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Research Article

Attention Characterization in Patients with Frontal and Temporal Lobe Epilepsy

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Abstract

Epilepsy is a common neurological disorder. Neuropsychological and psychiatric disorders are frequently present in epileptic disease and responsible, among other things, for frequent negative psychosocial reflexes for both patients and families. Data from the literature have reported a definite relationship between type of epilepsy and type of neuropsychological disturbance in patients with epilepsy. Epilepsy is closely associated with impaired quality of life. People with epilepsy have a worse quality of life than the general population and many other chronic diseases. Despite this, no attention is paid to the quality of life of people with epilepsy except for symptom reduction. In adults, the specific functions of attention are poorly studied and underestimated.

The objective of the present study is to investigate some peculiar functions of patients with frontal Lobe (FLE) or temporal lobe Epilepsy (TLE).

Keywords

Epilepsy, Cognitive impairment, Attention.

INTRODUCTION

Epilepsy is a chronic noncommunicable brain disorder characterized by recurrent seizures due to a sudden abnormal and excessive discharge of neurons or brain cells [1]. Individuals who have had only febrile seizures and people with acute symptomatic seizures secondary to other diseases are not epilepsy [2,3]. Seizures are usually of short duration and can produce post-seizure impairment with short periods of interruption, which include phenomena such as body distortion, loss of consciousness, and injury, and their recurrence is a constant threat to the quality of life of the patient with epilepsy [4,5].

Globally, an estimated five million people are diagnosed with epilepsy each year. In high-income countries, an estimated 49 per 100,000 people are diagnosed with epilepsy each year. In low- and middle-income countries, this figure can be as high as 139 per 100,000 people. Nearly 80% of people with epilepsy live in low- and middle-income countries, and the risk of premature death in people with epilepsy is up to three times higher than in the general population. In many parts of the world, people with epilepsy and their families suffer from stigma and discrimination [5,6].

Epilepsy has significant consequences on patients' health and social functioning and results in significantly higher rates of impact on health-related quality of life due to the burden of medication use, higher socioeconomic costs, lower employment rates, and lower income than healthy individuals [7]. People with epilepsy face social stigma that increases the risk of low self-esteem, depression, anxiety, and suicide due to the fear of having the next seizure, reducing patients' quality of life [8]. Therefore, it is important for health care providers to routinely measure the impact of the complex drug-psycho-social therapy administered. It is important to evaluate the success of this holistic method of care by determining the degree of seizure control with medication and monitoring the reduction in seizure frequency [9,10].

Epilepsy affects many dimensions of the quality of life of people with epilepsy compared with other chronic diseases, both because of the nature of the disorder and its associated effects,

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such as problems with education, employment, marriage, perceived discrimination, anxiety and depression in comorbidity, and the outward manifestation of symptoms [11,12].

The World Health Organization (WHO) Global Burden of Disease 2010 study ranks epilepsy as the second most burdensome neurological disorder worldwide in terms of disability-adjusted life years [13].

Nearly 70 million people suffer from epilepsy worldwide. Epilepsy contributes to 1% of the global disease burden, 80% of which is in developing countries [14]. The prevalence and incidence of epilepsy in different countries vary. Epilepsy is closely associated with impaired quality of life. People with epilepsy have a worse quality of life than the general population and many other chronic diseases. Despite this, no attention is paid to the quality of life of people with epilepsy except for symptom reduction [3]. People with epilepsy were stigmatized and experienced reduced changes in every aspect of life, which hindered patients' quality of life [15-17]. Dodrill [18] in the publication of his research conducted with patients with epilepsy, with the aim of assessing cognitive impairment of attention, reports that patients complain of an underestimated, poorly investigated, and underestimated attention disorder, compared to other cognitive-type disorders.

In recent literature, attention is best described as a class of independent processes for review van Zomeren and Brouwer [19]. Attentional systems are diverse and distinct; some tasks overwhelmingly assess the selectivity dimension of attention among them are stimulus situations that require target identification in the presence of distractors (selective attention) or situations in which the subject is required to respond to multiple sources of stimulation (divided attention). Other tasks specifically assay the intensity dimension of attention. In this category, fall tests that assess the ability to quickly mobilize a response to the stimulus (phasic alertness). Most research on attention uses reaction time as its methodology. It is easy to focus attention for a short time on salient and predictable events, more difficult to 'sustained attention and vigilance in performing tasks that require maintaining an adequate level of response for relatively long times. Sustained attention is understood as the ability to maintain focus on critical events over a considerable period of time, presupposes selection and control capabilities, and thus reflects the operations of these components over time; vigilance, on the other hand, corresponds to the ability to monitor events with low frequency of occurrence over time. An assessment in the clinical setting must consider these processes separately; the use of single instruments that provide a comprehensive assessment of attention seems inadequate [20]. Most research on attention, uses reaction time as a methodology, it is assumed that mental operations take time, the longer the time between a presented stimulus and response the greater the processing required.

