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## CHARACTERIZATION

OF COGNITIVE PERFORMANCE IN PATIENTS DIAGNOSED WITH IDIOPATHIC FOCAL EPILEPSY

**CARACTERIZACIÓN DEL RENDIMIENTO COGNITIVO DE PACIENTES CON DIAGNÓSTICO DE EPILEPSIA FOCAL IDIOPÁTICA**

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## **ABSTRACT**

This research focuses on epilepsy; this disease is closely associated with significant psychological and social consequences for daily life. The objective is to characterize the cognitive performance of patients with idiopathic focal epilepsy. Methodology, an analytical observational study was developed in the Neurology and Neuropsychology Service of the Clinical Surgical Hospital: "Lucía Íñiguez Landín" in Holguín, from October 2022 to December 2023. The universe consisted of patients over 19 years of age with a diagnosis of epilepsy who They went to the aforementioned service. The sample was selected by intentional sampling that included patients with a diagnosis of idiopathic focal epilepsy and excluded patients with cognitive impairment attributable to other degenerative or acquired neurological conditions and consisted of 65 patients. The 60.00% of the patients were between 25 and 40 years of age and were male. 76.00% were below the average when evaluating attention, in visuo-spatial memory 60.00% were below the average, patients with deficits in regulation and control, as well as planning, predominated. And organization by 64.00% for both cases. Conclusions: Attention, visuo-spatial memory, regulation and control; and planning and organization turned out to be the aspects most affected in the cognitive performance of patients with idiopathic focal epilepsy.

### **Keywords:**

Epilepsy, cognitive performance profile, psychosocial factors.

## **RESUMEN**

La presente investigación se centra en la epilepsia, esta enfermedad se encuentra estrechamente asociada con significativas consecuencias psicológicas y sociales para su vida cotidiana. El objetivo es caracterizar el rendimiento cognitivo de los pacientes con epilepsia focal idiopática. Se desarrolló un estudio observacional analítico en el Servicio de Neurología y Neuropsicología del Hospital Clínico Quirúrgico: "Lucía Íñiguez Landín" de Holguín, de octubre 2022 a diciembre 2023. El universo estuvo constituido por pacientes mayores de 19 años con diagnóstico de epilepsia que acudieron al referido servicio. La muestra se seleccionó por un muestreo intencional que incluyó a los pacientes con diagnóstico de epilepsia focal idiopática y excluyó a los pacientes con deterioro cognitivo atribuible a otras condiciones neurológicas degenerativas o adquiridas y quedó constituida por 65 pacientes. El 60,00 % de los pacientes se encontraron entre los 25 y 40 años de edad y fueron del sexo masculino. El 76,00 % se situó por debajo del promedio al evaluar la atención, en la memoria visoespacial el 60,00 % se encontró por debajo del promedio, predominaron los pacientes con déficit de la regulación y el control, así como de la planificación y organización en un 64, 00 % para ambos casos. Se concluye que la atención, la memoria visoespacial, la regulación y el control; y la planificación y organización resultaron ser los aspectos más afectados en el rendimiento cognitivo de los pacientes con epilepsia focal idiopática.

### **Palabras clave:**

Epilepsia, rendimiento cognitivo perfil, factores psicosociales.

## INTRODUCTION

The study of the nervous system and the human mind began to develop in ancient times. These fields were the object of study of biology and philosophy in a separate way. Until a considerable amount of knowledge was accumulated, which determined the emergence of new sciences. Among them, medicine, neurology and neuropsychology. The conceptions about health and disease are enriched from the second half of the 20th century after the rapid progress of research related to the experienced nervous system, where the representatives of the Cultural Historical Approach. These researchers enriched the studies related to this subject and provided important theoretical references for later scientific research related to Neuropsychology.

A long way has passed since then until nowadays, until it has been stated from the academic field that Neuropsychology is part of the field of Neuroscience. This assertion considers that the Neurosciences take a multidisciplinary approach to the study of the nervous system, with the aim of unifying knowledge of neurobiological and psychobiological processes.

