

## The importance of early prevention of Alzheimer's disease



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### **Bárbara Ervilha Barros**

Undergraduate student of the seventh period of Medicine  
University Center of Caratinga – UNEC

### **Clarice Ferreira Dalmaschio Moreira**

Undergraduate student of the seventh period of Medicine  
University Center of Caratinga – UNEC

### **Laura Faria Martins**

Undergraduate student of the seventh period of Medicine  
University Center of Caratinga – UNEC

### **Juscélio Clemente de Abreu**

Doctor in Cytogenetics  
University Center of Caratinga – UNEC

### **Elisandra Gonçalves Campos de Abreu**

Specialist in Clinical Neuropsychology  
University Center of Caratinga – UNEC

### **ABSTRACT**

Currently, there is no cure for Alzheimer's disease (AD), so the earlier the diagnosis is made, the greater the chances of treating the symptoms correctly, slowing down the progression of the disease. Thus, the present study aimed to define,

theoretically, the main preventive measures for Alzheimer's disease, as well as to inform which tests are indicated for the early detection of AD and the competent ones capable of stopping the advance of cognitive decline and loss of functionality in the elderly, in addition to promoting awareness and understanding on the part of the family in relation to AD. enabling them to provide a better quality of life to the patient with the disease. Regarding the tests for early detection of AD, we highlight the cognitive, image analysis and cerebrospinal fluid protein tests, as well as genetic tests, which help in the diagnosis and prognosis of the disease, thus allowing the establishment of the appropriate therapy for the patient and clarifying the risk for family members, especially asymptomatic ones. Regarding the main components, the regular practice of physical exercise, involvement in leisure activities, adequate cognitive stimulation and the adoption of a healthy diet are highlighted. It was found that the greater the family's knowledge and understanding of Alzheimer's, the greater the chances of mitigating the increasing impact of AD on the health of the elderly population and improving the quality of life of these individuals.

**Keywords:** Alzheimer's disease (AD), Lifestyle and prevention.

## **1 INTRODUCTION**

Alzheimer's disease (AD) represents a degenerative, progressive, and irreversible neurological condition, as highlighted by Fernandes (2017), and tends to manifest itself with a higher incidence from the age of 65 (ROCHETTI, 2023).

The increase in life expectancy directly contributes to the increase in the prevalence of the disease, reflected in the significant growth of the elderly population, which reached 12.1% of the Brazilian population according to the 2010 census of the Brazilian Institute of Geography and Statistics (IBGE). Among the non-communicable diseases and conditions (NCDs), dementias, especially AD, emerge as one of the main concerns (FARIA et al., 2023).



At the same time, the World Health Organization (WHO) projects that, by 2030, about 78 million people will face dementia. Given this scenario, it is imperative to understand and implement effective prevention strategies.

Although healthy lifestyle habits such as a balanced diet and regular exercise are often cited as potential measures to delay or prevent the development of AD, it is crucial to obtain clear and specific information about the main factors that require attention in this context.

The search for guidance on Alzheimer's disease is proposed because the first symptoms of the disease are confused with natural aging processes. This conditioning causes the disease to be diagnosed late (MIRANDA *et al.*, 2020).

Nationally, about 50 to 60% of dementia cases in the elderly are diagnosed as AD. As the disease progresses, it becomes necessary for individuals to receive daily care and have a caregiver to provide adequate home care. The role of the caregiver is extremely important to assist in the patient's daily activities. However, caring for a person with AD is a complicated and demanding task, impacting not only the caregiver but the entire family (KUCMANSKI *et al.*, 2016).

In addition to drug treatment, several measures are effective in slowing down the progression of AD. The Unified Health System (SUS) advocates a multidisciplinary approach, highlighting the importance not only of professional intervention, but also of the constant involvement of the family and caregivers. In this context, it is imperative to promote awareness and understanding on the part of the family in relation to AD, enabling them to provide a better quality of life to the patient with the disease. This comprehensive approach, which involves both medical and family support, is essential to optimize therapeutic outcomes and mitigate the impact of AD on the patient's daily life (MATOS, 2022).

Early identification of AD is of paramount importance to immediately start drug treatment in order to slow its progression. Unfortunately, there is, so far, no way to stop the degenerative process. It is essential for people to be aware of the symptoms, avoiding the false impression of their insignificance. In addition to the clinical picture, there are psychological and behavioral disorders that hinder the patient's daily activities.

The treatment of Alzheimer's prioritizes the reduction of cognitive deficits and behavioral changes, and it is essential to prescribe medications exclusively by a doctor. Psychological support has been shown to be fundamental, both for the patient and for his family and caregivers. Even with palliative approaches, the patient's quality of life tends to deteriorate progressively as the disease progresses, reinforcing the need for research for prevention.