According to Donders [21], the assumptions underlying this method are based on:

- The time between stimulus presentation and response execution is occupied by successive processes or stages of processing, which begin only when the previous stage has finished its operations (assumed serial processing).
- The number of stages required to arrive at the answer varies according to the difficulty of the task: the more complex the task, the more operations to be performed (additivity assumption).

Using tasks of different complexity, it is possible to infer the time required to perform certain cognitive operations. Donders [21] considered three conditions: *simple reaction time*, (the possible response is only one), *choice reaction time* (the stimulus is chosen from a larger set and the response must be different according to the type of stimulus *go/nogo method,* the stimulus is chosen from a larger set, as in the previous case but only one must be responded to.

The methods indicated with *go/nogo* are generally relatively longer. Reaction time methodology obviously limits the possibilities for exploration of attentional behavior; real-life situations cannot be consistently reproduced, but by creating controlled laboratory situations it is possible to isolate more clearly the different underlying processes. It is easy to focus attention for a short time on salient, predictable events; sustained attention and vigilance is more difficult when performing tasks that require maintaining an appropriate level of response for relatively long periods of time. By *sustained* attention we mean the ability to maintain focus on critical events over a considerable period of time. It presupposes selection and control capabilities and thus reflects the operations of these components over time. Instead, *vigilance* corresponds to the ability to monitor events with low frequency of occurrence over time. We have difficulty sustaining our attention especially in complex tasks with little salience, as well as in tasks that are too simple, monotonous and uninteresting. In these experiments, subjects are tested for prolonged periods; the probability of target occurrence, ranges from 3 percent to 5 percent at the beginning of the test there is a fast performance and a good level of accuracy; there is then a decline in performance as time passes, reaction times increase, false alarms (mistakenly believing that the critical event is present) and omissions (failure to detect critical events).

The decrease in vigilance is characterized by a gradual decline in the speed of signal detection and an increase in the number of errors; the ability to detect stimuli deteriorates as early as the first fifteen minutes, even if the signals are salient and clearly visible [22]. Dodrill, in the publication of his research conducted on patients with epilepsy for the purpose of assessing cognitive impairment of attention, reports that patients complain of a disturbance of attention; this deficit appears to be underestimated, poorly investigated, and underestimated compared to other cognitive deficits [18].

Objectives of the Study

Based on these observations, it is of interest to evaluate the performance in attentional tasks of patients with epilepsy and in particular patients with more specific forms of epilepsy (partial epilepsy) than those reported to date in the literature. In this research, the aim is to evaluate through the use of the Tea Test of Zimmermann and Fimm [23] the profile of attention in patients with nongeneralized partial epilepsy.

In particular, the following attentional processes will be measured:

- Phasic alert
- Divided attention
- Selective attention
- Vigilance

METHOD AND SUBJECTS

The Subjects

Seventeen patients (10 men and 7 women), aged between 20 and 66 years old, voluntarily participated in the study, of them (10 with a middle school license, 4 with an elementary school license, 2 with a high school diploma, 1 with a college degree). They are patients from the Epilepsy Clinic of the Neurology of the Polyclinic of Messina, on drug treatment in monotherapy (N= 7), polypharmacy (N= 10), no patient is drug-resistant. Only patients with partial epilepsy whose onset dates back at least one year and who in the last month, had a seizure were included.

Instruments: description of the Test used (TEA of Zimmermann and Fimm; 1992/94) [23]

Alertness Testing

The purpose of this test is to examine phasic alertness) [24,25] “arousal” according to Pribram & MC Guinness [26], that is, the ability to maintain in the presence of a high-priority stimulus, the level of attention and maintain it [27]. The test consists of measuring reaction time (RT) with or without a warning stimulus (a sound). A cross appears in the middle of the screen and the subject must press a button as fast as possible. The test consists of four sections, organized according to an ABBA design (where A = section without warning and B = section with warning). Both simple reaction time and phasic alert-reaction are therefore determined: the difference in median reaction times in trials with and without a warning stimulus is calculated. Of particular relevance is, the time course of individual reaction times, this highlights brief suspensions of attention ("lapses of attention") [19].

Optical Vigilance Testing

These are four different paradigms with different stimuli (acoustic, visual, visual-acoustic); by which the ability to maintain attention or alertness in a prolonged manner is examined. Attention disorders that last longer are a cause of brain injury, especially of traumatic genesis [28].

In this study, the version with low stimulus frequency was used to examine sustained attention. The average presentation rate is one stimulus per minute. The test has a duration of 15 minutes. On the screen a bar swings up and down and the subject must respond, by pressing a button as quickly as possible, as soon as the bar makes a larger than normal upward swing.

