

The Risk and The Prevention of Alzheimer's Disease and Its Challenges Within These Thirty Years

Chenyu Wei*

Program of public health, University of California, Irvine, Irvine, CA, United State

* Corresponding author: cwei14@uci.edu

Abstract. At present, much more elderly suffer from Alzheimer's disease (AD), and this disease even occurs commonly in young people. Therefore, understanding the challenges of AD and finding ways to prevent and control this disease might be a significant event globally. Researchers found the factors of this disease include lifestyle, genes, environment and aging by conducting a series of experiments and observations. AD also brings many effects to people, psychological and physical. The data showed that the number of people with AD will increase in the future, so finding a way to control and cure this disease is a high priority for people.

Keywords: Alzheimer's Disease, Prevention, Intervention, Treatment.

1. Introduction

Alzheimer's disease (AD) is a brain disease common in the elderly. The symptoms of this disease include memory loss, inability to speak and write, emotion out of control, etc. In the most severe cases, the patients are entirely unable to take care of themselves and gradually lose their bodily functions, which might lead to death. According to research about AD, 47 million people had Alzheimer's disease in 2015, which would increase to 130 million in 2050 globally [1]. Although the elderly are the main population suffering from AD, more and more young people also suffer from this disease in the 21 century. The Alzheimer's disease that occurs in people between the ages of 30 and 64 is called early-onset Alzheimer's disease, and for this early onset, researchers have performed a meta-analysis in which they concluded that as many as 3.9 million cases of early-onset Alzheimer's disease had occurred worldwide by 2021 [2]. Based on the UK Daily Telegraph, the youngest patient who suffered from AD is Becky Barletta, only 31 years old [3]. It undoubtedly alarmed people to pay more attention to this disease. By comparing some data, it was found that Finland has become the country where people have the highest rate of getting AD, and in the U.S, AD is the sixth leading cause of death [4]. Besides, in China, the number of people with Alzheimer's disease rose from 7 to 66 per 1,000 people from 2007 to 2017 [5]. Within these thirty years, the globe has been facing this challenge. There is still no drug that can completely control the disease. People can only slow down the deterioration of the disease through some effective drugs and interventions for prolonging the disease's progression, but there are some drawbacks. Therefore, this study will look at the causes, influences, interventions and challenges to explore more probable solutions and directions of AD so that the discussion can provide a reference for the prevention and control of AD in the future.

2. The risk factor for Alzheimer's disease

2.1. Aging

Aging is a critical factor that increases the risk of getting Alzheimer's. Due to the weakening of physiological functions, atrophy of brain function can occur. The researchers experimented on the correlation between Glia and AD by observing two cases (38 and 68 years old) [6]. Glial cells are an essential part of the brain, but there is also a cell called Microglia, which negatively affects people. Because of aging, some Microglia can form more in the brain of older people. This Microglia can form Amyloid plaques and lead to AD. Based on the result of this experiment, researchers found that

this type of Glial cell can create a pro-inflammatory environment, which leads to accelerated deterioration of AD.

In addition, patients who suffer from chronic diseases have a higher probability of getting AD because of the metabolism slowing down. Nevertheless, like chronic disease patients, the metabolism of the elderly slows down due to aging, and their ability to metabolize sugar becomes weaker than before. At this time, there is a risk of metabolizing too much glucose instead of energy. Expert studies have shown that lower glucose intake and metabolism increase the risk of AD because of the decreased glucose uptake by the brain in older adults [7]. Of course, aging in the elderly affects not just some bodily functions but all aspects of the body, which explains why the elderly are more likely to suffer from AD.

2.2. Lifestyle

With the increasing frequency of AD in recent years, it has been found that it is affected by physiological reasons, but more so by lifestyle habits.

2.2.1 Smoking and Drinking

With the fierce competition happening in society, people would suffer from anxiety and depression. People will reduce their stress through outside influences, including smoking and drinking. However, smoking and drinking bring adverse effects on people getting AD. The researchers in Chongqing, China, experimented with the relationship between drinking or smoking with AD for seven years which a sample is 3170 men [8]. They are divided into several groups, and several test methods conduct in the experiment. According to the result of the experiment, drinking and smoking have a positive correlation for AD. Men who smoke have a higher risk of getting AD than men who do not smoke. Besides, men who seldom drink would have a lower risk of AD than men who often drink [8]. This experiment explains one of the causes of AD: smoking and drinking.

2.2.2 Stay up late

Staying up late is also a significant cause of AD. The primary manifestation of staying up late is to exceed one's biological clock for a long time or to stay up all night. This behaviour is typical in people's lives, especially after the popularity of electronic products. People will spend time in the evening to play cell phones and watching TV. Dr. Séverine Sabia of the University of London led a team that studied the relationship between sleep and AD in people aged 50 and older and found that those who slept less than six hours a day were 30 percent more likely to have AD than those who slept seven hours or more [9]. Based on the article written by Dr. Andrew E. Budson, a professor at Harvard Medical School, What links the two is a protein called Beta-Amyloid, a protein that accumulates and causes Alzheimer's plaques. This protein is secreted during the day and is washed away by brain cells at night when people sleep. Nevertheless, if a long time does not sleep or does not get enough sleep, this protein accumulates and leads to AD [10]. This data demonstrates that staying up late and the risk of AD have a close relationship.