## 2 DEVELOPMENT

### 2.1 UNDERSTANDING ALZHEIMER'S IN CONTEMPORARY SOCIETY

AD is a neurodegenerative disorder that occurs due to excessive accumulation of beta-amyloid protein in the brain. This protein is formed during the processing of the amyloid precursor protein, playing a role in maintaining synaptic integrity and regulation (BALBINO, 2021). According to Sereniki and Vital (2008), this disease is usually associated with advanced age, whose cognitive and neuropsychiatric manifestations result in progressive disability and disability.

Usually, the first clinical symptom of the disease is a deficiency in recent memory, while old memories are preserved to a certain stage. In addition to difficulties with attention and verbal fluency, other cognitive functions deteriorate as one progresses, including the ability to perform calculations and visuospatial skills. The patient's wakefulness and lucidity are not affected until the disease is at an advanced stage (PEIXOTO, 2021).

In addition to the symptoms mentioned above, other noticeable symptoms include: difficulties in decision-making, lack of motivation, mood swings, the presence of depression and anxiety, unusual anger reactions and aggression on certain occasions, as well as loss of interest (PEIXOTO, 2021).

AD is the most common cause of dementia, accounting for 50% to 60% of cases (LEAL, 2021). According to Garces (2021), it is a neurological disease with no cure, with a prevalence of 10% in the population over 65 years of age, reaching 47.2% in the age group of 85 years.

According to the 2012 report by the World Health Organization (WHO), more than 35 million people worldwide currently suffer from dementia, and this number is expected to double by 2030 (66 million) and triple by 2050 (115 million). In Brazil, there are no precise data on the number of people with AD, but it is estimated that there are approximately 1.2 million cases of this dementia. (SILVA, 2021).

AD is the most common form of dementia, affecting millions of people. In addition to directly impacting the patient, this disease also significantly affects their family. It affects the patient's memory, thinking, behavior, and ability to perform daily activities, impacting all aspects of their existence, significantly influencing families and caregivers, who need to deal with the challenges and demands associated with caring for a dementia patient (ALVES, 2023).

Due to the cognitive and functional impairment stemming from Alzheimer's disease, it is essential that caregivers also receive support and follow-up, as AD not only affects patients, but also their families and society as a whole. Multidisciplinary follow-up provides appropriate guidance and support to caregivers, helping them to cope with care challenges and promote quality of life, both for patients and their families (PRIULLI, 2020).



AD is a complex and multifactorial condition, since the neuropathological changes observed are triggered by a combination of genetic and environmental factors. Despite more than a hundred years since its first description, there is still no definitive cure for the disease (ALVES, 2023).

However, it is possible to reduce the risk of developing Alzheimer's symptoms or slow down the deterioration process in cases that have already been diagnosed. In this sense, it is the responsibility of health professionals to guide people on the importance of identifying and controlling personal risk factors, adopting simple but effective lifestyle changes (PEIXOTO, 2021).

## 2.2 EXPLORING THE INTERCONNECTION BETWEEN AGING, DEMENTIA, AND ALZHEIMER'S DISEASE

It is believed that the occurrence of dementia cases is directly related to advancing age. According to studies, approximately 55% of dementia diagnoses made in psychiatric outpatient clinics are attributed to AD. In addition, physical inactivity is another factor that influences the development of AD, and is an aspect that can be modified (BEZERRA, 2023).

Based on these statistics, there is evidence that the prevalence of AD increases significantly every five years, starting at 65 years of age, and doubles by the age of 90. This indicates that the risk of developing the disease increases progressively with aging (BEZERRA, 2023).

According to Kusumota *et al.* (2021), depression in the elderly is generally not taken seriously and is often diagnosed as a normal aging process. However, this condition can trigger mental changes that can lead to dementia in the future (PEIXOTO, 2021).

In the pre-dementia stage and in the early stage, the symptoms are often overlooked, being seen by family members and even some health professionals as part of the aging process, due to the gradual onset of the disease. Therefore, it is challenging to determine, precisely, when the disease begins (PEIXOTO, 2021).

## 2.3 MECHANISM OF ALZHEIMER'S DISEASE

According to Alves (2023), the mechanism of action of AD is related to the normal conformational change of beta-amyloid protein and tau protein in toxic models. These proteins form toxic sheets, resulting in the formation of neuritic plaques and fibrillar nodes, respectively.