Go/nogo Test

Go-nogo tasks examine the specific ability to repress an inappropriate reaction, an ability that should be deficient especially after lesions of the prefrontal cortex. Luria (biblio)Calls it "disturbed arbitrary action" in the presence of frontal lobe lesions. Selective Attention is measured with this test; the test is intended to examine the ability to repress the response to irrelevant stimuli and the reaction time in the stimulus selection condition (comparison with simple reaction time in the alertness test may be of interest here) [29].

The five-stimulus version was used in this study. A square appears in the middle of the screen. Two squares with a certain pattern serve as target stimuli, while three others are distractor stimuli. The subject must press the button quickly when the target stimuli appear and not press when the distractor stimuli appear. A total of 60 stimuli appear randomly throughout the test.

Test of Divided Attention

Patients complain of difficulty in situations where multiple aspects are asked [30]. Divided attention can be measured with "dual task" tasks, where two stimuli are asked to be observed, one visual and the other acoustic. Through the divided attention test, two simultaneous tasks (one visual and one acoustic) are administered. In the visual task, the subject must detect the presence of a square in a sixteen-point grid, in which continuously changing crosses appear.

In the acoustic task, the subject listens to a continuous series of high and low sounds (Di-Da-Di-Da etc.) and must respond to variations in the normal sequence (Di-Di or Da-Da). Fifteen acoustic and fifteen visual stimuli are presented in the test along with 185 non-target acoustic and 85 non-target visual stimuli.

Procedure

The series of attention tests, (taken from Zimmermann and Fimm's TEA battery) was administered individually in a quiet, distraction-free environment. Each individual was shown the pre-test practice sequence. Stimuli regarding the battery were presented on a personal computer screen, approximately 60 cm away from the patient; the expected manual-type response was made by pressing a button connected to the computer, which measures reaction time. The duration of the test ranged from about 50 minutes up to 1 hour.

Data Analysis Test

The main values taken into consideration are, reaction time, number of omissions, early responses and the phasic alert parameter, which is calculated according to the following formula:

Par.All.phasic = median RT without warning-median RT with warning

Median of total RTs

Divided Attention Test: The subject's performance is evaluated based on reaction time, number of omissions and number of false responses.

There is a correction to the individual score through a formula that takes into account the patient's age (see below). The use of this adjusted score allows patients to be compared to standardized norms [23].

Go-nogo test: The main parameters are reaction time to target stimuli, number of false responses (responses to non-target stimuli) and number of omissions.

Vigilance Test: The main values considered are reaction time of correct responses, number of omissions (omission of target stimuli) and false responses (responses to non-target stimuli).

The tests used allow normalization against a group of normal subjects. Normalized T values (with mean=50 and standard deviation = 10) were calculated for all tests for the parameters: median, standard deviation of reaction times, valid reactions, false reactions, and omissions. Before the median and standard deviation of reaction times are calculated, the program makes a correction for late reactions, eliminating all reaction times that exceed the median by 2.35 times the standard deviation. Based on the parameters measured, according to the normative sample data, there appears to be an effect of age, no influence of sex, for this reason a correction formula is provided for reaction times (no correction is provided for errors in the four tests used). The general correction formula is:

Adjusted result = value-[(age-41.34) * (correction value)].

The correction values vary from test to test (for a review Zimmermann and Fimm, 1992/94) [23].

Statistical Analysis

Numerical data were expressed as mean, standard deviation (S.D.) and quartiles, and the categorical variables as absolute frequencies and percentages. Due to the low sample size, the non-parametric approach was used for data analysis.

The Spearman correlation test was applied in order to assess the existence of significant bivariate interdependence between variables related to individual profiles of epileptic patients. Some scatterplots were realized in order to better visualize the interdependence relationship between examined variables. A p-value lower than 0.05 was considered to be statistically significant. Statistical analyses were performed using IBM SPSS for Windows, Version 22 (Armonk, NY, IBM Corp.).

Group Results

The reaction time data were obtained through the parameters required by each individual test. Tables and graphs showing in percentile rank the performance of the subjects are given for each individual test.

RESULTS

Descriptive statistics, calculated on the 17 subjects who make up the sample under study, are presented in Tab.1. The mean

Table 1: Descriptive statistics for numerical variables measured on the sample.

