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COGNITIVE IMPAIRMENT IN EPILEPSY

Neurology

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ABSTRACT

INTRODUCTION: The cognitive effects of epilepsy are unique for each patient. Cognitive assessment is particularly indicated to provide an accurate characterization of patients with cognitive deficits. Hence we undertook the study on cognitive impairment in epilepsy.

AIM: To study the burden of Cognitive Impairment in Epilepsy.

METHODS: This is a prospective study done in Epilepsy division of Institute of Neurology, Madras Medical College from July 2014 to June 2015. Adden Brooke's Cognitive Examination (ACE) – (Final Revised Version) – were used for cognitive assessment.

RESULTS: This study is done in 100 patients with Epilepsy on Antiepileptic drugs (AED).

Males = 63% – Mean age ($41.15^{(w)}$, $37.52^{(p)}$). Females = 37% - Mean age ($38.38^{(w)}$, $32.36^{(p)}$). (w-well controlled, p-poorly controled). Statistical analysis revealed significant cognitive impairment in poorly controlled epilepsy group (AED Monotherapy [$p<0.005$] AED polytherapy [$p<0.026$] and Impairment of attention and orientation [$p<0.0001$], Memory [$p<0.0001$], Fluency [$p<0.0001$], Language [$p<0.0001$], and visuospatial function [$p<0.001$]. Well controlled group showed no significant cognitive impairment.

CONCLUSION: Poorly controlled epilepsy status has statistically significant Impairment in cognitive function and hence we should aim to achieve good seizure control to prevent cognitive problem.

KEYWORDS

Epilepsy, AED, Cognitive Impairment.

INTRODUCTION:

Epilepsy describes a condition in which a person has recurrent seizures due to a chronic, underlying process. Epilepsy and AED therapy has influence on cognition. Cognition is impaired in large proportion of patients with poorly controlled seizures, irrespective of the localization of the epileptogenic foci.Both anatomical and functional abnormality leads to refractory seizure, producing cognitive impairment.

METHODS:

This is a prospective study conducted in Epilepsy division of Institute of Neurology, Madras Medical College, Chennai, from July 2014 to June 2015. Adden Brooke's Cognitive Examination (Final revised version) were used. Patients suffering from Epilepsy due to various etiologies, taking AEDs were included in this study. Patients with cognitive problem due to other neurological illness were excluded.

RESULTS:

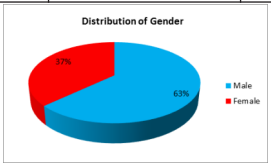
This study is done in 100 patients with epilepsy on Antiepileptic drugs. Age group from 13 years to 70 years were included for the study. Patient taking both monotherapy and polytherapy are studied. Patients from both rural / urban area are included. Epilepsy status divided into well controlled and poorly controlled group.

Adden brooke's cognitive examination (revised version) – includes orientation, registration, attention and concentration, memory, verbal fluence, language, visuospatial abilities, perceptual abilities were included for analyzing cognition.

Patients educational status is also considered for cognitive assessment.

GENDER:

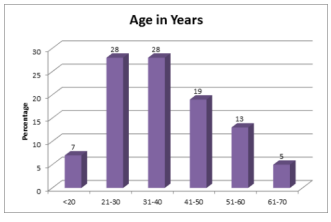
Gender	Number	Percent
Male	63	63.0
Female	37	37.0
Total	100	100.0



Males – 63%
Females – 37%

AGE:

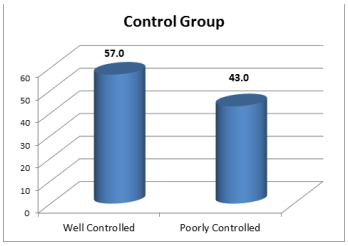
Age in years	Number	Percent
<20	7	7.0
21-30	28	28.0
31-40	28	28.0
41-50	19	19.0
51-60	13	13.0
61-70	5	5.0
Total	100	100.0



Males –mean age (41.15(w) 38.38(p))
Females –mean age (37.52(w) 32.36(p))
(W – Well controlledP – Poorly controlled)

CONTROL GROUP:

Epilepsy	Percent
Well Controlled	57.0
Poorly Controlled	43.0



Adden Brooke's Cognitive Assessment:
Poorly controlled epilepsy patients showed significant cognitive impairment.

1) Attention = p<0.0001
2) Memory = p<0.0001
3) Verbal Fluency = p<0.0001
4) Language = p<0.0001
5) Visuospatial = p<0.0001

On comparing the educational status, low education status with poorly controlled epilepsy showed significant cognitive impairment.

