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Characterization of cognitive disorders in patients with Alzheimer's disease

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SUMMARY

Introduction: Alzheimer's disease has become a very serious social problem for millions of families and for national health systems around the world.

Aim: describe cognitive disorders in patients with Alzheimer's disease.

Methods: An observational, descriptive, and prospective study was conducted in patients diagnosed with Alzheimer's disease who were seen in the neurology clinic of the Outpatient Medical Center, belonging to the Carlos Manuel de Céspedes Provincial Hospital, from January 2020 to January 2021. The study universe consisted of 64 patients

and the sample was 40 cases, previously evaluated and diagnosed with Alzheimer's disease and followed up in the Neurology clinics. The association of the variables was evaluated using the Chi-square test, considering a probability value less than 0.05 as significant. The variables used were sex, age, years of disease progression, clinical assessment of Alzheimer's disease, and the different cognitive disorders found.

Results: A higher prevalence was found in females in the 61-70 age group with grade II dementia or moderate dementia, according to the Clinical Dementia Rating (CDR) scale, with a time of evolution of one to five years in relation to cognitive impairment, with short-term memory, long-term memory and orientation being the most prevalent.

Conclusions: The importance of cognitive testing in patients with Alzheimer's dementia was demonstrated.

Keywords Alzheimer's disease; Cognitive disorders; Assessment.

ABSTRACT

Introduction: Alzheimer's disease has become a very serious social problem for millions of families and for national health systems around the world.

Objective: describes cognitive disorders in patients with Alzheimer's disease.

Methods: An observational, descriptive and prospective study was carried out in patients diagnosed with Alzheimer's disease who were seen in the neurology clinic of the Ambulatory Medical Center, belonging to the Carlos Manuel de Céspedes provincial hospital, in the period from January 2020 to January 2021. The universe of study was made up of 64 patients and the sample was 40 cases, previously evaluated and diagnosed with Alzheimer's disease and followed up in Neurology clinics. The association of the variables was evaluated using the Chi-square test, considering a probability value less than 0.05 significant. The variables used are sex, age, years of evolution of the disease, clinical assessment of Alzheimer's disease and the different cognitive disorders found.

Results: a prevalence of female patients, older than 60 years with dementia and with an evolution time of more than three years was found; it was evidenced that the most

affected cognitive disorders in the studied patients were short-term memory, orientation and moderate dementia (50%).

Conclusions: the importance of cognitive tests in patients with dementia of the Alzheimer type was demonstrated.

Keywords: Alzheimer's disease; Cognitive disorders; Assessment.

SUMMARY

Introduction: Alzheimer's disease is a very serious social problem for millions of families and for national health systems around the world.

Aim: to uncover cognitive disturbances in patients with Alzheimer's disease.

Methods: An observational, descriptive and prospective study was carried out on patients with a diagnosis of Alzheimer's disease who were treated in the neurology clinic of the Ambulatory Medical Center, belonging to the Carlos Manuel de Céspedes Provincial Hospital, in the period from January 2020 to January 2021. The universe of the study was constituted by 64 teachers and shows the results of 40 cases, previously evaluated and diagnosed with Alzheimer's disease and accompanied by Neurology consultations. The association of the variables was evaluated by means of the Qui-square test, considering a probability value less than 0.05 to be significant. The variables used are sex, age, years of disease evolution, clinical assessment of Alzheimer's disease and the different cognitive disorders found.

Results: The highest prevalence of female sex in the 61-70 age group with grade II or moderate dementia was verified, according to the Clinical Dementia Rating (CDR) scale, with a time course of evolution from five years to five years in relation to cognitive impairment, prevailing over short-term memory and over long-term memory. e orientation.

Conclusões: demonstrate the importance of two cognitive tests in patients with Alzheimer's dementia.

Keywords: Alzheimer's disease; Cognitive disorders; Avaliação.