According to Gonzalez et al. (2022), Neuropsychology differs from other behavioral Neurosciences in its object of study, as it focuses specifically on the knowledge of the neural bases of complex mental processes. For this reason, the subjects of study of Neuropsychology are almost exclusively human beings and the behaviors studied are more specific to our species, such as thought, memory, language, executive functions and more complex forms of motor and perception, among others. This variety of study topics gives this science a great applicability and an exceptional need for a scientific approach that enriches not only the clinical practice but also the theory that supports it.

According to the criteria of Perez (2018), the current need for Neuropsychology is also supported by the increase in the number of people with disorders produced due to brain damage or dysfunction, as a consequence of several daily events. The current situation also shows the increase in population aging and traffic accidents, among other factors, which influence the number of people with sequelae resulting from brain damage.

In Latin America, the situation described above is complemented by the incidence of the dynamic social life, which, although it is true that it generates social and health conditions that facilitate survival and prolong people's lives, also causes an increase in the number of individuals with lesions in their nervous system or psychological alterations that require a neuropsychological study.

Among the diseases that Neuropsychology deals with is Epilepsy, this disease affects the patient's state of health

and causes important changes in their daily life. Due to the importance of this disease, it is treated by different health systems around the world. At present, research is being carried out and a valuable theory has been developed. Health care institutions develop programs and implement numerous alternatives to care for patients who suffer from it.

In Cuba the prevalence of the disease ranges between three and nine per thousand inhabitants, the island has an extensive network of primary care hierarchized by the family doctor, so most patients with epilepsy are dispensed at the primary level. The interrelation between the primary and secondary levels generally allows cases to be evaluated by neurology specialists, who are responsible for periodic follow-up.

In the Clinical Surgical Hospital "Lucía Iñiguez Landín" of Holguín there is a high frequency of patients treated with the diagnosis of epilepsy, however, no local references were found to the assertive use of neuropsychological profiles as key elements to protocolize an individualized management of patients.

## METHODOLOGY

An applied research was developed through a transversal analytical observational transversal study in the Neurology and Neuropsychology Service of the Clinical Surgical Hospital: "Lucía Iñiguez Landín" of Holguín, from October 2022 to December 2023.

The universe was constituted by the patients older than 19 years old with epilepsy diagnosis who attended the referred service, of the mentioned institution, in the defined period. The sample was selected by a non-probabilistic purposive sampling that considered including patients with clinical and electroencephalographic diagnosis of idiopathic focal epilepsy and excluded patients with cognitive impairment attributable to other degenerative or acquired neurological conditions and/or psychiatric diseases. Thus it consisted of 25 patients.

Sociodemographic variables were used, such as:

Age: discrete quantitative variable, data were obtained from the identity card and the following scale was applied in three groups:

From 19 to 24 years old.

From 25 to 40 years old.

From 41 to 61 years old.

Sex: dichotomous nominal qualitative variable, the biological sex at birth was taken into account and the following scale was applied: Male or Female.

Schooling: ordinal qualitative variable, data were obtained from the interview, the last expired educational level was considered according to the following scale:

High School

Pre-university

Technical high school

University

Occupation: polytomous nominal qualitative variable, the data were obtained from the interview, the patients were classified according to the following scale:

Employed: this group included patients who were studying and/or working at the time of the investigation, regardless of the type of relationship.

Unemployed: this category included patients not considered in the previous category, as well as retirees and housewives.

Biological variables such as:

Type of crisis: polytomous nominal qualitative variable, data were obtained from individual medical records, for the classification of patients the criteria of Orellana & León (2021) were used, and four groups were considered according to the following categories:

Generalized: patients with loss of consciousness, tonic or clonic seizures and involuntary movements throughout the body.

Focused: Included patients with involuntary movements in one part of the body, strange sensations or intense emotions.

Reflex: Triggered by specific stimuli, such as flashing lights (photosensitive seizures) or intense sounds, variable symptoms, but the response to these stimuli triggers epileptic activity.