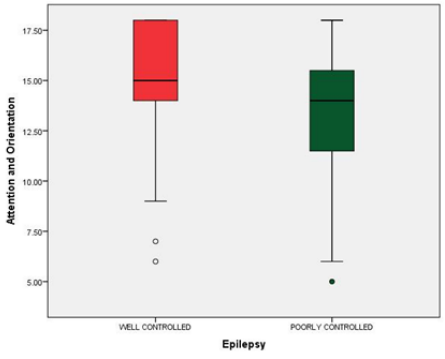
1) Attention = p<0.0001
2) Memory = p<0.0001
3) Verbal Fluency = p<0.0001
4) Language = p<0.0001
5) Visuospatial = p<0.0001

Epilepsy		N	Mean	Std. Deviation	Std. Error Mean
Attentionand Orientation_18	Well controlled	57	15.2632	2.67613	.35446
	Poorly controlled	43	13.3721	3.65815	.55786
Memory_26	Well controlled	57	17.0526	3.57282	.47323
	Poorly controlled	43	13.3488	3.67024	.55971
Verbal Fluency_14	Well controlled	57	9.4912	1.78408	.23631
	Poorly controlled	43	7.3023	2.07634	.31664
Language_26	Well controlled	57	21.2456	3.14688	.41682
	Poorly controlled	43	19.5814	4.02511	.61382
Visuospatial_16	Well controlled	56	12.4107	4.11992	.55055
	Poorly controlled	43	9.4651	4.99690	.76202

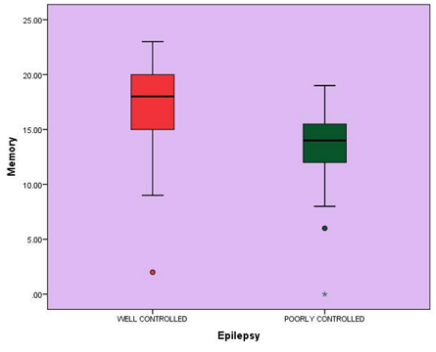
***p<0.0001**

Attention and Orientation = p<0.0001

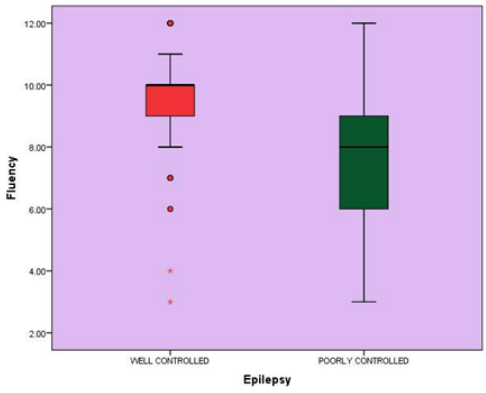
Poor seizure control group showed significant attention and orientation impairment.



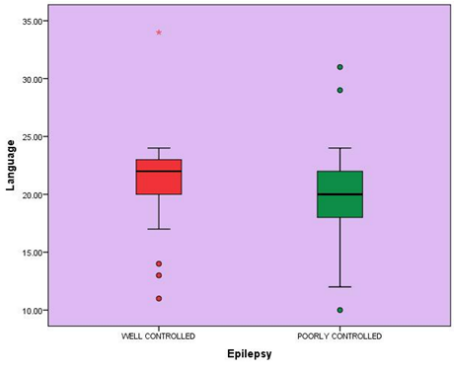
Memory= p<0.0001
Poor seizure control group showed significant memory impairment.



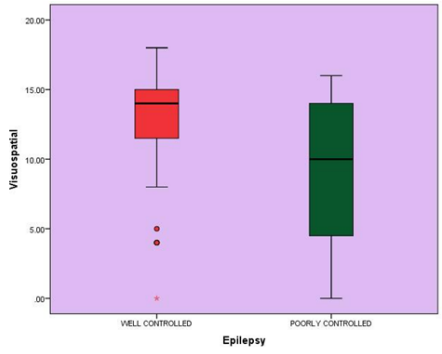
Verbal Fluency = p<0.0001
Poor seizure control group showed significant verbal fluency impairment.



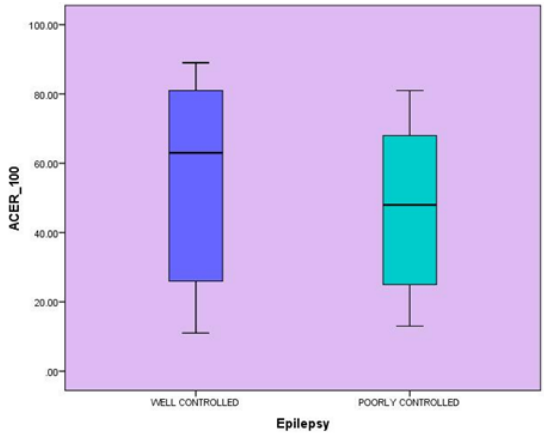
Language = p<0.0001
Poor seizure control group showed significant language impairment.



