



## NUTRITIONAL ASPECTS AND INTERVENTIONS IN ELDERLY WITH ALZHEIMER'S DISEASE: REVIEW

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### ABSTRACT

Aging is accompanied by several intrinsic and extrinsic factors that influence the mental, physical and social health of the elderly. Among the most diverse diseases associated with people who are over 65 years, stands out Alzheimer's disease. Alzheimer's is a neurodegenerative disease and associated with age and causes physical dependence and disability. The main initial symptom is recent memory loss, and with the increasing evolution of the disease, it is verified by alterations in the cognition being they the deficiencies of language and visual /spatial functions. In addition, it can be associated by behavioral disorders, aggression, depression and even hallucinations. Alzheimer's disease can originate in aging and genetics. Among the most diverse treatments and prevention, we have the nutritional care, which helps to prevent the development of the disease. Some studies have shown that there is a direct relationship between the high levels of cholesterol in the blood with the development of this disease. Therefore, the aim of this study is to discuss nutritional aspects and interventions in elderly people with Alzheimer's disease.

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### INTRODUCTION

The elderly population has shown a high growth in Brazil and in the world (Brasil, 2011; Ibge, 2012). According to WHO (2015), the number of people aged 65 and over grows rapidly and data indicate that an increase of 223% in the elderly is expected when compared to the year 1970. This peculiar increase occurs due to improved health and greater functional capacity of this public, as a result of the practice of regular physical activity and adequate eating habits (Wellman, 2011).

However, too much growth of this specific population needs attention, especially in the nutritional aspect, due to its primordial role against diseases associated with aging (Vellas, 2009). In addition, during aging there is a sudden reduction in body mass and an increase in adiposity caused by external factors such as sedentary lifestyle, muscular atrophy due to disuse, weak health, genetics, absence of physical exercise and inadequate diet. And this functional decline due to age is associated with increased dependence and comorbidities (Morley; Van Staveren, 2008; Barros, 2012). In addition, due to the increasing population over 65 years, it is possible to observe and predict an increase in the number of people with dementias. In the West, about 8-10% of people over 65 years

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of age suffer from dementia (WHO, 2002). Among the diseases that frequently affect the elderly, dementia, neurological disease that causes disability and dependence is considered one of the most important, especially Alzheimer's disease, which causes gradual decline in cognitive functions, changes in personality and behavior and decrease of activities of daily life, being considered the most common form between 60 and 80% of the cases of patients diagnosed with dementia (Apa, 2002; Pavarini *et al.*, 2008; Vellas, 2009). During the aging process, nutrition is influenced by several factors such as physiological changes, metabolic changes and functional capacity, causing changes in nutritional needs and nutritional status of the elderly (Freitas *et al.*, 2006; Sousa; Guariento, 2009). And in elderly people with Alzheimer's disease, rapid weight loss and severe malnutrition caused by complications leading to infection, respiratory failure and heart failure increase mortality (Castro, Frank, 2009). The nutritional status of the elderly diagnosed with Alzheimer's disease is drastically affected by the evolution of the disease due to inability to accept, chew, swallow and assimilate food (Tavares, Carvalho, 2012). As a result, factors such as loss of appetite, lack of interest in food and lack of awareness of the importance of nutrition, increase the risk of dehydration and malnutrition, damaging the health of the elderly (Frank; Soares; Gouveia, 2004).

In addition, chronic-degenerative diseases affect nutritional needs related to proteins and calories, caused by inappetence, caused by changes in the disease itself, by certain medications and by eating difficulties (Tavares, Carvalho, 2012). It is clear in the literature that it is necessary to adopt nutritional interventions, prevention, rehabilitation and maintenance, essential for achieving healthy aging and improving the quality of life of the individual diagnosed with Alzheimer's disease (Castro; Frank, 2009; Tavares; Carvalho, 2012). In this sense, it is possible to point out that a nutritional intervention in the elderly is extremely important in the fight against several diseases due to the aging process (Wellman, 2011). Therefore, this work aimed to recognize, through the literature, the main aspects and nutritional interventions in the diet of the elderly diagnosed with Alzheimer's disease.

