

NEURO-PSYCHOLOGICAL PROFILE OF EPILEPSY ON LURIA-NEBRASKA NEUROPSYCHOLOGICAL BATTERY

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ABSTRACT

Neuropsychological functioning of epileptic patients is emerging as an interesting area of research among clinician. There is sufficient evidence suggesting cognitive deficits among epileptics. No specific rehabilitation planning was prepared in this regard. The planning for rehabilitation can be prepared if a comprehensive functional organization of the brain of epileptics can be identified. The present study is directed towards the neuropsychological functioning of patients with idiopathic generalized epilepsies, and its comparison with normal controls. All the 60 subjects (30 normal controls and 30 epileptics), after matching their age and education were assessed on Luria-Nebraska Neuropsychological Battery(LNNB). The performance level and pattern of epileptics were significantly different than normal controls on all the parameters of LNNB. The battery could detect specific organic malfunctioning in epileptic patients.

Key Words: LNNB, Neuropsychology, Epilepsy

The validity of the Luria-Nebraska Neuropsychological Battery(LNNB), Form I, as a measure of cognitive deficit associated with the neurological disorder in adults, has been well reported by a number of researchers since its inception. These studies have reported that, the LNNB is sensitive to cognitive deficit in neurological patients when compared with normal controls. It has also been indicated that LNNB performance level varies widely within both positive and negative neurological examination outcome groups with a history of neurological disorders, differential cognitive performance patterns of patient with lateralized and regionally focal brain lesions (Moses & Maruish, 1988). The first study to examine the sensitivity of the LNNB to cognitive

deficit in epilepsy was reported by Berg and Golden (1981). They compared groups of 40 normal controls with 22 patients in whom seizure onset was idiopathic and 18 patients in whom the seizures were post traumatic or symptom of other neurological disorders. They found 87.5% accuracy of correct diagnosis. Most of these studies reported only the efficacy of the LNNB in diagnosing the disorders, for which there are other more reliable mode of investigation to diagnose. The functional organization of the brain in condition of epileptic seizure would have been more appropriate to study, through which effective rehabilitation planning could be proposed in chronic epileptic patients.

The present study is directed towards the

functional organisation of the brain of patients with idiopathic generalized epilepsies in comparison to matched normal controls.

MATERIAL AND METHOD

The study sample consisted of two groups. The first group comprised of 30 male suffering from idiopathic generalized epilepsies and the second group of 30 control male normal patients matched for age and years of schooling in whom confirmed or suspected underlying structural cause of epilepsy were excluded. The two groups were matched for age and education variables because these two variables are considered to influence cognitive functioning, the most. The mean age of controls, who were not having any medical or psychiatric problems, was 34.97 years with s.d. of 8.42 years (range 20 years to 55 years), whereas, mean age of 30 epileptics, who were diagnosed by one psychiatrist and confirmed by neurologist, was 33.53 years with s.d. of 9.84 years (range 20 years to 55 years). The mean of number of years of schooling in the control group was 11.63 years with the s.d. of 1.56 years, whereas, the mean in the epileptics group was found to be 11.53 years with s.d. of 1.43 years. The duration of illness was more than two years, and less than five years. All patients were on maintenance medication with anti-epileptics.

Procedure:-All the subjects were evaluated on Luria-Nebraska Neuropsychological Battery, Form-I (Golden et al., 1985), and scoring was done as per the manual. The final conversion of raw score in to T-score was done according to Moses, 1988 for all cases, to avoid examiner's variation, and minimize chance factors. The epileptic patients were kept one day off the medicines before evaluation on the LNNB.

Statistical Analysis:-The one tailed t-test was computed to compare the means of two groups for all fourteen scales (C1 to C14 with S1, S2 and S3). To illustrate the pattern of performance of the mean T-score of each for both the groups is presented through a graph.

RESULTS

The demographic matching of the two groups is shown in table-1. The t-value of age and education wise distribution of the sample was found to be non-significant ($P < 0.05$). This shows that the two groups are well matched for their age and education. The subsequent band wise analysis of two groups is shown from table-2 to table-5. Comparison on almost all the scale was found to be highly significant statistically. The t-value and significance level are indicated in each table. The performance patterns of the two groups are presented in the graph.

**TABLE-1
AGE AND EDUCATION WISE DISTRIBUTION OF THE SAMPLE**

Variables	Controls N=30	Epileptics (N=30)
Age (in yrs.)		
Mean (s.d.)	34.97 (8.42)	33.53 (9.84)
Range	20-55	20-55
	t=0.61, d.f.= 58, N.S.	
Education (Schooling in yrs.)		
Mean (s.d.)	11.63 (1.56)	11.53 (1.43)
Range	9-15	9-15
	t=0.11, d.f.=58, N.S.	

t-value is nonsignificant in both the variables.

All the scales included in sensory motor band i.e. motor functioning, rhythm, tactile functioning, and visual functioning, were able to differentiate the two groups on the basis of their performance on these scales ($P < 0.001$) as shown in table-2.