Seizure frequency: discrete quantitative variable, data were obtained from individual medical records, for the classification of patients the criteria of the International League Against Epilepsy were used and two groups were considered according to the annual frequency of seizures:

Low-frequency idiopathic focal epilepsy: less than two seizures per year.

High frequency idiopathic focal epilepsy: two or more seizures per year.

Among the cognitive variables studied were:

Attention: discrete quantitative variable, the data were obtained from the results of the instruments: direct digits subtest of the Wechsler Adult Intelligence Scale. WAIS (*Wechsler Adults Intelligence Scale*) and the Trail Making

Test (TMT) and the following scale was applied, which considered two categories in each case:

For the WAIS direct digit subtest: patients were classified according to whether they achieved scores equal to or greater than the average or below the average.

For the TrailMaking Test (A and B): in both tests, patients were classified according to whether they achieved scores equal to, above or below the 20th percentile.

Memory: discrete quantitative variable, data were obtained from the results of the instruments:

For working memory, the results of the WAIS inverse digit subtest were used and patients were classified into two groups according to whether they achieved scores equal to or above the average or below the average.

For immediate and delayed audio-verbal memory, the results of the Hopkins word list were used and patients were classified into two groups according to whether they achieved scores equal to or above the 20th percentile or below the 20th percentile.

For visuospatial memory, the results of the Rey's complex figure were used and patients were classified into two groups according to whether they achieved results equal to or above the average or below the average.

Executive function: discrete quantitative variable, data were obtained from the results of the instruments, four categories were defined:

Phonological Fluency: according to whether they reached results equal to or above the 20th percentile or below it.

Semantic fluency: according to whether they reached results equal to or above the 20th percentile or below it.

Regulation and control domain, according to the results of the Litvan FAB (Frontal Assessment Battery) and patients were classified into three groups:

Normal: 16 to 18 points

Deficit: 13 to 15 points

Dementia: less than or equal to 12 points.

Planning and organization domain, according to the results of the Hanoi Tower, patients were classified into two groups according to whether they achieved results equal to or greater than the average or below the average.

Affective function: dichotomous nominal qualitative variable, the data were obtained from the results of the instruments and two pathologies were considered:

Major depressive episode, according to the results of the Hamilton Depression Scale and patients were classified into two categories:

With major depressive episode: considered patients who obtained 13 or more points in the sum of the scale.

Without major depressive episode: considered patients who scored less than 13 points on the sum of the scale.

Generalized anxiety disorder according to the results of the Hamilton anxiety scale and patients were classified into two categories:

With generalized anxiety disorder: considered patients who obtained 15 or more points in the sum of the scale.

Without generalized anxiety disorder: considered patients who obtained less than 15 points on the sum of the scale.

The empirical methods made it possible to collect, organize and perform a preliminary analysis of the information, by means of neuropsychological evaluation, for the primary collection of the data of the patients to be studied.

Documentary analysis: It was used in the review of the individual clinical history and other documents related to the patient.

Observation: this method was applied as part of the neuropsychological evaluation.

Interview: this method was applied as part of the neuropsychological assessment.

Survey: instruments for the evaluation of the functions that make up the neuropsychological profile were used as a means of the survey, which in the interest of the research were:

To evaluate attention, the direct digit subtest of the Wechsler Adult Intelligence Scale (WAIS) was used. WAIS (Wechsler Adults Intelligence Scale) and the A and B letter and number connection test, TMT (Trail Making Test).

In the evaluation of working memory, the WAIS inverse digit subtest was applied, for immediate and delayed audio-verbal memory the Hopkins word list was used and for visuospatial memory the Rey's complex figure was used.

In the assessment of executive function, the Litvan FAB (Frontal Assessment Battery) and the Hanoi Tower were used.

The Hamilton scales for depression and anxiety were used in the assessment of affective function.