## AGING

The human organism has a limited life span and undergoes physiological changes with the advancement of age, with aging being the last phase of life, characterized by the decline of the functional capacity of the organism (Straub *et al.*, 2001). The aging of the population has occurred in a fast and accentuated way, currently it is seen as a characteristic phenomenon of developed and developing countries (BRASIL, 2011). In Brazil, the corresponding percentage of elderly (60 years or more) is 24.5% of the Brazilian population. According to data from the Brazilian Institute of Geography and Statistics (IBGE), the number of elderly people increased from 15.5 million in 2001 to 23.5 million in 2011, demonstrating that the longevity of the population has increased significantly (Ibge, 2012). The process of human aging is natural, progressive and inevitable, composed of several morphological and functional alterations, resulting from the erosion of the corporal, psychic and cognitive structures, which lead the individual to a dynamic, continuous and irreversible process of organic disorganization and the emergence of vulnerabilities due to the incidence of associated pathological processes (Torres *et al.*, 2013; Fries; Pereira, 2013).

Thus, aging is not defined chronologically, but by processes that vary according to each individual, involving hereditary factors, the influence of the environment, age, diet, occupation and lifestyle (Claudino *et al.*, 2010). Biological aging is characterized by a decrease in the metabolic rate due to the reduction of the energy exchanges of the organism, associated with a low in the capacity of regeneration of the cells. Capable of causing anatomical and physiological changes that lead to a lower efficiency of the organic and functional systems, which in normal situations do not seem to cause functional losses (Figueiredo, 2007; Sequeira, 2007). When this loss of capacity is very pronounced, it makes the elderly person more fragile and more and more limited, reducing their ability to perform routine activities due to poor balance, weakness, lack of resistance and frequent falls (Carvalho Filho; Papaleo Netto, 2006).

Such modifications, makes the elderly more vulnerable to biological changes, and less able to maintain the body's homeostasis when subjected to physiological stress, and more susceptible to chronic diseases, with consequent repercussions on functional capacity, associated with loss of autonomy and independence (Paz; Santos; Eidt, 2006; Simões; Carvalho, 2011). Aging, begins with changes in the external appearance such as the appearance of white hair, slowness in movements, changes in balance, muscle weakness, emotional and cognitive changes (Sequeira, 2007). Internally, the changes are related to changes in vital organs, basal metabolism, the immune system, and the emergence of diseases associated with aging such as osteoarticular, cardiovascular, type 2 diabetes mellitus, neurodegenerative diseases and several neoplasias. (Fulop *et al.*, 2012; Lang; Govind; Aspinall, 2013). In this way, taking into account the natural incapacity acquired due to the aging process, it is necessary to understand the care that this population needs.

## Nutritional Needs of the Elderly

The physiological and anatomical changes characteristic of aging reflect consequences on the health and nutrition of the elderly (Vitolo, 2014). According to Afonso and Sonati (2007), nutrition plays an important role in the aging process and food helps to maintain nutritional status and prepares the body for the individual to be able to perform their daily activities. Therefore, it is important to know the normal bodily changes that occur during the aging process. Among the common biological changes of this process include the progressive decrease in lean body mass and body fluids, the increase of fatty tissues or malnutrition and, above all, significant muscle loss (Najas, 2005). Several factors, biological, social or psychological, are related to changes in eating practices (Fisberg *et al.*, 2005). Therefore, it is of essential importance to be aware of nutritional changes due to the advancement of age, especially in developing countries, where the elderly present a premature functional aging due to lifestyle factors (Neri, 2008). In the elderly, diversified food, with food from different sources, provides the necessary nutrients for balanced nutrition, provided they ingested the recommended amount to meet energy expenditure and maintain adequate nutritional status (Sonati *et al.*, 2011). Therefore, its nutritional monitoring is necessary, in order to reach the energy, macro and micronutrient needs. It is known that total energy expenditure declines with increasing age, which contributes to the reduction of energy needs (Busnello, 2007).

A good nutritional status, with the adequate supply of energy, proteins, vitamins and minerals is of extreme importance for the elderly to resist chronic and debilitating diseases and to maintain health and independence (Durgante; Milani, 2007).