Visuospatial = p<0.0001
Poor seizure control group showed significant visuospatial impairment.



ACER_100 = p<0.0001
Poor seizure control group showed significant cognitive impairment.



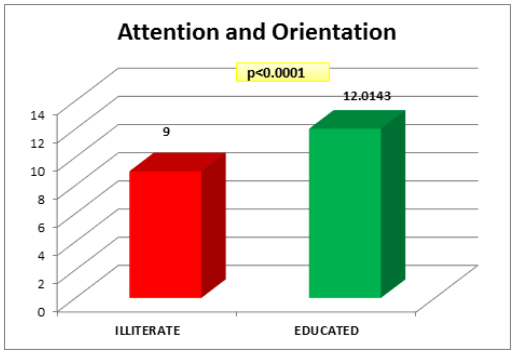
EDUCATION:

Group Statistics					
Education		N	Mean	Std. Deviation	Std. Error Mean
Attentionand Orientation_18	Illiterate	70	12.2667	3.62875	.66252
	Educated	30	15.3857	2.59483	.31014
Memory_26	Illiterate	70	12.4333	4.15794	.75913
	Educated	30	16.7571	3.23673	.38686
Verbal Fluency_14	Illiterate	70	7.1333	2.34496	.42813
	Educated	30	9.1571	1.83078	.21882
Language_26	Illiterate	70	18.8000	4.86649	.88850
	Educated	30	21.2714	2.65898	.31781
Visuospatial_16	Illiterate	70	9.0000	5.29825	.98386
	Educated	30	12.0143	4.20660	.50278

***p<0.0001**

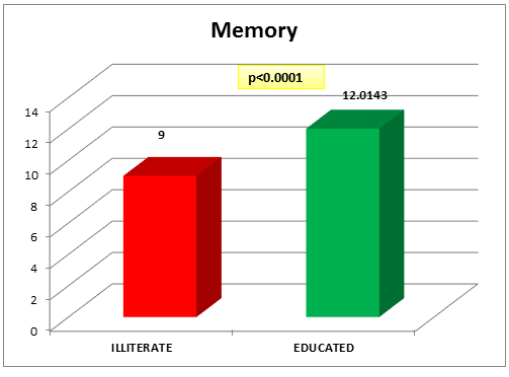
Attention and Orientation :

Poorly controlled seizure in the illiterategroup showed significant attention and orientation impairment.



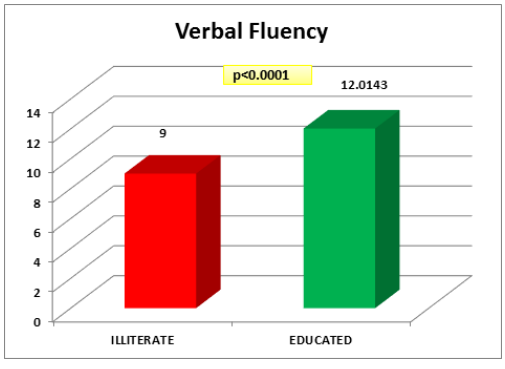
Memory :

Poorly controlled seizure in the illiterate group showed significant memory impairment.



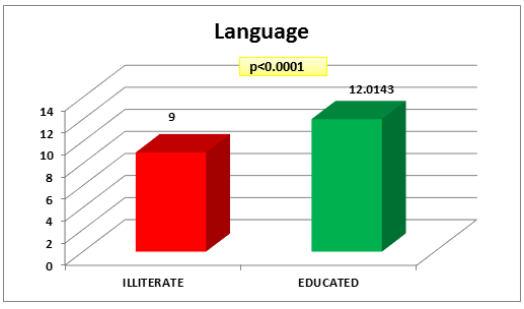
Verbal Fluency:

Poorly controlled seizure in the illiterate group showed significant verbal fluency impairment.



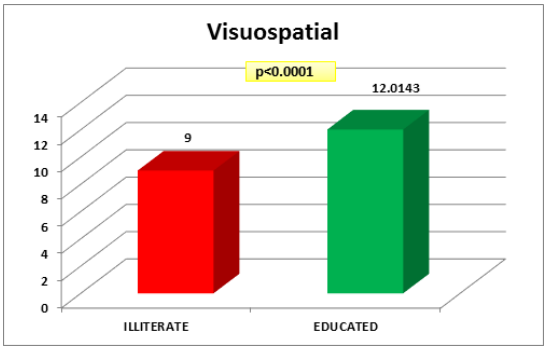
Language:

Poorly controlled seizure in the illiterate group showed significant language impairment.