Theoretical methods:

Historical-logical: For the analysis of specialized literature and documentation, with the aim of examining the historical background that has characterized idiopathic focal epilepsy and the neuropsychological profiles of the disease, up to the present day.

Hermeneutic: It allowed interpreting the state of opinion of the scientific community regarding the theoretical bases

of neuropsychological profiles and their usefulness in patients with idiopathic focal epilepsy.

Deductive-inductive: it allowed inferring the results of the research, as well as regrouping all the information and specifying the current status of neuropsychological profiles and their usefulness in patients with idiopathic focal epilepsy.

Analysis and synthesis: made it possible to study and discover the multiple relationships between the variables involved in the research.

Hypothetico-deductive: it was used in hypothesis testing and in the particularization of the results.

Statistical methods:

From descriptive statistics: to characterize the patients with a diagnosis of epilepsy according to sociodemographic and biomedical variables, as well as to identify the neuropsychological alterations these patients and assess them from the neuropsychological point of view, absolute frequencies, percentages and ratio were used in the processing of the information for qualitative variables and for quantitative variables the arithmetic mean and standard deviation were calculated.

Techniques and procedures

The reason for the research was explained to the patients who made up the sample and their willingness to participate in the study was requested through informed consent; all patients agreed to participate.

The interview and neuropsychological evaluation of each patient was carried out by means of the previously described instruments, of which subtests were used separately from the Spanish versions, validated and standardized in Latin American populations in previous studies.

A database was created with the data in Microsoft Excel 2010 and the statistical package SPSS version 26. The previously stated methods allowed the research objectives to be met. The results were summarized and presented in statistical tables and graphs for better understanding.

## DEVELOPMENT

From theory it is known that neurological disorders constitute a group of diseases of the central and peripheral nervous system, among which the most common are: epilepsy, Alzheimer's disease, cerebrovascular diseases, migraine and other headaches. Similarly in the group of neurological disorders are included: multiple sclerosis, Parkinson's disease, neurological infections, brain tumors, traumatic conditions of the nervous system and disorders caused by malnutrition, each of them with their clinical manifestations and repercussions for the patients who suffer from it (Browne & Holmes, 2019).

The World Health Organization (2023), estimates that at around one billion people worldwide suffer from some neurological disorder and more than six million die each year, of which 80% occur in low- or middle-income countries. These disorders occur in all age groups and in all geographic regions. The increase in life expectancy and the decrease in birth rate result in a demographic transition that causes predominantly young populations to become older populations, in the process of aging, which leads to an increase in the frequency of neurological disorders.

Lopez (2022), states that among neurological disorders, epilepsy stands out, this pathology is characterized by a predisposition to generate seizures with neurobiological, cognitive, psychological and social consequences. The definition of epilepsy requires the occurrence of at least one seizure or epileptic crisis, that is, the transient occurrence of signs and/or symptoms due to excessive and synchronous abnormal neuronal activity.

Thus, it is stated by scholars that epilepsy is a chronic neurological disorder distributed worldwide that affects both genders and manifests itself in all ages. The term also applies to a broad group of conditions characterized by common symptoms called seizures, which may occur in the context of brain injury of systemic, toxic or metabolic origin.

The diagnosis of epilepsy implies firstly the existence of a persistent brain lesion, which is present whether or not seizures occur, and secondly, that the consequences of this abnormality may or may not cause uninterrupted disability between seizures. Epilepsy is among the disorders closely associated with significant psychological and social consequences for daily living (Lopez, 2022). People with hidden disabilities such as epilepsy are among the most vulnerable in any society. The aforementioned gives this disease relevance and a great value for research in the clinical setting.

The results of rehabilitation programs could mean a better quality of life, better social functioning in general, better functioning, for example in work performance and better social contacts. It is an urgent public health challenge to make effective epilepsy care available to all who need it, regardless of national and economic boundaries. Despite significant advances in the understanding of the disease and ways to counteract its pathological consequences, research has so far been unsuccessful in substantiating the development of effective strategies capable of preventing the development of the pathogenic process, initiated by different etiological factors.