The elderly need a varied and balanced diet adequate for the organic functions. The meals should be easy to digest and cause satisfaction to feed themselves, be economically accessible and fit the individual's taste buds, aiming at the pleasure of feeding and attaining the nutritional recommendations of age (Fiore *et al.*, 2006; Ferreira *et al.*, 2008). The consumption of prepared foods, milk, refined cereals, meat and sugar and a decrease in the consumption of fruits, vegetables, whole grains and cereals (Geib, 2012). According to Brasil (2006), the consumption of fruits and vegetables by the Brazilian population assists in the prevention and control of chronic non communicable diseases, especially when associated with obesity. In the composition of the energetic needs, a representation of 10 to 15% of proteins is recommended, while 55 to 75% must come from carbohydrates and 15 to 30% of lipids, of which it is further recommended that 7 to 10% of the diet are saturated, 10% polyunsaturated and the remaining monounsaturated (Brasil, 2006). Healthy and varied diet, rich in vitamins and minerals and low in saturated fats, has a protective role in relation to the development of diseases characteristic of this stage of life (Dornelles, Costa, 2003). Fruits and vegetables are the main sources of vitamins and minerals, acting on the proper functioning of the organism, and it is recommended to consume at least five portions of these in the daily diet (Novaes *et al.*, 2005; Magnoni *et al.*, 2005; Busnello, 2007). In addition, complex carbohydrates should also be consumed in greater amounts as a source of fiber, which has a role in intestinal function, glycemic and cholesterol control (Durgante, EL Kik, 2007). The needs of vitamins and minerals by the elderly are greater than those of adults, since their absorption may be reduced (Muñiz; Martinez; CosBlanco, 2004). Deficiencies of some of these elements are associated with decreased immune response and consequent infections, and can be prevented by their adequate intake (Novaes *et al.*, 2005).

#### **Anatomic and physiological changes due to aging**

The physiological changes observed in the elderly reflect not only the aging process, but also the effects of years of exposure to environmental agents, as well as disease processes (Bós, 2007). The aging process has its own characteristics, considered normal for the life stage, such as: difficulties in swallowing, changes in the digestive system, loss of muscle mass, decreased sensorial sensitivity, cardiorespiratory impairment, renal disease, endocrine dysfunction and reduction of cognitive function, which causes a certain loss of memory (Menezes; Marucci, 2005). Over the years, it may decrease memory efficiency, but there is a possibility of changes, so memory is considered the best biological instrument to understand aging (Rozeli; Oliveira, 2010). However, it is important to note that senile dementia or Alzheimer's disease is not a normal part of aging (Busnello, 2007).

#### **Alzheimer's Disease**

Dementia generally falls into the class of brain disorders and many of them are considered irreversible. Among dementia-associated diseases, Alzheimer's disease is the most common

form, which accounts for about 50% to 70% of all cases, and is classified as a mental and behavioral disorder (Who, 2015). Alzheimer's disease is neurodegenerative and is associated with age, so that the first symptoms are characterized by deficiency in recent memory, accompanied by difficulty in attention and speech (Jones-jr, 2006). In addition, with the evolution of the disease, other cognitive functions are affected, such as the ability to perform mathematical calculations and use of common objects such as cutlery and tools (Lindeboom; Weinstein, 2004). Symptoms are regularly accompanied by behavioral changes such as aggressiveness, hyperactivity, depression, irritability and hallucinations (Forlenza, 2000).

This disease is characterized physiologically by synaptic loss and neural death in the brain regions responsible for cognitive functions, including the cerebral cortex, hippocampus, entorhinal cortex and ventral striatum (Selkoe, 2001). Alzheimer's disease carriers have amyloid fibrillar deposits found in the walls of blood vessels, which are associated with several types of senile plaques, and accumulation of abnormal filaments of tau protein and subsequent formation of neurofibrillary tangles (NFT), as well as neural loss, synaptic and inflammation (Selkoe, 2001). The disease is initially stimulated as nerve cells in the brain undergo a reduction in size and number. The brain is different from the other organs of the body, because each nerve cell is responsible for a unique function. In the brain each part has a specific function, and all must work together for the perfect functioning of this organ of extreme importance to all the functions of our body. Therefore, the loss of any part of the brain results in the loss of this same function, because in many situations no other part of the brain can assume or perform this function. Thus, as Alzheimer's disease progresses and affects the various brain areas, certain functions or abilities are lost (Callone *et al.*, 2006).