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Introduction

For several decades, there has been an increase in the number of older people. In 2021, it was estimated that 55 million people worldwide suffered from dementia. This figure will reach 80 million by 2030 and 152 million by 2031.2050. Cuba is not excluded from this demographic reality of population aging. It is the fourth oldest country in Latin America, with 17% of its population over 60 years of age. By 2025, it will become the second oldest country in Latin America.(1) This increase in life expectancy has led to an increase in disabilities and chronic non-communicable diseases (NCD), among which dementia stands out, which constitute a major health problem worldwide. The World Health Organization (WHO) estimates that one billion people were over 60 years of age in 2020 and that this age group will double to 2.1 billion by 2050. Its annual incidence is 4.6 million, and costs are estimated at \$2.8 trillion by 2030. (2)

In developed countries, Alzheimer's disease is the third most costly disease in terms of social and economic burden after heart disease and cancer, and is the fourth leading cause of death in countries such as the United States, Japan, Spain, and Switzerland. It is estimated that approximately 160,000 people in Cuba suffer from this disease or a related dementia, a figure that is expected to double by 2025. (3)

Studies conducted in the country show that for every patient, two family members are affected. Previous studies conducted in Cuba report that the prevalence of dementia syndrome is 10.2%. (3)

In Cuba, in 2021, Alzheimer's dementia was the fifth leading cause of death in both sexes, with 6,208 deaths, for a rate of 20.8%. Therefore, considerable material and human

resources are used for the comprehensive care of these patients (3). Our population is aging at an accelerated rate. The percentage of older adults in the Cuban population in 2022 was 21.6%. (3)

Dementia is the leading cause of disability in old age, becoming one of the main public health problems in the world due to the inevitable increase in its prevalence and the enormous magnitude of the psychosocial and economic repercussions on patients, their families and the health systems responsible for their care. As has been established, the most frequent cause of dementia continues to be Alzheimer's disease (AD). (4)

Global death rates attributed to Alzheimer's disease and other dementias over the past 10 years (44%) are more than double the increase in death rates from heart disease (21%) over the same period. Over the past 30 years, the global prevalence of Alzheimer's disease and other dementias has increased by more than 144%. Seventy-five percent of those living with dementia worldwide are undiagnosed, equivalent to 41 million people. (4)

The first requirement for a diagnosis of Alzheimer's disease (AD) is the presence of dementia. Dementia involves a loss of cognitive abilities to such an extent that it interferes with the person's normal activities. This loss must affect memory and other cognitive functions (e.g., executive ability, language, praxis); in addition, impaired consciousness or a serious psychiatric condition must be excluded. The main process consists of degeneration and loss of nerve cells in the cortical association areas and the medial aspect of the temporal lobes and hippocampus. (5)

Brief cognitive tests (BCTs) are the most widely used method of neuropsychological assessment, both by neurologists, geriatricians and psychiatrists, as well as by primary care physicians and other health professionals (nurses, nursing assistants, psychologists, speech therapists, occupational therapists, among others). (6)

If the gerontological population in our country continues to increase as it has been in recent years, it is estimated that the number of patients with Alzheimer's type dementia could increase, making it necessary to investigate the behavior of this dementia, which motivated us to carry out this study. The cognitive sphere being one of the most affected,

which raises the following question: What will be the main characteristics of cognitive disorders in patients with Alzheimer's disease?

Methods

An observational, descriptive and prospective study was conducted in patients diagnosed with Alzheimer's disease who were treated in the neurology consultation of the Ambulatory Medical Center, belonging to the Carlos Manuel de Céspedes Provincial Hospital., between January 2020 - January 2021.

The study population consisted of 64 patients. The sample consisted of 40 previously evaluated cases, diagnosed with Alzheimer's disease, and followed in the Neurology clinics. The association between variables was assessed using the Chi-square test, with a probability value less than 0.05 considered significant. The variables used were sex, age, years of disease onset, clinical assessment of Alzheimer's disease, and the different cognitive impairments found.

The Alzheimer's Association is the organization that has established the most commonly used diagnostic criteria, recorded in the NINCDS-ADRDA Alzheimer's Criteria. These guidelines require the presence of a cognitive disorder and the suspicion of a dementing syndrome, confirmed with a neuropsychological evaluation, to categorize the Alzheimer's diagnosis.

A primary data collection form was created to capture the data of interest to the research. Patient interviews and medical records were reviewed to obtain information relevant to the research. The tests were administered directly to the patients, accompanied by their families, in 60- to 90-minute sessions that included a thorough history of personal history, treatment, and other associated conditions.

The MMSE (Mini-mental State Examination), CAMCOG (Cambridge Cognitive Examination), and CDR (Clinical Dementia Rating) staging scales were administered. To meet the objectives, patients with Alzheimer's disease were characterized according to

sociodemographic and clinical variables using the survey developed by the author. Patients who agreed to participate in the study by signing an informed consent form were included. Patients with a previous diagnosis of severe depression or with cognitive impairment that prevented neuropsychological studies were excluded. Results were presented primarily using simple and composite tables.