In research on the subject, the results of the synergy of basic and clinical multidisciplinary research are of vital importance in order to evaluate the clinical applicability of the results of neurobiological research and their influence

in diagnostic and therapeutic terms, so as to generate guidelines and recommendations for specific purposes.

The development of health care strategies should not simply be based on available scientific information, but should also contribute to its enrichment through original research. This approach is vital to meet specific local requirements and to take into account the socioeconomic situations in which health care policy must be formulated.

The International League Against Epilepsy develops important actions through its different commissions (in genetics, neurobiology, psychobiology, epidemiology, therapeutic strategies, diagnostic methods and health care policies), with which it actively promotes international networks of research collaboration to stimulate and facilitate research that, beyond technology, is rather the result of an intellectual attitude aimed at understanding and improving the principles on which every medical activity should be based.

The diagnosis of epilepsy has significant medical and psychosocial consequences, the development of clinical research on epilepsy provides data on the magnitude of the disease, its causes, diagnostic and therapeutic decision making. These elements make the neuropsychological evaluation of the epileptic patient an essential element in the diagnosis and treatment of the disease, as it allows to assess the cognitive abilities of a given epileptic patient, and includes an attempt of integration and interpretation in the context of the underlying epileptic disease.

The evaluation also includes a review of family, social, school, work and psychiatric/emotional aspects, as well as personality and vocational aspects. The type of neuropsychological assessment and the use of this information varies according to the particular needs of the patient. Cognitive performance determines possible medical or psychosocial interventions according to the cognitive and behavioral abilities or weaknesses of each patient.

Celorio et al. (2017), state that it is characteristic of the cognitive performance of patients diagnosed with idiopathic focal epilepsy, the attention deficit which has great importance in clinical practice. It has been observed that a significant percentage of people with epilepsy experience difficulties in attention and concentration, which can affect their quality of life and performance in various daily activities. The causes of attention deficit in patients with epilepsy may be multifactorial. On the one hand, the abnormal electrical discharges in the brain themselves during epileptic seizures may interfere with cognitive processes, including attention.

The authors Perez & Barr (2023), state that neuropsychological assessment is useful to specifically identify areas of difficulty in attention and design personalized intervention strategies. This may include attention training techniques,

cognitive-behavioral therapy to address anxiety or depression, and environmental modifications to reduce stress and improve concentration. It follows that attention deficit in patients with epilepsy is a problem that has a significant impact on their quality of life. Addressing this problem in a comprehensive manner and using multidisciplinary approaches to intervention is essential to improve the well-being and cognitive functioning of these patients.

It is agreed with Condes et al. (2013), that in these patients working memory is responsible for maintaining and manipulating short-term information. The impairment of visuospatial memory conditions that patients with epilepsy may experience difficulties in the perception and processing of visual and spatial information, which affects their ability to orient themselves in space or remember the location of objects. On the other hand, in relation to audio-verbal memory this influences the ability to remember verbal instructions or retain information presented in auditory form. It is important to keep in mind that difficulties in these areas of memory may vary according to the type of epilepsy, the location of epileptic activity in the brain and other individual factors.

The importance of knowing cognitive performance in the context of epilepsy lies in its ability to assess and understand memory functioning in patients. This cognitive performance allows the identification of possible memory deficits associated with epilepsy, which in turn facilitates the design of patient-specific intervention and treatment strategies.

In addition, cognitive performance provides valuable information on the impact of epilepsy on other cognitive functions, which contributes to a more complete understanding of the patient's needs and more personalized care. It is important to keep in mind that variability in the instruments used to assess executive function may condition differences in results between different studies.

The characterization of cognitive performance turns out to be a powerful tool in the diagnosis, care and management of the patient, as well as provides elements that allow action to improve the overall well-being of the patient and his or her family. Research on this subject, which has only begun in recent years, attributes more and more importance to these elements, but so far it is not a common practice to use them as tools for medical decisions in the comprehensive management of these patients. The aim is to study the cognitive modifications of patients with the diagnosis of idiopathic focal epilepsy, in order to verify if there is any deterioration in patients with this type of epilepsy.