In addition to the genetic factor, other etiologic agents such as toxicity to infectious agents, aluminum, oxygen reactive substances and neurotoxic amino acids are associated with the occurrence of damage in microtubules and associated proteins, which are considered to be determinants of Alzheimer's disease (Smith, 1999). Smith (1999) reports that about 1/3 of Alzheimer's disease patients exhibit familiarity and behave with an autosomal dominant monogenic inheritance pattern. Children of parents with Alzheimer's disease have a 50% chance of inheriting the disease. The prevalence of dementia in people aged 60 years or older varies from 4.6% in Central Europe to 8.7% in North Africa and the Middle East, and in other regions the data range from 5.6 to 7.6 % (Martin-Prince *et al.*, 2015). Globally, 35.6 million people are living with Alzheimer's and it is estimated that this number doubles every 20 years, totaling 65.7 million in 2030 (Wimo; Winblad; Jönsson, 2010).

#### **Classification of Alzheimer's Disease**

Although people with Alzheimer's disease have the same symptoms, the disease can be classified into three categories (Abreu; Forlenza; Barros, 2005; Martin-prince *et al.*, 2015). 1 - Early Onset Alzheimer's: this category is characterized by early onset and is a rare form of the disease, diagnosed before age 65 and manifested generally in people with Down's Syndrome. It was discovered that the first Alzheimer's disease gene was present on chromosome 21 involved in Down's syndrome (Smith, 1999; Marttin-prince *et al.*, 2015).

2 - Late or sporadic onset Alzheimer's: This late onset form is the most common form of onset of the disease, which accounts for approximately 90% of cases and eventually appears after age 65. This type of disease can also be presented as sporadic Alzheimer's and affects people who may or may not have a family history of the disease (Martin-Prince *et al.*, 2015). 3 - Familial Alzheimer's: this form is known to be hereditary. The presence of this gene means that there is the possibility of developing Alzheimer's disease, usually between 40 and 60 years. (Martin-Prince *et al.*, 2015).

### Symptoms of Alzheimer's disease

At the beginning of the disease, it is possible to observe small forgetfulness, memory loss, which is mistakenly interpreted by family members as part of the natural aging process. Those diagnosed with the disease can become very confused and in some cases aggressive, and may even present personality changes (Bottino *et al.*, 2002). In the last stage of the disease, the patient becomes totally dependent on a relative or caregiver (Luzardo; Gorini; Silva, 2006). At this stage, the elderly present swallowing problems, neurological changes, fecal and urinary incontinence, mutism and irritability (Camargo, 2003; Fachine, 2012). However, in the scientific literature, it is still not possible to perform an examination that proves that the patient has the disease, the only way is through the biopsy of the brain tissue (Callone *et al.*, 2006). In the same way, a cure for this disease has not yet been found, but drug interventions have shown positive effects on the stabilization of cognitive function if offered at the beginning of the disease (Callone *et al.*, 2006).

### Risk factors for Alzheimer's disease

Among the risk factors involved for the onset of Alzheimer's disease, genetic factors and age are highlighted. Barranco - Quintana *et al.*, (2005) in their review, presented that sex is also presented as a risk factor for the disease and that its prevalence is higher in females. In this same work, other risk factors are presented as family history. In addition, other studies (Honig *et al.*, 2003; Mohajeri *et al.*, 2015) show that stroke, heart disease and hypertension are directly related to the risk of Alzheimer's disease. Interestingly, recent studies have shown that the onset of Alzheimer's disease is also related to Type 2 Diabetes Mellitus, and this risk factor can be reduced with control of serum glycemic levels (Luchsinger *et al.*, 2009; Ohara *et al.*, 2011). Therefore, nutrition presents itself as a good non-drug intervention in the fight against Alzheimer's disease.

### Clinical and nutritional manifestations characteristic of Alzheimer's disease

The first symptoms that appear in Alzheimer's disease are memory deficits, making the elderly more and more dependent and compromising the quality of life (Neto; Tamelini; Forlenza, 2005). Changes in language are also common, difficulties in forming sentences and completing thoughts, making it difficult for the bearer to communicate with relatives, caregivers and society (Carvalho Filho, 2006). Alzheimer's disease can affect the visual, olfactory and gustatory capacities (Tavares, Carvalho, 2012). These situations directly affect nutritional status, because over time, the elderly suffer from decreased food acceptance, swallowing, chewing, and especially with the loss of the notion of the

importance that nutrition exerts, increasing the nutritional risk with the progression of the disease and making nutritional therapy essential (Busnello, 2007).