	Mean	SD	Percentage		
			25	50	75
Age	34,12	14,01	21,00	30,00	47,00
Median without_warning	435,59	197,92	306,45	336,30	569,85
Median with warning	409,99	157,61	288,40	367,30	488,20
Alertness_without_preall	4,41	4,60	1,00	3,00	6,00
Alertness_with_preall	4,35	4,91	1,00	1,00	7,50
Alertness	813,68	170,99	667,25	757,80	1001,55
Divided_attention	12,88	19,19	1,00	4,00	19,50
Divided attention omissions	6,35	11,79	1,00	1,00	2,00
Go/Nogo	730,20	115,07	638,25	726,30	764,15
Go/Nogo_RT	3,12	3,35	1,00	1,00	5,50
Go/Nogo errors	26,82	20,68	2,50	24,00	46,00
Vigilance RT	38,59	27,38	17,00	21,00	60,00
Vigilance	50,06	30,00	30,00	59,00	59,00

*Tables 2-7 show the results of the bivariate correlations among all variables found in the sample. Statistically significant interdependence relationships are highlighted with an * (if p-value <0.05), with ** (if p-value <0.01).*

Table 2: *Spearman's non-parametric correlations.*

		Age	Median without warning	Median with warning	Alertness Without warning
Age	Coeff	1,000	0,275	0,279	-0,268
Sig. (2-code)			0,285	0,278	0,299
Median without warning	Coeff	0,275	1,000	,882**	-,946**
Sig. (2-code)		0,285		<0,001	<0,001
Median with warning	Coeff	0,279	0,882	1,000	-1,801**
Sig. (2-code)		0,278	<0,001		<0,001
Alertness without warning	Coeff	-0,268	-0,946	-0,801**	1,000
Sig. (2-code)		0,299	<0,001	<0,001	
Alertness with warning	Coeff	0,260	-0,783	-0,920**	0,774**
Sig. (2-code)		0,314	<0,001	<0,001	<0,001
Alertness	Coeff	-0,79	0,203	-0,22	-0,233
Sig. (2-code)		0,764	0,434	0,933	0,368

Table 3: Spearman's nonparametric correlations.

		Alertness with warning	Alertness	Divided attention	Divided attention Omission
Age	Coeff	-0,260	-0,790	0,119	-0,485*
Sig. (2-code)		0,314	0,764	0,649	0,048
Median without warning	Coeff	-0,783**	0,203	-0,103	0,272
Sig. (2-code)		<0,001	,434	0,694	0,291
Median with warning	Coeff	-0,920**	-0,22	0,158	0,244
Sig. (2-code)		<0,001	0,933	0,545	0,345
Alertness without warning	Coeff	0,774**	-0,233	0,143	-0,253
Sig. (2-code)		<0,001	0,368	0,584	0,328
Alertness with warning	Coeff	1,000	0,170	-0,271	-0,198
Sig. (2-code)			0,514	0,292	0,445
Alertness	Coeff	0,170	1,000	-0,979**	0,230
Sig. (2-code)		0,514		<0,001	0,930

Table 4: Spearman's non parametric correlations.

		Go/Nogo	Go/Nogo_TR	Go/Nogo False response	Vigilance RT	Vigilance False response
Age	Coeff	0,038	0,110	0,075	0,291	-0,178
Sig. (2-code)		0,884	0,674	0,776	0,257	0,494
Median without warning	Coeff	0,634**	-0,389	0,174	-0,472	-0,302
Sig. (2-code)		0,006	0,123	0,503	0,056	0,238
Mesian with warning	Coeff	0,670**	-0,408	-0,006	-0,325	-0,530*
Sig. (2-code)		0,003	0,104	0,981	0,203	0,029
Alertness without warning	Coeff	-0,563*	0,369	-0,172	0,444	0,083
Sig. (2-code)		0,019	0,144	0,510	0,074	0,751
Alertness with warning	Coeff	-0,445	0,203	0,202	0,235	0,394
Sig. (2-code)		0,074	0,434	0,438	0,364	0,118
Alertness	Coeff	0,099	-0,078	0,296	-0,456	0,204
Sig. (2-code)		0,704	0,765	0,248	0,066	0,432

Table 5: Spearman's nonparametric correlations.

		Age	Median without warning	Median with warning	Allertness without warning
Divided attention	Coeff	0,119	-0,103	0,158	0,143
Sig. (2-code)		0,649	0,694	0,545	0,584
Divided attention omission	Coeff	-4,85*	0,272	0,244	-0,253
Sig. (2-code)		0,048	0,291	0,345	0,328
Go/Nogo	Coeff	0,038	0,634**	0,670**	-0,563
Sig. (2-code)		0,884	0,006	0,003	0,190
Go/Nogo RT	Coeff	0,110	-0,389	-0,408	0,369
Sig. (2-code)		0,674	0,123	0,104	0,144
G0/Nogo false response	Coeff	0,075	0,174	-0,006	-0,172
Sig. (2-code)		0,776	0,503	0,981	0,510
Vigilance RT	Coeff	0,291	-0,472	-0,325	0,444
Sig. (2-code)		0,257	0,056	0,203	0,074
Vigilance false response	Coeff	-0,178	-0,302	-0,530	0,083
Sig. (2-code)		0,494	0,238	0,029	0,751

Table 6: Spearman's non parametric correlations.