Visuospatial:

Poorly controlled seizure in the illiterate group showed significant visuospatial impairment.



Discussion:

Seizure is due to abnormal excessive or synchronous electrical activity in the brain. Seizure may be generalized, focal or absence seizure.

Epilepsy is a group of neurological illness characterized by epileptic seizure. Etiology for epilepsy is mostly unknown. The known causes are birth defects, genetic mutation, head injury, stroke, CNS infections and brain tumors. Epilepsy is present in 1% of the population, predominantly in the developing world.[1,2,3,4]

Epilepsy is treated according to the type and etiology of seizures. The epilepsy management is divided as medical management, surgery, nerves stimulation and dietary management.[1,2,3,4]

Anti epileptic drug therapy are the main forms of treatment for epilepsy, nearly 70% of the patients having seizure control with anti epileptic drug therapy. AED therapy may be mono or polytherapy. AED monotherapy with optimum dose gives good outcome. In medically refractory epilepsy AED polytherapy is used for seizure control.[4,5,7,13,]

Cognition is the mental action or the process acquiring knowledge and understanding through experience and the senses it includes process such as attention, memory, judgment, problem solving, decision making, comprehension and production of language.[3]

Cognitive impairment in epilepsy patients depends on etiology, age of onset, seizure type and severity, duration, anti epileptic medication and other factors.[3,4]
Cognitive impairment depends on the pathophysiology of the seizure disorder, patients with temporal lobe epilepsy will have memory problem. Patients with frontal lobe epilepsy used to have impaired executive function. Epileptic patients with disturbed thalamo cortical network will have defective linguistic abilities, executive functions and social competency.[8]

Cognitive impairments can post lifelong problems in epilepsy patients. Cognitive impairments in children manifest as learning disability and burden the rest of the life.[10]

Anti epileptic drugs also plays role in cognitive impairment in epilepsy. Benzodiazepines, Phenobarbital and topiramate produces cognitive impairment than Phenytoin, valproic acid or

carbamazepine.[11,12]

Avoiding rapid titration, using lower effective AED dose and limiting overall exposure, choosing slow release drugs to maintain relatively steady blood level and selective AED based on their cognitive effects can help to reduce the cognitive impairment.[13]

Newer AED has safe cognitive profile in appropriate dose as monotherapy. In pharmacoresistant focal epilepsy surgery can be a successful treatment options. The long term cognitive outcome after surgery appear very promising particularly when patients become seizure free.[4,5,14]

Cognitive deficiency in epilepsy are common, affecting multiple cognitive domains and producing impairment in quality of the life, attaining better seizure control improves cognition.[1,2,3,4,15,16]

The older AED is cause greater cognitive side effects than newer meditation. Cognitive rehabilitation is beneficiary in selected patients.[13,17,18]

The addenbrookes cognitive examination is a brief cognitive test that access five cognitive domains, such as attention, memory, verbal fluency, language and visuospatial abilities. The total core is 100, higher score indicating better cognitive functioning.[22]

In this study addenbrookes cognitive examination-R is used to analyse the cognitive impairment in epilepsy patients.

In this study patients on monotherapy with good seizure control had high addenbrookes score (P<0.005). patients on polytherapy with good seizure control had higher addenbrookes score (P<0.02).[21]

Poorly control epilepsy patients showed significant cognitive impairment. Attention (p<0.0001) memory (p<0.0001), verbal fluency(P,0.0001), language (p<0.0001)[21]

Educated patients had high addenbrookes score. Uneducated patients with poor seizure control showed significant cognitive impairment. Attention (p<0.0001), memory (p<0.0001), verbal fluency (p<0.0001), language (p<0.0001), visuospatial (p<0.0001). Education level significant influences performance on Addenbrooke's revised total score and subscale score.[22]

From this study adequate seizure control with either medical or surgical therapy decreases the burden of cognitive decline in epilepsy patients.

CONCLUSION:

Patients with poorly controlled epilepsy face the increased risk of cognitive impairment.

The goal in the treatment of epilepsy is to find the antiepileptic drug that will provide maximum seizure control while producing minimal side effects.

Newer selective antiepileptic drugs seems to have fewer adverse cognitive effects with good seizure control.

(ex.Gabapentin,Lamotrigene, Levetiracetam)

So adequate seizure control with fewer side effects provides better quality of life in the epilepsy patients.

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