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Alternative Approaches in the Prevention of Alzheimer's Disease

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Abstract

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Alzheimer's disease (AD) is currently the most common incurable forms of dementia. The number of people affected by this disease is expected to grow rapidly in the next decades due to the present demographic changes. Since the pharmacological treatment of AD is quite costly, researchers try to look for alternative treatments for patients suffering from AD. The purpose of this article is to explore the non-pharmacological preventive intervention strategies which can help healthy elderly individuals to delay the development of AD and in this way enable them to stay independent on the assistance of other people. Firstly, a method of literature review analyzing the data contained in the world's prestigious scientific databases: PubMed, Web of Science, Springer, and Scopus, in the period of 1990 – 2015 is used. Secondly, a method of comparison of different research studies examining preventive, non-invasive, intervention strategies in lowering the risk of cognitive decline is applied.

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Keywords: Alzheimer's disease; alternative treatments; physical activities; cognitive training; Mediterranean diet.

1. Introduction

Alzheimer's disease (AD) is one of the most common forms of dementia, the so-called aging diseases. Nowadays, it accounts for 60-80% of all dementia cases (Alzheimers Association, 2014). Although AD starts to affect people usually at the age of 65, by the age of 85, 50% of people are affected (Anand, Gill, & Mahdi, 2014). At present, approximately 34 million people suffer from AD and by 2015 this number should triple (Langa, 2015).

AD is a degenerative disease of the brain. It harms the brain and especially cognitive functions. The main symptoms of this disease include progressive memory loss, searching for the right words,



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inability to solve everyday issues, disorientation, speech disorders, and change of personality, which is manifested through aggravation, anxiety, violence, ignorance or bad judgement (Klimova, Maresova, Valis, Hort, & Kuca, 2015). At the beginning patients suffer from the short-memory loss, a lack of decision-making abilities; they can forget and conduct simple tasks. In the advanced stages they lose their memory, speech and have behavioral problems (Garcez, Falchetti, Mina, & Budni, 2015). Generally, AD is divided into three stages according to the specific symptoms of this disease. These phases include preclinical Alzheimer's disease, mild cognitive impairment (MCI) due to AD and dementia due to AD. This third stage is the worst since it severely affects not only the patients themselves, but also imposes a considerable economic and psychological burden on their caregivers. This phase eventually results in patient's death (Klimova, & Kuca, 2015).

The exact causes of AD are still not known. But the scientists are aware that there is a huge loss of neuron cells in the brain, particularly in the areas controlling memory and thinking. AD is characterized by the accumulation of beta amyloid ($A\beta$) and hyperphosphorylated tau, senile plaques and neurofibrillary tangles (Amemori et al., 2015; Sindi, Mangialasche, & Kivipelto, 2015). In addition, patients with AD suffer from oxidative stress, increased homocysteine and mitochondrial and vascular disruption and synaptic loss. Particularly the synaptic loss is closely connected with cognitive decline (Terry, 2000).

The purpose of this article is to explore the non-pharmacological preventive intervention strategies which can help people already in the preclinical period of AD to lower the risk of cognitive decline and in this way enable them to stay independent on the assistance of other people and constantly attempt to improve quality of their life even in the older age.

2. Methods

The methods of this review study included a method of literature review analyzing the data contained in the world's prestigious scientific databases: PubMed, Web of Science, Springer, Scopus, in the period of 1990 – 2015. The analysis concentrated on the occurrence of the key words: *Alzheimer's disease and preventive strategies*; *Alzheimer's disease and non-invasive strategies*; *Alzheimer's disease and physical activities*; *Alzheimer's disease and cognitive training*; *Alzheimer's disease and Mediterranean diet*. The research studies were classified according to their relevancy.

The author researched these studies, however, in the first case most of them were connected with pharmacological treatment and in the second case, they were associated with non-invasive diagnostic tools.

3. Alternative Approaches in the prevention of AD

At present there is no cure for AD. Nevertheless, there are treatment and lifestyle options which can delay the onset and development of this disease. These include both pharmacological and non-pharmacological therapies. However, the pharmacological treatment is quite costly and the drugs administered for AD are just few. In fact, there are only four clinically approved drugs (Klimova, Maresova, Valis, Hort, & Kuca, 2015). Therefore the non-pharmacological therapies seem to be a promising alternative option for the prevention of this disease. Out of these non-invasive therapies the

physical activities appear to have quite a positive effect in this respect since the factors such as obesity, appropriate eating habits focused on the use of low cholesterol food, or use of alcohol are then usually reduced, too. In addition, physical activities have a very positive impact on removing the neuropsychiatric symptoms such as depression or apathy. The reason is that elderly people tend to have a slower cerebral blood flow and metabolism which might even decrease with the start of AD. And physical activity can in fact contribute to the increase of vascularization and energy metabolism and thus lower occurrence of AD and maintain cognitive functions. This is particularly true for intense physical activities which can raise vascular endothelial growth factor in the brain of younger people (Li et al., 2011). In addition, Radaka et al. (2013) state that physical activities can improve the resistance against oxidative stress, help to renew from it and maintain cognitive competences.