Results

In Table 1, when analyzing the distribution of patients with Alzheimer's disease according to age group, the 61-70 age group prevails with a total of 17 (35.0%), with the female sex being the most affected with 29 (72.5%).

Table 1. Distribution of patients with Alzheimer's disease by age group.

Age group	Amount	Sex			
		M	%	F	%
40 - 50 years	4	2	5.0	2	5.0
51 - 60 years old	12	4	10.0	8	20.0
61 - 70 years old	17	3	7.5	14	35.0
≥ 71 years old	7	2	5.0	5	12.5
Total	40	11	27.5	29	72.5

In Table 2, regarding the distribution of patients according to the time of evolution of the disease and the presence of cognitive impairment, 100% were between 1-5 years of evolution coinciding with cognitive impairment, of variable degree.

Table 2. Distribution of patients according to the time of evolution of the disease and the presence of cognitive impairment.

Time of evolution of the disease	Without cognitive impairment	With cognitive impairment	No.	%
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- 1 year	0	0	0	0.0
1 - 5 years	0	40	40	100.0
6 - 10 years	0	0	0	0.0
Total	0	40	40	100.0

In Table 3, within the most affected cognitive processes in patients, short-term memory predominated, being affected in the 100%, followed by long-term memory with 22 (55%) respectively and orientation with 16 (40.0%).

Table 3. Distribution according to the most affected cognitive processes in patients.

Most affected cognitive processes	No. (40)	%
Short-term memory	40	100.0
Long-term memory	22	55.0
Attention	3	7.5
Thought	9	22.5
Language	7	17.5
Perception	5	12.5
Orientation	16	40.0
Construction skills	8	20.0
Troubleshooting	11	27.5

In Table 4, when relating the most affected cognitive processes with sex, the affectation of short-term memory predominated in the female sex (72.5%) with respect to the male sex with (27.5%), long-term memory predominated in the female sex (72.7%) with respect to the male sex (27.3%) followed by orientation (56.3%) with a predominance in the female sex and the male sex (43.8%). The statistical test performed showed a probability greater than 0.05, therefore, it is corroborated that there is a relationship between sex and cognitive processes.

Table 4. Distribution according to cognitive processes in relation to sex.

Most affected cognitive processes	No.	Sex			
		F	%	M	%
Short-term memory	40	29	72.5	11	27.5
Long-term memory	22	16	72.7	6	27.3
Attention	3	2	66.7	1	33.3
Thought	9	6	66.7	3	33.3
Language	7	4	57.1	3	42.9
Perception	5	3	60.0	2	40.0
Orientation	16	9	56.3	7	43.8
Construction skills	8	6	75.0	2	25.0
Resolution of issues	11	8	72.7	3	27.3

p = 0.9641

In Table 5, the clinical assessment of Alzheimer's disease according to the Clinical Dementia Rating (CDR) scale, grade II dementia or moderate dementia predominated with a total of 20 patients (50.0%), followed by mild dementia (45%).

Table 5. Clinical assessment of Alzheimer's disease according to the Clinical Dementia Rating (CDR) scale

CDR Stage. Median (range)	No.	%
0 (Normal)	0	0
I (Mild dementia)	18	45.0
II (Moderate dementia)	20	50.0
III (Severe dementia)	2	5.0

Discussion

To enable the achievement of the objective of this study, a set of socio-demographic and

cognitive variables were analyzed.

To determine cognitive alterations, the MMSE (Mini-mental State Examination) evaluation scales were used in the research, CAMCOG (Cambridge Cognitive Examination) and CDR (Clinical Dementia Rating).