### Nutrition and Alzheimer's Disease

The aging process is accompanied by physical changes capable of interfering with the nutritional status of the elderly, as they present a significant reduction of muscle mass, increase of the trunk, decrease of fat tissues present in the upper and lower limbs (Garcia *et al.*, 2007). In the literature, therefore, it is seen that diet is a precursor to aging and dementia, influencing mainly Alzheimer's disease (Hughes *et al.*, 2010; Shah, 2013; Cooper, 2014; Mohajeri, Troesch, Weber, 2015; Morris *et al.*, 2015). However, the inclusion of antioxidant nutrients in the diet of the elderly with Alzheimer's disease, may help protect against the evolution of the disease, since neurodegenerative diseases, specifically Alzheimer's Disease, may be related to increased oxidative stress (Mortiz, 2007). Evidence also shows that vitamins related to the metabolism of homocysteine, fats and alcohol influence the progression of Alzheimer's disease (Luchsinger, Mayeux, 2004; Correia *et al.*, 2015). Patients with Alzheimer's disease present significant weight loss, caused by the nutritional and physiological disorders of the organism (Gillette *et al.*, 2007). It is present in the early stages and even before diagnosis, and increases as the disease progresses (Belmin, 2007). Therefore, the inclusion of nutritional therapy in the elderly seems to be extremely important for prevention and also as protection against the development of Alzheimer's disease (Reming, 2008).

### Nutrition care with the elderly with Alzheimer's disease

Adequate nutritional therapy and the monitoring of the nutritional status of elderly patients with Alzheimer's disease can improve the patient's quality of life and even delay the progression of the disease (Reming, 2008). Elderly patients with Alzheimer's disease present a higher risk of protein-energy malnutrition and their levels of micronutrients and essential fatty acids may be compromised with disease progression (Mi *et al.*, 2013; Prince *et al.*, 2014). However, patients with dementia require a caloric increase due to some changes and agitation characteristic of the disease, but with the evolution, a change occurs in the alimentary habit, increasing the consumption of simple carbohydrates and decreasing the amount of proteins, due to the difficulty in chewing and deglutition that can affect these patients (Sampaio; Sabry, 2007). Therefore, when nutritional risk is detected, dietary techniques should be used, such as increasing the energy density of the diet, supplementing specific nutrients according to the needs of each individual, adjusting the volume of the diet, fractionating the food and also adjusting the consistency of the meal, and if necessary, use nutritional support (Machado *et al.*, 2009). Furthermore, patients with Alzheimer's disease present deficiencies of selenium, fiber, iron and B, C, K and E complex vitamins (Cardoso *et al.*, 2010, Shah, 2013; Prince *et al.*, 2014; Lopes *et al.*, 2014). Therefore, it is necessary to reach the daily doses according to the recommendations of these nutrients (Callone *et al.*, 2006; Correia *et al.*, 2015).

### Nutritional Recommendations for Micronutrients

#### Vitamin C

Vitamin C is essential for the formation of neurotransmitters, it has antioxidant function against oxidative stress. Patients with

Alzheimer's disease have low plasma levels of vitamin C, necessitating frequent attention in relation to concentrations (Harrison, 2012; Cooper, 2014; Mohajeri; Troesch; Weber, 2015). The recommended daily doses of vitamin C for men over 18 years old is 90mg / day and for women for the same age 75mg / day. The food sources are citrus fruits such as orange, lemon, tangerine and vegetables and leaves Such as cabbage, spinach and broccoli (Institute of Medicine, 2000).

### Vitamin E

Vitamin E is important for the functioning of neurons, also acting as antioxidants (Mohajeri; Troesch; Weber, 2015). The lack of this vitamin can cause neurological disorders and affect not only the physiology but also the brain functions (Mohajeri, Tröesch; Weber, 2015). Studies have shown that vitamin E intake, through diet, can act as a protector for Alzheimer's disease, because it is associated with a lower incidence of this pathology (Devore *et al.*, 2010; Shah, 2013; Barnard *et al.*, 2014). Daily vitamin E recommendations for men and women over 18 years of age are 15mg / day. It is present in vegetable oils, olive oil, sunflower seeds and oilseeds such as hazelnuts, almonds and nuts (Institute of medicine, 2000).