		Alertness With warning	Alertness	Divided Attention	Divided attention omission
Divided attention	Coeff	-0,271	-0,979**	1,000	-0,006
Sig. (2-code)		0,292	<0,001		0,982
Divided attention omission	Coeff	-0,198	0,230	-0,006	1,000
Sig. (2-code)		0,445	0,930	0,982	
Go/Nogo	Coeff	-0,445	0,099	0,022	0,468
Sig. (2-code)		0,074	0,704	0,932	0,058
Go/Nogo RT	Coeff	0,203	-0,078	0,001	-0,440
Sig. (2-code)		0,434	0,765	0,990	0,077
G0/Nogo false response	Coeff	0,202	0,296	-0,243	0,223
Sig. (2-code)		0,438	0,248	0,347	0,389
Vigilance RT	Coeff	0,235	-0,456	0,453	-0,164
Sig. (2-code)		0,364	0,066	0,068	0,529
Vigilance false response	Coeff	0,394	0,204	-0,319	-0,44
Sig. (2-code)		0,118	0,432	0,212	0,868

Table 7: Spearman's non parametric correlations.

		Go/Nogo	Go/Nogo RT	Go/Nogo	Vigilance RT	Vigilance Errors
Divided attention	Coeff	0,022	0,000	-0,243	0,453	-0,319
Sig. (2-code)		0,932	1,000	0,347	0,068	0,212
Divided attention errors	Coeffi	0,468	-0,440	0,223	-0,164	-0,044
Sig. (2-code)		0,058	0,077	0,389	0,529	0,868
Go/Nogo	Coeff	1,000	-0,893**	0,432	-0,302	-0,390
Sig. (2-code)		.	<0,001	0,083	0,239	0,121
Go/Nogo RT	Coeff	-0,893**	1,000	-0,289	0,393	0,243
Sig. (2-code)		<0,000	.	0,261	0,119	0,348
Go/Nogo errors	Coeff	0,432	-0,289	1,000	0,219	0,208
Sig. (2-code)		0,083	0,261	.	0,398	0,423
Vigilance	Coeff	-0,302	0,393	0,219	1,000	-0,006
Sig. (2-code)		0,239	0,119	0,398	.	0,983
Vigilance errors	Coeff	-0,390	0,243	0,208	-0,006	1,000
Sig. (2-code)		0,121	0,348	0,423	0,983	.

age of the sample is 34.12±14.01. The median alertness without warning is 435.59±197.92 while the mdn alertness with warning is 409.99±157.61. The mdn alertness without warning is found to be 4.41±4.60, while the same measure with warning is 4.35±4.91, and the alertness score is 813.68±170.99. Focusing on divided attention, it averages 12.88±19.19, while divided attention omissions is 6.35±11.79. Focusing on the variable Go/Nogo, it averages out to be 730.20±115.07; again with reference to this variable, analyzing true responses gives 3.12±3.35, while false responses give 26.82±20.68. Finally, the RT has a mean of 38.59±27.38, while the optical vigilance false responses has a mean of 50.06±30.00. Descriptive statistics, calculated on the 17 subjects who make up the sample under study, are presented in Table 1.

Examining the results, we note that there is a significant inverse correlation between alert and median; more specifically, alert without early warning is negatively correlated with both Median without warning (rs=-0.946; p<0.001), and to median with warning (rs=-0.801; p<0.001), and alert with early warning also shows such inverse correlation with both median without warning (rs=-0.783; p<0.001) and median with warning (rs =-0.920; p<0.001) (Table 2). The variable Go/Nogo is significantly and positively correlated with the variable median without warning (rs=0.634, p=0.006) and the variable median with warning (rs=0.670; p=0.003) (Table 4); on the other hand, its correlation with the variable "Alert without early warning" is significant and negative (rs=-0.563; p=0.019) (Table 3); the variables Go/Nogo TP and Go/Nogo false response are not significantly correlated with any other variable (p>0.050).

In addition, there is a negative inverse correlation between the Vigilance false response and the median with the warning variable (rs=-0,530, p=0,029) (Table 5); we can observe an inverse significant correlation between "divided attention omission" and age (rs=-0.485; p=0.048) (Table 3). Moreover, highly significant and negative is the correlation between divided attention and alertness (rs=-0.979; p<0.001) (Table 3). There are no further significant bivariate interdependencies between the observed parameters in the examined sample.

In this study, 17 patients with nongeneralized partial epilepsy under equivalent drug treatment were examined. In general, it can be said that examination of the protocols for evaluating attentional processing with the Zimmermann and Fimm test (1992/94), revealed the presence of slowness in response times to the alertness tests with and without pre-alert, the Go/Nogo test and the divided attention test. Of the patients examined, only two showed adequate response speed. The only resulting performance in the normal range is that in the sustained attention test, with the exception of two patients who show severely deficient performance, characterized by a high number of omissions and errors. Slow response appears to be a factor that can explain the overall performance picture. We present below some observations on the individual processes investigated in our research.