In the present investigation, according to age group, a prevalence of the female sex was found, agreeing with the results obtained by Leyva Aguilera JR, age has been analyzed as one of the main risk factors associated with cognitive deterioration and dementia affecting around 10% of the population over 60 years of age and up to 50% of those over 85 years of age.⁽⁷⁾

Andrango Pilataxi and collaborators obtained similar results, with a predominance of the female sex, coinciding with various studies on the subject, who consider the female sex another risk factor for suffering from dementia, one of the fundamental reasons being that they live three times longer than men, we must also take into account the action of sexual hormones on the brain and the decrease in their production with the onset of menopause in women, which is why they have a greater predisposition to cognitive disorders. (8)

Rosales Martínez GM found that the main cognitive alterations are related to executive planning functions, memory processes, and visuospatial disorientation. The results confirm what other studies have found, arguing that patients with AD in the early stages present cognitive alterations that impact functionality, family environment, and quality of life. (9)

All authors agree that cognitive impairments in AD are heterogeneous, and therefore it is necessary to assess the functioning of a wide range of cognitive domains. Studies in recent decades have found alterations in attention, working memory, information processing speed, executive functions, episodic memory, visuospatial and visuoconstructive abilities, language, and verbal fluency. (10)

The cognitive domains most affected in the study population were memory, orientation, and calculation; thus, observations seen in patients who were older and had longer

periods of illness increased as the disease progressed. (11)

It is important to note that short-term memory problems affect precisely 100% of the individuals studied. Memory is a complex mental process through which everything that was once conscious is recorded, retained, and reproduced, making subsequent use of the experience. These disorders contribute, in part, to the disorientation in time and space suffered by Alzheimer's patients, results that coincide with those proposed by González-Martínez P. et al. (11)

According to Hammer GD and collaborators, memory worsens as the disease progresses, since not only prefrontal cortical areas are affected but also parietal areas and ascending subcortical systems that use other neurotransmitters. This particular deterioration of memory may be related to alterations in cholinergic circuits, as well as with temporomedial structural changes, among which those that occur in the hippocampus have been highlighted. (12)

The results obtained by Salazar J, Mescua M They correlate directly and significantly with all the neuropsychological variables evaluated. In the case of orientation as an affected process, patients begin to become disoriented in time and place, with a significant weakening of active attention. This demonstrates that in the initial stages of the disease there is degeneration in other areas, since the brain processes that mediate attention are located in cortical areas such as the medial prefrontal cortex, the anterior cingulate area (A24), and the prelimbic cingulate area (A32). This demonstrates the close relationship between attention and memory. (13)

According to the time of evolution of the disease and the presence of cognitive impairment, it was evident that the patients had a predominance between 1 and 5 years of evolution of the disease since their diagnosis, being in the range of 3 to 5 years the most affected, this may be given by the accumulation of B-amyloid plaque and the presence of neurofibrillary tangles in the different brain areas, agreeing with the results obtained by Salazar J, Mescua M and Villarejo Galende A and collaborators. (^{13,14})

The results obtained in our research demonstrate how the accentuation of the affected

functions presented by the patients evaluated by MMSE was statistically related to the severity of the disease measured through the Cambridge Cognitive Examination scale (CAMCOG) as demonstrated by Villarejo Galende A in his studio. ⁽¹⁴⁾

Studies by García Aranda suggest that most Alzheimer's patients present an executive deficit, either isolated or combined with other cognitive alterations, which is considered the most characteristic of the disease, such as visuospatial skills and some language modalities. ⁽¹⁵⁾

Some authors, such as Broche Pérez, report that the deficit in the ability to learn new information is more frequently affected in these patients. In his study, this author determined the frequency and differences in some clinical characteristics between AD patients with cognitive impairment, demonstrating that cognitive performance progressively declines with age. ⁽¹⁶⁾

It is worth noting that in our study, using the clinical assessment of the disease according to the Clinical Dementia Rating (CDR) scale, it was evident that half of the patients studied had moderate dementia, which reflects the degree of cognitive impairment present in this group of patients, who, depending on the time of the evolution of the disease, these disorders were becoming more pronounced, affecting their mental health and constituting a burden for their families in the care of these patients.

Conclusions

Females were the most affected, with the 61-70 age group being the most prevalent, and 100% had a time of onset between 1 and 5 years of age. The most affected cognitive processes in the patients studied were short-term memory and orientation, and the predominant clinical stage was moderate dementia.

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Conflict of interest

The authors declare no conflicts of interest.

Authorship contribution

Luis Alexis Bárzaga Fonseca: Conceptualization, research, methodology, writing, review and editing.

Ramón Calzado Salomón: Supervision, validation.

María Valdés Taset: Writing-original draft.

Ennis Yanet Quincoses Naples: Content Review

Nataly Rivero Sánchez: Information gathering.

I, Luis Alexis Bárzaga Fonseca, on behalf of all the co-authors, declare the veracity of the content of the article.