The epileptic subjects were showing significantly more deficits as compared to control group. The C2 (rhythm scale) and C4 (visual scale) were the highest elevation above 60-T score in this band. On speech band parameter, the highest elevation was found in receptive and expressive speech scale, which is well above 60-T score indicating definite organic deficit (table-3). On conceptual band, of the LNNB, arithmetic and intellectual functions are mainly exceeding above

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critical level of 60-T score (Table-4). On summary band, only pathognomonic sub-scale is near 60-T score (Table-5). All the sub-scales of the LNNB were below 45-T score in normal controls, as well as they all are differing significantly with epileptic profile.

As far as, pattern performance of epileptics are concerned, the highest elevation on rhythm scale with expressive speech skills followed by intellectual functioning are appearing typical brain functioning of the epileptics.

PATTERN PERFORMANCE OF EPILEPTIC VS NORMAL CONTROLS

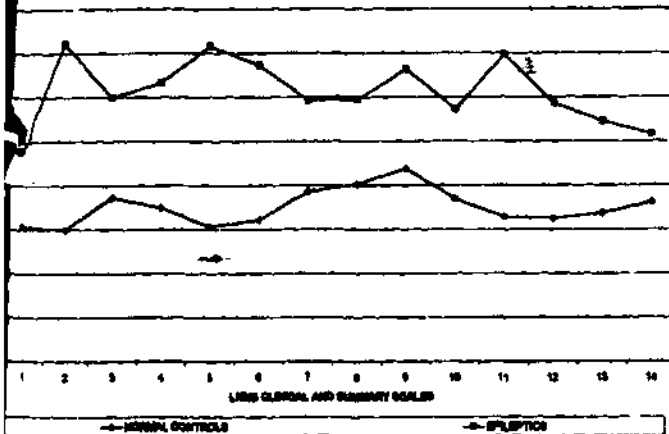


TABLE 2
COMPARISON ON SENSORIMOTOR BAND OF LNNB

Scales	Controls (N=30)		Epileptics (N=30)		t-value (d.f.=58)
	Mean T-score	S.D.	Mean T-score	S.D.	
C1, Motor Functions	30.7	2.15	47.63	9.11	9.91**
C2, Rhythm	29.97	1.97	72.17	10.16	22.33**
C3, Tactile Functions	37.27	3.02	59.97	9.13	12.92**
C4, Visual Functions	34.97	2.65	63.27	8.61	17.20***

=Significant at 0.01 level, *=Significant at 0.005 level

TABLE 3
COMPARISON ON SPEECH BAND OF LNNB

Scales	Controls (N=30)		Epileptics (N=30)		t-value (d.f.=58)
	Mean T-score	S.D.	Mean T-score	S.D.	
C5, Receptive Speech	30.67	5.66	71.57	16.71	12.70***
C6, Expressive Speech	32.23	4.19	67.23	16.88	11.02***
C7, Writing Function	38.55	1.20	59.30	16.30	7.20**
C8, Reading Functions	40.27	1.98	59.47	8.50	6.12**

=Significant at 0.01 level, *=Significant at 0.005 level

TABLE 4
COMPARISON ON CONCEPTUAL BAND OF LNNB

Scales	Controls (N=30)		Epileptics (N=30)		t-value (d.f.=58)
	Mean T-score	S.D.	Mean T-score	S.D.	
C9, Arithmetic functions	43.83	2.12	66.40	16.15	7.57**
C10, Memory Functions	37.00	2.94	57.23	8.26	12.64**
C11, Intellectual Functions	32.80	4.03	69.70	13.41	14.44**

=Significant at 0.05 level, *=Significant at 0.01 level

TABLE 5
COMPARISON ON SUMMARY BAND OF LNNB

Scales	Controls (N=30)		Epileptics (N=30)		t-value (d.f.=58)
	Mean T-score	S.D.	Means T-score	S.D.	
S1, Pathognomonic	32.50	3.97	58.63	8.73	14.93**
S2, Left Hemisphere functions	33.70	1.27	54.50	15.05	7.55**
S3, Right Hemisphere function	36.20	4.48	51.63	6.04	11.24**

**=Significant at 0.01 level.

DISCUSSION

Neuropsychological functioning of epileptic patients is almost ignored area in India. Most of the clinicians treat epilepsy symptomatically, without consideration of its cognitive aspect in terms of neuropsychological rehabilitation. There are number of researches indicating cognitive dysfunction in epileptics, but none of them explained the pattern of deficits, and major strengths and weaknesses of functional network of epileptic patients. As revealed by tables 2-5 in present study, the epileptic neuropsychological performance were poor on almost all parameters when compared with normal controls. We have already excluded cases with underlying structural brain lesion, which could affect the neuropsychological performance.

When we see the graphic presentation of the performance pattern, the highest elevation in C5 with the combination of C2, C11, C9 and C4 indicates the left hemisphere dysfunction, as per the manual (Golden, et al., 1985). The other possibilities are ; if the C5 scale is the highest, as well as significantly elevated above the critical level by at least 15 points, deficits are undoubtedly associated with left hemisphere. Lesser elevations caused by difficulty with the more complex items, can appear as the highest scale in right anterior dysfunction (Golden et al., 1985). Berg & Golden (1981) also reported significant cognitive deficit in epileptics. Herman et al. (1985) reported different neuropsychological profile of epileptics in comparison to normal control. Since the epileptic patients were on maintenance antiepileptic medication and only one day drug holiday was allowed, which is insufficient to washout the drug, it is difficult to say that all the deficits are due to epilepsy alone.

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