependent. Any medical co morbidity, Pregnancy and lactation were excluded.
- Written informed consent was obtained from all participants after complete description of the study to the subjects. Evaluation of the samples was done as per procedure of methodology.

Ethical consideration

The study was approved by Institutional Ethics Committee. Written informed consent was taken from the study subjects. They were informed about the purpose of the study and were ensured confidentiality. They were also informed about their right to withdraw any point of time during the study and told that their withdrawal from study would not have any impact in the treatment of the condition. All voluntary participants were informed of possible risks and benefits of participating in the research.

NIMHANS Neuropsychological test-

All study participants completed a comprehensive battery of well-established NIMHANS neuropsychological tests including:

Attention and psychomotor speed-

a. Digit symbol substitution and test: DSST is a test of visuomotor coordination, motor persistence, and sustained attention response speed.

b. Trail making test -A: Participants are asked to connect a series of 25 numbered dots in ascending order as quickly as they can (e.g., 1-2-3, etc.). Time to completion is recorded.

c. Trail Making Test -B: This test adds a set-shifting component to Trail Making Test-A and requires participants to alternate

between numbers and letters in ascending order (e.g., 1–A–2–B, etc.). Time to completion is recorded.

Executive functions:

Controlled Oral Word Association (COWA): It is a measure of verbal fluency. Participants are asked to generate as many words as they can that begin with a given letter. A total of three letters are given. Participants have 60 s for each letter and cannot use proper nouns or numbers, or provide different endings to a root word already given.

Verbal learning and memory:

Rey auditory verbal learning test (AVLT): It consists of words designating familiar objects like's vehicles, tools, animals, and body parts. There are two lists A and B with 15 different words in each list.

Visuo-spatial construction:

Rey-O Complex Figure—Boston Qualitative Scoring System: Copy Presence and Accuracy. The copy of the complex figure is scored for the inclusion, accuracy, and placement of all aspects.

Methodology

- Protocol is made after discussion with Guide and approval from ethics committee of the institute.
- Subjects were included in the study from epilepsy clinic in mental hospital Banganga and OPD of department of psychiatry, MGM, medical college, & M.Y. hospital and Mental hospital, Indore after meeting inclusion criterion. Subjects not meeting inclusion criteria or meeting exclusion criteria were excluded from the study.
- Department of psychiatry runs epilepsy clinic on every Thursday during OPD hours in mental hospital Banganga. Subjects visiting in epilepsy clinic

were precisely evaluated for seizure and other comorbidities then diagnosis of seizure accordance to ILAE classification expended version Then subject precisely were screened for study. After applying strict inclusion and exclusion criteria participants were included in the study.

- Subjects who were included for study where explained the study procedure in detail containing Information about study its procedure, duration, participant selection, risk, benefits, voluntary participation and confidentiality of the study. Relevant questions asked about the study procedure were answered satisfactorily. After explaining the procedure in detail the subject were ask to provide written consent form for the participation in study without any under force and willingly.
- A detailed assessment of the patient's complaint was done on the basis of seizure questionnaire and diagnosis was formulated clinically in accordance with international league against epilepsy classification for seizure Disorders. Afterwards NIMHANS neuro-psychological battery test was administered for assessment of cognitive domain in seizure patients. After establishment of diagnosis appropriate treatment was provided to the patient on the same consultation. All the collected information was stored and later digitized for interpretation.

Statistical analysis

The statistical analysis of data was done by SPSS version 23.0 (SPSS South Asia Pvt Ltd., Bengaluru, Karnataka, India) .Test of significance was seen by chi square test and fisher exact test was applied for correction wherever applicable.

Results

Table 1: Various cognitive domain distributions in studied sample

Cognitive domain test	<15 th percentile (%)	>15 th percentile (%)
COWA	11	89
CFT	79	21
DSST	61	39
CT-1	28	72
CT-2	27	73
AVLT(NC)	75	25
AVLT(IR)	49	51
AVLT(DR)	61	39

N =100 Controlled oral word test(COWA) for Executive function ,complex figure test (CFT) for visuospatial test, digit symbol substitution test(DSST) for mental speed, color trail test 1 and 2 (CT) for attention, Auditory verbal learning test (AVLT) for verbal learning and memory, number corrected (NC), immediate recall (IR), delayed recall (DR). Cognitive domains scores which fall below 15th percentile are considered as deficient scores.

Discussion

In our study we found Cognitive impairment in all domain of cognitive function in person with epilepsy including 11% subjects shown cognitive impairment in executive function,61%subjects shown impairment in mental speed, 79%subjects shown impairment in visuo-spatial construction and 27% subjects shown impairment in attention, 75%subjects shown impairment in verbal learning and memory. Which is inconsistent with Miller et al case control study in which Thirty-eight older adults with epilepsy and 29 healthy controls including 39.5% with impairment in visual memory, 23.7% each in attention and executive function, 18.4% in visuo-spatial skills, and 15.8% for both verbal memory and language. In our study mental speed, verbal and visual learning and memory was highly impaired in study participants because of the poor initial registration of numbers and geometric figures which shows that short term

memory was more affected. Previous studies also shows that memory impairment, mental slowing, and attention deficits are the most frequent cognitive disorders associated with epilepsy [10, 11]. The domains most affected were calculation and attention (48%), memory troubles were reported in 27.45% of patients, in concordance with the study of Berg [12] who had reported a frequency of 25-55%.

Conclusion

This study was designed to highlight cognitive aspects of epileptic patients. Most of the epileptic patients suffer cognitive impairment which goes undetected and untreated so early detection of cognitive impairment will lead to better treatment outcome of epileptic patients.

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