The brain, after the process of neuronal injury, is the site of the highest proportion of the expression of the precursor peptide of the amyloid protein (PPA) and its function is synaptic formation and repair. After being cleaved, PPA becomes the beta-amyloid protein present in plasma and cerebrospinal fluid. When in its abnormal structure, it can induce aggregation, through the formation of neuritic plaques, resulting in inflammation in the brain (ALVES, 2023).



The temporal lobe regions are the sites of greatest hyperphosphorylation of the tau protein (BEZERRA *et al.*, 2023), which consists of a phosphate group that is added to the protein. This leads to the formation of neurofibrillary tangles, contributing to the development of Alzheimer's Disease (LEAL, 2021).

## 2.4 DIAGNOSIS FOR EARLY DETECTION OF ALZHEIMER'S DISEASE

According to Paiva (2023), early diagnosis is essential for the effective treatment of AD symptoms. The earlier the diagnosis is made, the greater the chances of applying the appropriate treatment, highlighting the importance of starting the right treatment from the beginning.

Early diagnosis makes it possible to prevent the worsening of symptoms through a multidisciplinary intervention, aiming to improve the quality of life of AD patients and reduce psychosocial and economic impacts, as stated by Leal (2021).

Scientists seek early screening of the disease, through blood biomarkers, which involves immunoprecipitation and mass spectrometry, with the aim of exploring ways to find out how the disease can be slowed or stopped with reduced diagnostic costs (SILVA *et al.*, 2021).

For cognitive analysis in dementia observations, neuropsychological tests can be used, the patient undergoes a series of cognitive tests and neuroimaging exams for a diagnosis of probable Alzheimer's disease, by eliminating other diseases, tracking cognitive losses (BITENCOURT *et al.*, 2018).

In order to discern cognitive impairment at an early stage, it is considered to track executive functions, which surround cognitive capacities such as initiative, planning, sequencing and monitoring complex behaviors directed to a conduct. It is argued that cognitive screening instruments are substantial assessment tools (MIRANDA *et al.*, 2020).

### 2.4.1 Cognitive tests

Cognitive tests are used to measure and assess cognitive or thinking functions, such as concentration, memory, visuospatial orientation, problem solving, counting and linguistic skills (MARTINS *et al.*, 2013)

Some examples of these tests include: Mini-Mental State Examination (MMSE); Montreal Cognitive Assessment (MoCA); Alzheimer's Disease Assessment Scale (ADAS-Cog).

The aforementioned tests are essential for diagnosing the various types of dementia and they are also used to assess mood and diagnose depression, which have symptoms similar to those of dementia. In addition to cognitive testing, neuropsychological assessment is also often used to monitor the progression of AD and other causes of dementia.



## 2.4.2 Imaging tests and central nervous system proteins

According to Bezerra (2023), doses of tau protein and beta-amyloid protein can be found in cerebrospinal fluid (CSF), plasma, and neuroimaging. These biomarkers are indicative of AD and can be used to identify and diagnose patients in the early stages of the disease, as well as to assist in differentiating AD from other forms of dementia, and in clinical practice, the interpretation of CSF biomarker test results requires other clinical and neuropsychological evaluations to confirm or rule out the diagnosis of Alzheimer's disease.

## 2.4.3 Molecular Testing

The genetic risk factor for early Alzheimer's disease can be predicted through next-generation gene sequencing (NGS) panels

The main genes involved with early AD are APOE, APP, PSEN1, PSEN2, ABCA7, CLU, CR1, PICALM and SRL1.

Sequencing verifies alterations in the genes associated with early-onset AD (gene variations), which may help in the diagnosis and prognosis of the disease, thus allowing the establishment of the appropriate therapy for the patient and clarifying the risk for family members, especially asymptomatic ones. However, the positive result does not mean that the person will necessarily develop the disease, but that he or she has a higher risk, and it is necessary to maintain a healthier lifestyle.

## 2.5 LIFESTYLE AND PREVENTION MEASURES

Alzheimer's has modifiable risk factors that can be prevented or controlled in order to delay its onset or even attenuate it, such as: hypertension; diabetes; obesity; sedentary lifestyle; smoking; alcoholism; depression; high cholesterol; cardiovascular diseases; Previous cerebrovascular accident, among others. (SILVA *et al.*, 2021).

A diet rich in foods with omega 3, vitamins E and C is an important marker, as bioactive compounds, such as antioxidants, help reduce the risks of inflammation and oxidative stress. These processes are associated with a higher risk of dementia, such as Alzheimer's, since they favor cognitive decline and a drop in brain activity (FUJII, 2020).