2.2.3 Unhealthy diet

Diet is one of the most critical factors in regulating AD. An unhealthy diet and unbalanced eating habits can increase the development of AD. Nowadays, many people only like fish and meat or junk food and ignore nutritional balance. At the same time, some people will eat only a single kind of food or an excessive amount of food that they think is healthy, such as fish oil. However, this is not reasonable. In 2009, there was a research published about fish and AD. The researchers spent nearly ten years observing people who consistently ate fish or omega and People who did not. After ten years, researchers conclude that there is no relationship between AD and omega or fish [11]. Many people consider that eating lots of fish is good for memory or that reducing the risk of getting AD is not the right idea. A balanced diet must be the better choice. More importantly, junk food or high-calorie food negatively affects this disease. A team of researchers at USC conducted an experiment using mice divided into two groups and fed food with different levels of fat and sugar. The results

showed that the mice in that group with higher levels of fat and sugar had more protein plaques in their brains that are associated with AD [12]. Therefore, diet might be one of the risk factors for AD.

2.3. Environment

According to research, people found a correlation between a specific environment and having AD. One of the genes called APOE4 is one of the main elements that cause AD, and this gene can be formed due to long-term environmental pollution, including metals and air pollution [13]. Second, a single environment may increase the risk of having Alzheimer's disease. Researchers conducted experiments on the effects of the environment on AD through AD models and mice. The experiment results showed that a rich environment resulted in less cognitive impairment in the mice. The rich environment here could also represent the environment in which people live. If there is no other place in life except home, it may increase people's probability of suffering from AD [14].

3. Influences

3.1. Physical

AD can have several adverse physical effects on people, and people in the early stages can begin to experience memory loss and start to experience cognitive changes. They begin not to remember things, may forget where they are, and slowly begin to forget the people around them [15]. In the middle stage, patients may have mobility problems [15], they may have difficulty doing things by themselves, including bathing or dressing, and they may have bladder or bowel problems that cause them to go to the bathroom frequently [16]. Their immune system would get worse and worse [16]. More importantly. The biggest overcome to this disease is that patients would eventually lose any ability, including eating, breathing or walking [15]. They can only stay in bed anytime and depend on others to care for them until death.

3.2. Psychological

For the psychological aspect, patients at the early stage would become anxious. They are unwilling to accept this truth and might be irritable [15]. As it worsens, the psychological impact on the patient increases. From anxiety and agitation at the beginning, they slowly possess more frustration, depression, and possibly uncontrollable tears [15]. Some patients may even experience fantasies where they feel they have done this or heard something that did not happen. Psychological disadvantages of AD also contain insomnia, self-doubt, and neurosis. This disorder would make patients seem to be bigoted.

4. Current prevention or intervention and future expectations

4.1. Medication

Many disorders can be controlled with medications, and many treatments for Alzheimer's disease have been geared toward the globe in recent years. Aducanumab is one of the FDA-approved drugs for Alzheimer's [17]. This drug aids in the reduction of Amyloid deposits in the brain. Galantamine, Rivastigmine, and Donepezil are effective in lowering the symptoms of cognitive impairments and memory loss in people with mild to moderate Alzheimer's disease. Acetylcholine, a substance found in these three inhibitors, is essential for brain and memory function. Doctors would also provide Donepezil, Carboplatin patch, and Memantine to patients with more severe AD to help them cope with the symptoms of losing abilities.

Although these medications are beneficial for Alzheimer's disease, they are not used to treat the condition; rather, they are used to slow it down. Patients are also subjected to several negative effects as a result of these medications. Aducanumab, for example, would let people accumulate fluid or get a brain hemorrhage [17]. Other drugs, such as Memantine and Rivastigmine, cause dizziness,

vomiting, and diarrhea. Although the severity of these side effects varies from person to person, it would be a major "disaster" for elderly individuals who have less resilience.

4.2. Prevention

4.2.1 Keep a healthy lifestyle

Looking for the causes of getting AD suggests that a healthy lifestyle is essential for people to prevent AD. Smoking, staying up late, being obese, or drinking alcohol can all increase the prevalence of AD. Therefore, anyone needs to reduce these behaviours and maintain a healthier lifestyle. First, maintain a balanced diet, as Dr Marshall's research at Harvard University has shown that the risk of AD can be reduced through a Mediterranean diet [18]. Furthermore, a study on the relationship between the Mediterranean diet and AD showed that a healthier diet moderated the association between A β 42/40, pTau181, and brain atrophy.