### Complex B Vitamins

It is observed that low levels of folic acid and vitamin B12 are related to the development of Alzheimer's disease, and low levels of vitamin B predict the cognitive alteration in elderly men (Mohajeri; Troesch; Weber, 2015). Other studies show that supplementation with B vitamins decreases the atrophy of specific areas of the brain affected by Alzheimer's disease (Douaud *et al.*, 2013; Mohajeri; Troesch; Weber, 2015). Therefore, the daily recommendations of vitamin Piridoxin B6 for men between 19 and 50 years of age are 1.3mg / day and 1.7mg / day for men over 50 years. Dosages for women between the ages of 19 and 50 are 1.3mg / day and 1.5mg / day for women over 50 years of age (Institute of Medicine, 2001). The recommended vitamin B12 is 2.4µg / day for men and women over 18 years. And folic acid is needed 400 µg / day to reach the recommended daily doses (Institute of Medicine, 2001). B vitamins are found in green leafy vegetables such as eggplant, beetroot and broccoli, in whole grains, legumes, citrus fruits, meats, fish, viscera, molluscs and egg yolks (Institute of Medicine, 2001).

### Vitamin D

Adequate intake of vitamin D is important for cognitive performance, and is related to areas of the brain responsible for the planning, processing and formation of new memories (Buell; Dawson-Hughes, 2008; Nimitphong; Holick, 2010; Annweiler *et al.*, 2012, Zhao *et al.*, 2013, Annweiler; Llewellyn; Beauchet, 2013; Mohajeri; Troesch; Weber, 2015). In Alzheimer's patients, it is important to monitor the levels and availability of this vitamin, as it is associated with other diseases such as osteoporosis, cardiovascular alterations, diabetes mellitus, and changes in the immune system (Zhao *et al.*, 2013). Daily intake of 15µg / day is recommended for men and women between 19 and 70 years and 20µg / day over 70 years (Institute of Medicine, 1997).

### Lipid Intake

Consumption of polyunsaturated fatty acids, especially omega-3s and low intakes of hydrogenated and saturated fat, may

reduce the risk of developing Alzheimer's disease (Huet *et al.*, 2006). The levels of decosahexanoic fatty acids decrease with advancing age, affecting cognitive ability, especially in the elderly and patients with Alzheimer's disease (Shatenstein; Kergoat; Reid, 2007; Muldoon *et al.*, 2010; Mohajeri; Troesch; Weber, 2015; Correia *et al.*, 2015). Since DHA participates in the formation of neuronal membranes and acts as a neuroprotector, the ingestion of eicosapentaenoic and decosahexanoic fatty acids improves synaptic function, optimizing brain function (Yurko-Mauro *et al.*, 2010; MI *et al.*, 2013; Raji *et al.*, 2014; Mohajeri; Troesch; Weber, 2015). Therefore, both prevention and intervention should ensure the consumption of recommended daily doses of 1.6g / day for men and for women 1.1g / day, both older than 18 years (Institute of Medicine, 2005).

### Neurotoxic Metal

#### Alumin

Attention should be paid to the levels of aluminum in the body, which when present in excess has a strong neurotoxic potential and is often found in the brains of people with Alzheimer's disease (Barnard *et al.*, 2014; Correia *et al.*, 2015). Studies have shown that the ingestion and environmental exposure of aluminum may lead to genetic alterations and mainly Alzheimer's disease (Frisardi *et al.*, 2010; Squitti *et al.*, 2014). In order to control exposure to this metal, the use of aluminum-containing cooking utensils, antacids, baking powder and products containing aluminum should be avoided (Barnard *et al.*, 2014; Correa *et al.*, 2015).

### Conclusion

Nutrition plays a key role in the prevention of Alzheimer's disease. Adopting a healthy dietary pattern rich in fruits and vegetables ensures the consumption of antioxidants, the low consumption of saturated fats and the higher consumption of unsaturated fats, the weekly consumption of fish, oilseeds and vegetable oils and the inclusion of cereals in the diet is related to the prevention of Alzheimer's disease. Considering the nutritional deficiencies of the elderly and especially the patient with Alzheimer's, supplementation and consumption of foods varied sources of vitamin A, C, D, E, K, folic acid, complex B, selenium, omega 3, it is extremely necessary to ensure the recommended daily doses, and levels should be monitored and corrected whenever necessary to improve the quality of life of the elderly with Alzheimer's disease.

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