Alertness Test

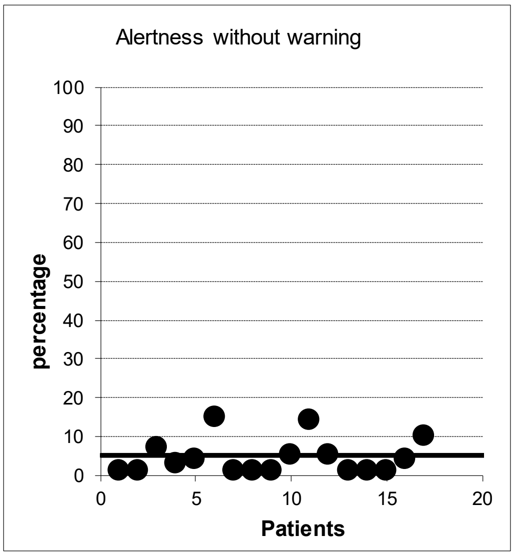
With regard to the Alertness test, phasic alertness and tonic arousal, understood as the ability to maintain in the presence of a high-priority stimulus the level of attention were examined. Of the 17 patients tested, 11 held a score below the 5 percentile, indicative of severe performance, but mostly of low arousal. In the Alert with Pre-alert task, 12 patients maintain a score below the 5 percentile and show an insufficient "warning" effect to compensate for severe slowness (and baseline "arousal" deficit).

Selective Attention (Go/NoGo)

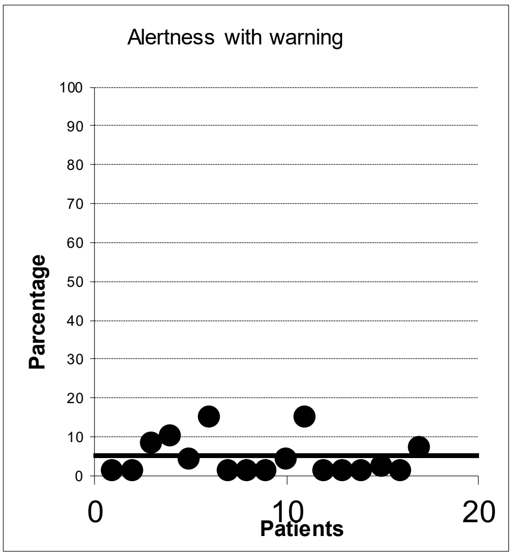
In selective attention, the ability to suppress the response to irrelevant stimuli and the reaction time to targets, under the condition of stimulus selection, is examined. Selective attention in addition to the ability to focus attention, has as a premise change the attentional focus, defined special or general form of flexibility. Three aspects of selective attention are distinguished:

- Selection of a part of the stimulus situation, to which attention is referred;
- Maintaining the "focus" of attention, toward another part of the stimulus situation.

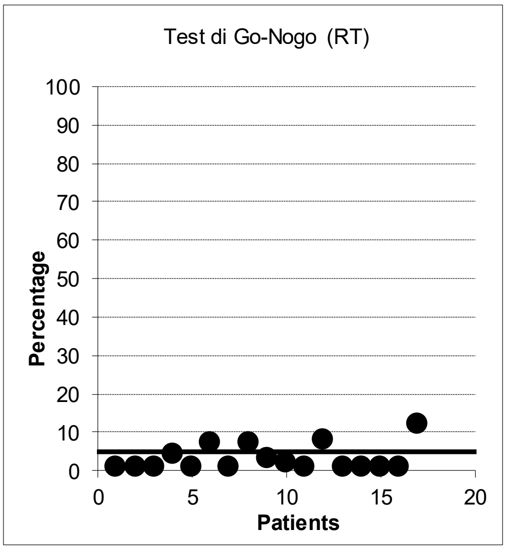
The importance of shifting focus is obvious. Flexibility spans one dimension in which extreme is perseverance, the other is complete distractibility. From the examination of this task of the 17 patients in 12 there is a high degree of slowness, reaction times are below the 5 percentile, this is not associated with a high number of errors, only 6 patients perform below the 5 percentile in terms of false alarms. Thus in the majority of patients, the ability to suppress the response to nontarget stimuli seems to be preserved, but this occurs with a considerable degree of slowness.