The practice of physical activity helps to keep the brain more active, protecting it or alleviating the symptoms of a dementia process, as well as stimulating cognitive capacity, seeking new forms of knowledge, learning a language or playing an instrument, in addition to maintaining reading habits and social interaction. However, the important thing is to keep the brain always active, because what is good for the heart is also good for our brain (PEIXOTO, 2021).



## 2.6 THE IMPACT OF AD ON THE CAREGIVER

The role of the caregiver is essential in the daily lives of AD patients, becoming involved in virtually all aspects of care, and increasingly performing additional functions. As the disease progresses, the caregiver is responsible for finances, medications, personal care tasks, bathing, and feeding. The caregiver is usually chosen within the family circle, the task is assumed in an unexpected way, and he or she is led to an emotional overload (GIRARDINI *et al*).

It is observed that such responsibility has become an exhausting and stressful task, due to affective involvement and for the transformation of a previous relationship of affection to a relationship of dependence, where they start to have restrictions on their own life, in this regard, the WHO created iSupport, an online training program that offers these people advice on care management, how to deal with changes in behavior and how to take care of your own health (KESTEL, 2019).

Attention to caregivers of dementia patients is essential, as it is reflected in a better quality of life not only for the caregiver, but especially for the patient (CRUZ, 2008).

## 2.7 EARLY INTERVENTION IN ALZHEIMER'S DISEASE

Currently, there is no cure for dementia, so the earlier the diagnosis is made, the greater the chances of treating the symptoms correctly, slowing the progression of the disease. With the help of magnetic resonance imaging, it is able to identify the first signs of the disease or, for more advanced cases, its degree of severity (PAIVA, 2023).

The first symptoms of AD usually appear a few years before family members notice it, but they are very punctual, such as simple forgetfulness, changing names, repeating the same story, and changes in behavior. Recent memory loss is the main warning sign of this disease (MINISTRY OF HEALTH, 2022).

Neurodegenerative diseases have four clinical stages, initially there is memory loss, personality change, and locomotion abilities. The moderate stage is characterized by difficulty speaking and performing daily activities, as well as agitation and insomnia. When in the advanced stage, the individual presents urinary and fecal incontinence, resistance to performing daily tasks, difficulties in eating, and progressive motor impairment. Finally, the terminal stage is characterized by total memory loss and dependence on others (PAIVA, 2023).

As it is a progressive disease, the symptoms increase over time and begin to bring irritability, language failures, impairment in the ability to orient oneself in space and time. In the most severe cases, there is a loss of the ability to perform everyday tasks. Therefore, the sooner you seek a medical diagnosis, the greater the chances of slowing down the process and preventing the rapid evolution of Alzheimer's (ROCHA, 2023).



Early diagnosis is the key to initiating the correct treatment and, with the advancement of technology, we can use techniques to monitor a patient's progress, from the stage of mild cognitive impairment to the stage of dementia (PAIVA, 2023).

### 3 FINAL THOUGHTS

It is estimated that by 2050, more than 25% of the world's population will be made up of the elderly, and AD is the most common disease among this age group. Thus, there is an urgent need to understand and develop strategies for the early prevention of AD.

Family knowledge of the disease, early identification and control of AD risk factors, along with simple lifestyle modifications, can contribute to the preservation of cognitive abilities over a longer period, resulting in a better quality of life.