With the purpose of characterizing the cognitive performance, the study was developed in the selected hospital, it is appreciated as a result a predominance of patients between 25 and 40 years of age, in 73, 14 %, while 15, 30 % were between 41 and 61 years of age and only 10,

76 % were between 19 and 24 years old. Of the patients, 84.06% were male. The average age of the patients involved in the study was  $37.54 \pm 9$  years, idiopathic focal epilepsy was more frequent in men than in women.

There was a predominance of focal seizures in 80.00%, while 12.00% of the seizures were reflex seizures and only 8.00% were generalized. As for frequency, 64.00% of the patients presented more than two seizures in a year. Regarding attention, 76.00% of the patients were found to be below the average in the direct digits subtest to evaluate attention, and as for the results of the Trail Making Test, 76.00% were found to be above the 20th percentile in both cases.

The results of the WAIS inverse digit subtest for working memory showed that 68.00% of the patients were above the average; however, when evaluating visuospatial memory through the Rey complex figure, 60.00% of the patients obtained results below the average. While the results of the Hopkins word list for the evaluation of immediate and delayed audio-verbal memory in both cases 76.00 % of the patients reached values above the 20th percentile.

The results of the tests to evaluate the executive function in patients with idiopathic focal epilepsy show that 92.00 % of the patients were above the 20th percentile in the evaluation of phonological fluency and 76.00 % of the patients were in this position in semantic fluency. Regarding the assessment of regulation and control through the Litvan FAB (Frontal Assessment Battery), 64.00% of patients with deficits predominated, while 36.00% were normal and no patients with dementia were found. The evaluation of planning and organization, through the Hanoi tower showed that 64.00% were below average.

The results obtained show that the impairment of executive functions in idiopathic focal epilepsy varies according to the area of the brain affected by epileptic discharges. It is important to keep in mind that not all patients with idiopathic focal epilepsy present impairments in executive functions and that the severity of these impairments varies from one patient to another. It should be noted that inhibitory control may be compromised, which can lead to difficulties in regulating emotions or controlling impulses, so the approach to these impairments should include cognitive rehabilitation strategies, as well as adjusting antiepileptic treatment to minimize side effects.

In the care of these patients it is vitally important to provide support and education to both the patient and family members to help them understand the possible impairments in executive functions and how to manage them in daily life. Information and emotional support are essential to improve the quality of life of patients with idiopathic focal epilepsy.

Although idiopathic focal epilepsy is considered a benign condition in terms of prognosis, patients have an increased risk of developing anxiety and depression compared to the general population, closely related to a combination of biological, psychological and social factors. In biological terms, it is noted that idiopathic focal epilepsy and psychological disorders share common neurobiological mechanisms, such as hypothalamic-pituitary-adrenal axis dysfunction and alterations in neurotransmitters involved in mood regulation.

Studies on this subject provide valuable information on the affective sphere, which allow us to know that psychological factors, such as chronic stress associated with recurrent seizures, and social factors, such as stigma and discrimination associated with epilepsy, could also contribute to the development of anxiety and depression in these patients.

The presence of anxiety and depression in patients with idiopathic focal epilepsy have a negative impact on their quality of life and influence the course of the disease. Affective disorders increase the risk of developing seizures and affect the response to antiepileptic treatment. As a result, their management requires tools for their detection and timely treatment, although pharmacological treatment with antidepressants and anxiolytics is effective, psychological interventions, such as cognitive-behavioral therapy, are valuable in their treatment.

## CONCLUSIONS

In the study, patients between 25 and 40 years old, male, pre-university, unemployed, with more than two focal seizures per year, predominated. In cognitive performance, impairment in attention, visuospatial memory, regulation and control, and planning were relevant in patients with idiopathic focal epilepsy. Depression was the most frequent disorder in the affective sphere, although it was not the essential objective of the study.

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