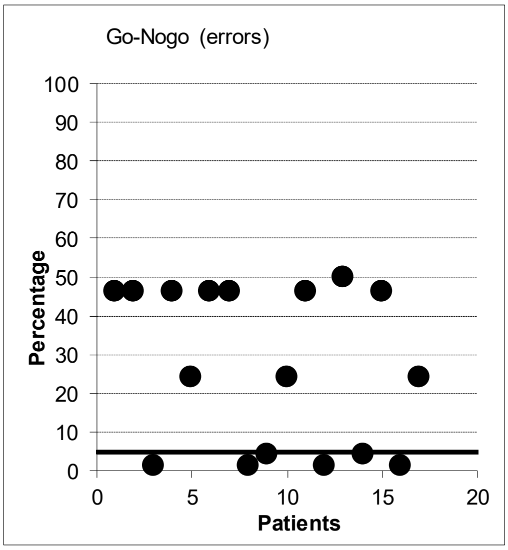
Graphs 1



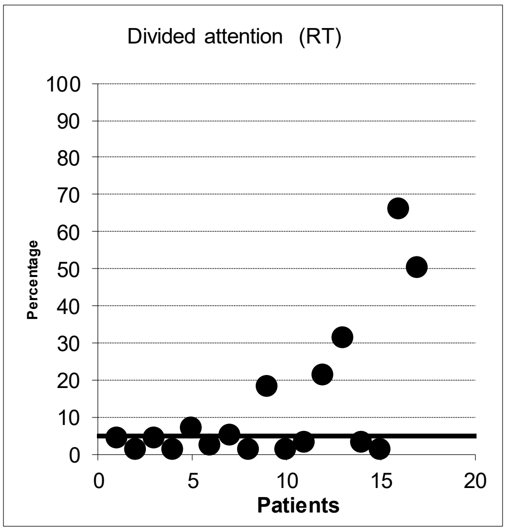
Graphs 2



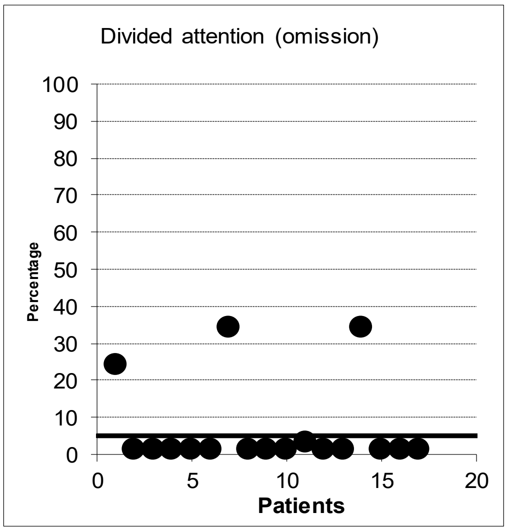
Graphs 3



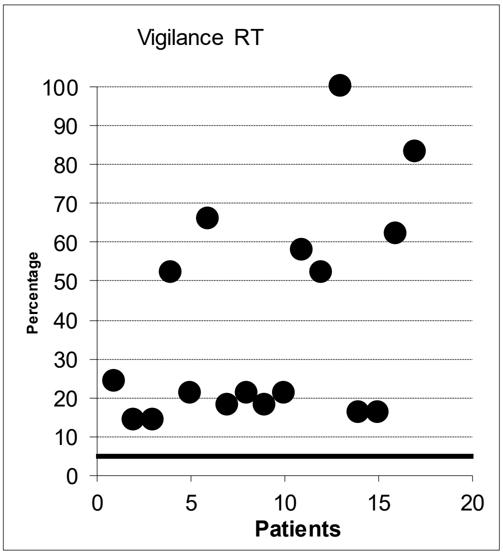
Graphs 4



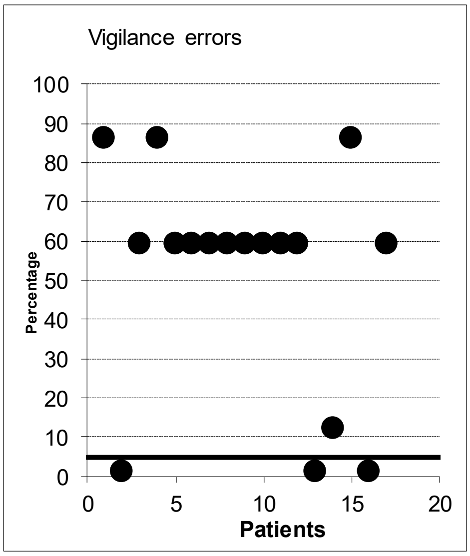
Graphs 5



Graphs 6



Graphs 7



Graphs 8

Divided Attention

The assessment of this ability was done through a "dual-task" task each individual subject was asked to respond to two stimuli, one visual and the other acoustic administered simultaneously. From the results obtained, it is possible to detect in 10 patients severe deficient performance below the 5 percentile; 14 patients made a high number of omissions (below the 5 percentile). Thus, selective deficit in handling multiple stimuli is present, causing a high number of errors.

Sustained Attention (Vigilance)

The sustained attention test can be performed with different paradigms (auditory, visual, visual-acoustic) and the ability to sustained attention or alertness should be examined. On examination of performance in this test, performance in the normal range is evident, despite 3 patients making a high number of omissions. An adequate level of responsiveness is present, even in long and repetitive tasks, which differs significantly from the results on previous tests (with the exception of two patients who showed pathological performance). The cause of the observed deficient performance, cannot be attributed generically to fatigue.