## REFERENCES

- ALVES, D. E.; Damião, Bruno; Simioni, Patricia Ucelli. "Doença de Alzheimer: uma atualização sobre tratamentos e perspectivas." *Cadernos Acadêmicos*, v. 9, n. 1, 87 – 100, 2023.
- BALBINO, C. S. A influência da alimentação no tratamento da doença de Alzheimer. *Brazilian Journal of Health Review*, v. 4, n. 3, 2021, p. 10279-10293. Acesso em: 20 set. 2023.
- BEZERRA; ROCHETTI, T.A., et al. "Relação entre neuroinflamação, biomarcadores e atividade física na prevenção da doença de Alzheimer." *Peer Review*, v. 5, n. 4, p. 48-62, 2023.
- BITENCOURT, E. M. et al. Doença de Alzheimer: aspectos fisiopatológicos, qualidade de vida, estratégias terapêuticas da fisioterapia e biomedicina. *Inova Saúde*, v. 8, n. 2, p. 138-157, 2018.
- CRUZ, M. N. O impacto da doença de Alzheimer no cuidador. 13 de abril de 2008. Disponível em: <https://doi.org/10.1590/S1413-7372200800020000>
- FUJII, D. C.; DISNER, E. É possível prevenir o Alzheimer? 2020. Disponível em: < <https://christianefujii.com.br/e-possivel-prevenir-o-alzheimer/>>. Acesso em: 20 set. 2023.
- GIRARDINI, D. *et al.* O impacto da Doença de Alzheimer no familiar cuidador. *Filadélfia Oficial - Fundo Branco Horizontal*. Disponível em: < <https://www.filadelfia.com.br/artigo-academico/o-impacto-da-doenca-de-alzheimer-no-familiar-cuidador/>>.
- KESTEL, P. et al. Ontology-based approach for the provision of simulation knowledge acquired by Data and Text Mining processes. *Advanced Engineering Informatics*, v. 39, p. 292-305, 2019.
- KUCMANSKI, L. S., Universidade Federal da Fronteira Sul, Brazil, Zenevicz, L., Geremia, D. S., Madureira, V. S. F., Silva, T. G. da, & Souza, S. S. de. (2016). Alzheimer's disease: challenges faced by family caregivers. *Revista brasileira de geriatria e gerontologia*, 19(6), 1022–1029. Disponível em: <https://doi.org/10.1590/1981-22562016019.150162>.
- LEAL, T. A. (2021). Manejo nutricional no Alzheimer: uma revisão integrativa, 2021. Acesso em: 20 set. 2023.
- MARTINS N.I.M, CALDAS P.R, CABRAL E.D, LINS C.C DOS S.A, CORIOLANO M. DAS G.W DE S. Instrumentos de avaliação cognitiva utilizados nos últimos cinco anos em idosos brasileiros. *Ciênc saúde coletiva* [Internet]. 2019Jul;24(7):2513–30. Available from: <https://doi.org/10.1590/1413-81232018247.20862017>.
- MATOS, J. D.'Arc. C.; FIGUEIRA, V. B. Doença de Alzheimer e qualidade de vida: revisão integrativa. *Saúde & Ciência em Ação*, v. 8, n. 1, p. 67-84, 2022.
- MINISTERIO DA SAUDE. Saúde reforça importância do diagnóstico precoce da Doença de Alzheimer para evitar progressão rápida da doença. 3 de nov. de 2022. Disponível em: < <https://www.gov.br/saude/pt-br/assuntos/noticias/2022/setembro/saude-reforca-importancia-do-diagnostico-precoce-da-doenca-de-alzheimer-para-evitar-progressao-rapida-da-doenca> >. Acesso em: 20 de set. de 2023.
- MIRANDA, S. A. et al. Aplicabilidade de atividades lúdicas como parâmetro na reconhecimento do Alzheimer precoce na atenção básica de saúde. *Revista Eletrônica Acervo Saúde*, (44), e2250-e2250. Acesso em: 20 set. 2023.



PAIVA, N., ESCOVEDO, T. Detecção Precoce de Alzheimer Usando Machine Learning. 2023. Acesso em: 20 set. 2023.

PEIXOTO, C. T. S. Saúde mental: um enfoque voltado à prevenção da demência de alzheimer. 2021.

PRIULLI, E.; PIRES, C. R. F.; CEZAR, T. C. M. Alimentação como fator de proteção da doença de Alzheimer. *Research, Society and Development*, v. 9, 10, 2020, p. e4259108895-e4259108895.

ROCHA, L. Exame pode indicar diagnóstico de Alzheimer dez anos antes do início dos sintomas, sugere estudo. 12 de jan. de 2023. Disponível em: < <https://www.cnnbrasil.com.br/saude/exame-pode-indicar-diagnostico-de-alzheimer-dez-anos-antes-do-inicio-dos-sintomas-sugere-estudo/>>.

SERENIKI, A.; VITAL, M. A. B. F. (2008). A doença de Alzheimer: aspectos fisiopatológicos e farmacológicos. *Revista de Psiquiatria do Rio Grande do Sul*, 30(1 suppl). Disponível em: <https://doi.org/10.1590/s0101-81082008000200002>.

SILVA, Y. J.; LESSA, R. T.; ARAUJO, G. N. Avanços no diagnóstico precoce da Doença de Alzheimer e novas perspectivas de tratamento: uma revisão sistemática da literatura. *Brazilian Journal of Health Review*, v. 4, n. 3, 2021, p. 10121-10135.

STORTI, L. B.; QUINTINO, D. T.; SILVA, N.M.; KUSUMOTA, L.; MARQUES, S. Sintomas neuropsiquiátricos do idoso com doença de Alzheimer e o desgaste do cuidador familiar. *Rev. Latino-Am. Enferm [Internet]*. 2016 [acesso em 05 de jun 2020]; 24: e2751, 2016. Disponível em: <https://doi.org/10.1590/1518-8345.0580.2751>.