Several large clinical studies (Buchman et al., 2012; Lautenschlager et al., 2008; or Verdelho et al., 2012) have been conducted to discover the effect of physical activities/exercises with respect to the delay of the development of dementia, respectively AD. All of them have brought positive effects. Furthermore, Karceski (2012) shows that the risk of the development of AD is twice as higher with inactive people than with those who perform daily physical activities. Ontario study (Ontario Brain Institute, 2014), for example, adds that older people free of AD may decrease the risk of the development of this disease by 40% provided they do regular physical activities. Research also indicates that the most effective physical activity seems to be aerobics (Paillard, 2015) because aerobics can stimulate and sustain the sensorimotor net. This has been also confirmed by the experts of the International Conference on Nutrition and the Brain in Washington in 2013 (Barnard et al., 2014). However, all these physical activities should be performed intensively at least three times a week in order to have a conclusive and effective impact on people's state of health (Paillard, Rolland, & de Sonto Barreto, 2015).

In addition, to delay the risk of cognitive decline in AD, people should be involved in the training of their cognitive competences, which consists of mental activities such as solving crosswords, playing board games, learning a new language, or memorizing short lists. For example, Verghese et al. (2003) in their study state that if people do crossword puzzles four times a week, they can lower the risk of dementia by 47% compared to the people who do it only once a week. It has been also proved that people who try to study another foreign language have a lower risk of development of AD (Bialystok et al., 2012; Craik et al., 2010).

A number of research studies (Frisardi et al., 2010; Tagney, 2014; Willet et al., 1995) also emphasize the importance of the Mediterranean diet in the prevention and delay of AD. The reason is that the Mediterranean diet is relatively inexpensive, free of negative side effects and with more persuasive epidemiological outcomes (Thaipisuttikul, & Galvin, 2012). Moreover, it is rich in such nutrients as fruit, vegetables, fish, nuts, whole grains, and olive oil, and all these products are fresh. In addition, a moderate consumption of red wine, modest portions of poultry, dairy products and red meat are also recommended.

4. Discussion

As the information provided in Section 3 shows, the non-pharmacological therapies can be a good supporting intervention in people's lifestyle with the purpose to keep them physically, mentally and economically independent as long as possible, and thus, constantly maintaining their quality of life even in older age. In addition, such interventions have also a positive impact on caregivers' mental and physical burden (Maresova, Klimova, & Kuca, 2015).

Recently, other non-invasive therapies such as music therapy (Balbag, Pedersen, & Gatz, 2015) or multi-nutrient intervention in form of medical foods (Van Wijk et al., 2014; Weiqian, van Wijk, Cansev, Sibjen, & Kamphuis, 2013) can be good protective factors against the development of AD.

Table 1 below demonstrates the key benefits and limitations of these therapies in the prevention of AD.

Table 1. An overview of the key benefits and limitation in the prevention and delay of AD

Benefits	Limitations
<ul style="list-style-type: none"> • non-invasive, well tolerated; • none or fewer side effects; • more non-pharmacological therapies are emerging; • social inclusion; • lower costs of treatment, institutionalization, care; • positive outcomes of clinical studies; • ecological approach. 	<ul style="list-style-type: none"> • short-term effect of clinical studies; • a lack of randomized clinical research; • a lack of overall research on alternative treatment therapies.

Source: Author's own processing.

5. Conclusion

The findings of this article indicate that the non-pharmacological therapies play an important role in people's lifestyles, however, they should consistently and intensively perform them from their early life so that they could be effective enough on their physical and mental state in their later life. The positive aspect of these activities such as physical exercises, cognitive training or the Mediterranean is also the fact that people can continue in them even in the older age. Moreover, it has been proved that following a healthy lifestyle might directly protect against the development of AD and other disease connected with AD, for instance, vascular disease and diabetes (Pope, Shue, & Beck, 2003).

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