DISCUSSION

In this study, 17 patients with nongeneralized partial epilepsy under equivalent drug treatment were examined. In general, it can be said that examination of the protocols for evaluating attentional processing with the Zimmermann and Fimm test (1992/94), revealed the presence of slowness in response times to the alertness tests with and without pre-alert, the Go/Nogo test and the divided attention test. Of the patients examined, only two showed adequate response speed. The only resulting performance in the normal range is that in the sustained attention test, with the exception of two patients who show severely deficient performance, characterized by a high number of omissions and errors. Slow response appears to be a factor that can explain the overall performance picture.

From the results that emerged, it is possible to state that these patients except two, who present normal performance in all tests, are slow in both simple and structured visual situations. Most of the patients are unable to use the warning stimulus effectively. For the component of selective attention and divided attention, there is a deficit in the handling of multiple stimuli in addition to intensive type disorders. This result leaves open the possibility, that there is a double disruption concerning both the intensive and selective components of attentional processes.

The effect of slowness is more pronounced in particularly complex situations, such as in the divided attention task. The difficulty of the task increases the number of errors made. In interpreting the observed attentional disturbances, it is possible to think of an influence of drug therapy and an effect of seizures, which negatively interfere with cognitive functions.

Data collected in the past document the neuropsychic toxicity of antiepileptic drugs, the negative effect on mental function and behavior manifested in both children and adults [24-34]. These behavioral disorders according to these researches, are not dose dependent and do not clearly correlate with plasma levels. They can be transient and are habitually reversible after drug withdrawal [35]. More recent data confirm that older generation drugs, cause worse cognitive performance except for verbal memory. Thus, drugs cause undesirable effects, which can produce impairment in cognitive function (in the case of this study, a deficit affecting both the intensive and selective components of attention).

CONCLUSION

The problem of the relationship between epilepsy and cognitive disorders is made particularly complex by a number of factors, on the one hand specific factors common to different types of epilepsy and intrinsic to the disease itself and nonspecific factors, which concern the influence of medical and surgical therapy; not to be underestimated is the emotional experience that being "epileptic" entails at the relational, school, and work levels [36].

There is thus difficulty in distinguishing the effects of medication from those exerted by epilepsy (type, frequency, age of onset of seizures, duration of epilepsy) and from possible brain damage and psychosocial factors (limitations in activities, reduced opportunities for learning, decreased confidence in one's own possibilities.

To all this must be added the impact of negative conceptions about the disease, which are still active today. The sick person is considered not normal and is isolated from the family, school and the world of work; at other times the family is overprotective and this accentuates the sense of psychological inadequacy, in which the patient lives [37-40].

One possible way to address these issues, could be based on a controlled study of the effects of drugs, in patients at the initial time when they are diagnosed, this would allow performance in attentional tasks to be assessed, prior to the initiation of drug treatment and would thus allow the specific effect of drugs to be isolated, possibly also in relation to doses and plasma concentrations of administration. Such an application is the optimal model of investigation, which could lead to important confirmations of collected data. Beyond these considerations, I would like to point out how in the relationship with the patients examined, an aspect of the experience of the "epileptic patient" emerged for whom prejudicial factors and social stigma, could constitute pathogenic moments sometimes more serious than the seizures themselves.

These people are subjected to strict drug treatment and kept under close medical supervision, among the undesirable effects of antiepileptic drugs, those related to mental function and behavior assume a major and fundamental importance, they accentuate and cause a number of difficulties in relational life, facilitated by the seizures and epilepsy-related prejudices. In clinical practice, both physicians and patients, attribute all changes in behavior and mental efficiency to the disease. Relevant is how the patient experiences his or her pathological condition, related both to the dialogue with the treating physician and to the relationship he or she has with the family, social and school context. Attentional, cognitive and pharmacological problems, can cause behavioral problems, negative emotional resonances, determined by the experience of this chronic illness and by incorrect environmental responses. So for example in the school, work environment, any unusual behavior is circumscribed to "epileptic" behavior.

Epilepsy is recognized as a social disease, as it affects individuals of all ages and requires special care (Ministerial Decree 5.11.1965; G.U.19.2.1996 No. 44) to address the problem and discourage prejudice and stigmatization, a multidisciplinary organization is definitely needed, which will enable social rehabilitation of the sick person, projected toward the world of family, school and work.

The community should be properly informed about the reality of this disease, thus avoiding making the epileptic, a handicapped person to be pitied or marginalized as "different." As Manfredi [41] points out, collaboration with a psychiatrist and psychotherapeutic care, are of great importance in conducting treatment; the therapeutic problems of crises and psychological or psychopathological correlates must be addressed comprehensively. An epilepsy patient is simply a sick person, of one of the many diseases that can affect humans. It seems to me that I can conclude this discussion by emphasizing how what these patients expect, apart from a healing is a less discriminatory and marginalizing attitude.

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