Secondly, having a good night's sleep and reducing late nights will reduce the risk of AD for the general population, while for those who already have AD, it will help them prolong the progression of the disease. Experts such as Dr. Andrew SP Lim and Dr. Lei Yu have studied the effects of sleep on AD and have concluded that ApoE, a genetic material, is associated with a risk of developing AD. The study results showed that adequate sleep significantly attenuated the negative effect on the risk of AD [19].

Exercise, such as yoga, aerobics, and walking, can help people avoid disease in addition to sleep. The brain cell may be enlarged and activated by increasing blood flow. Furthermore, a large body of evidence suggests that exercise can help people avoid or delay the onset of Alzheimer's disease, regardless of whether they are healthy or have the condition. Sharon M, a clinical psychologist, encouraged her students to explore Alzheimer's disease and exercise [20]. The findings of this study, which included a dozen exercise sessions and community activities for 24 people with early Alzheimer's disease between the ages of 54 and 88, revealed that the majority of the patients restored to or even exceeded their previous health levels. Overall, both physical and mental health have improved.

4.2.2 Cognitive therapy

Mental health, in addition to physical therapies, is critical for avoiding and controlling this condition. Music therapy, for example, has been a popular psychotherapy in recent years, having a substantial impact on a variety of psychiatric illnesses. This treatment was given to Alzheimer's sufferers for six weeks in an experiment [21]. In this study, researchers discovered that music had a substantial impact on anxiety and despair, especially when the music matched personal tastes. This study's participants had better language and a steadier mood. Both the patients and their families benefited greatly from this treatment. There are many more therapies available besides this one, and these psychological therapies are also effective in helping patients maintain a positive mental state and emotions.

4.3. Expectations

Despite the fact that there are several techniques to improve AD, there is no treatment that can manage the condition. There is currently no treatment that can cure Alzheimer's disease, thus further research is needed in the future. The previous study has shown that Amyloid buildup is a real cause of Alzheimer's disease, and that Amyloid should be explored while researching and creating medications.

Furthermore, Alzheimer's sufferers require greater affirmation and psychological support and confirm as much of their value as feasible. Some minimally sick people, for example, maybe placed in restaurants, where they would be able to recognize their worth and raise their consciousness while working. Restaurants of this type have been established in China, Japan, and other countries. Meditation is another more effective technique for patients to experience greater validation and self-worth, although it is rarely emphasized.

Nonetheless, it must be stated that it would be beneficial in the treatment of mental illnesses. Patients with mild to moderate Alzheimer's disease are prone to anxiety and despair, and mental health issues might increase the risk of developing the disease. Patients can breathe out their anxiousness while meditating. Patients may feel lonely and worthless at times, but during meditation, they might sense the warmth and confirmation of comments like "my family loves me" and "I am valued." Community groups should promote this strategy to families who have Alzheimer's patients. These sorts of specialized seminars for Alzheimer's patients should be held to guide them via meditation.

5. Conclusion

The analysis and description of Alzheimer's disease show many effects and prevention of this disease and reveal the outlook for future development. People may not pay much attention to this disease now, but if they do not pay any more attention, more and more people may step into this trap. In the future, the globe must spend much money on researching an effective medicine for AD and develop more targeted treatments for intervention. Lastly, people should prevent the disease from their daily life such as eating a balanced diet, doing exercise, getting enough sleep and reduce smoking or drinking.

References

- [1] RAHMAN M R, TAJMIM A, ALI M, et al. Overview and current status of Alzheimer's disease in Bangladesh [J]. *Journal of Alzheimer's Disease Reports*, 2017, 1(1): 27–42.
- [2] Estimates of young-onset dementia prevalence just doubled [EB/OL]. ALZFORUM, [2022-04-07]. <https://www.alzforum.org/news/research-news/estimates-young-onset-dementia-prevalence-just-doubled>.
- [3] PATEL A. Family struggles with 32-year-old's dementia diagnosis: 'there is not much of becky left' - national [EB/OL]. Global News, Global News, 2017-09-06. [2022-04-25]. <https://globalnews.ca/news/3721224/woman-diagnosed-dementia-31/>.
- [4] HILLIS K. Alzheimer's statistics – United States & Worldwide stats [EB/OL]. BrainTest, 2018-06-21. [2022-04-25]. <https://braintest.com/alzheimers-statistics-throughout-the-united-states-and-worldwide/>.
- [5] LI K, WEI S, LIU Z, et al. The prevalence of alzheimer's disease in China: A systematic review and meta-analysis [EB/OL]. *Iranian journal of public health, Tehran University of Medical Sciences*, 2018-11. [2022-04-25]. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6294855/>.
- [6] Xia X, Jiang Q, McDermott J, et al. Aging and Alzheimer's disease: Comparison and associations from molecular to system level [J]. *Aging Cell*. 2018;17(5): e12802.
- [7] YIN F, SANCHETI H, PATIL I, et al. Energy metabolism and inflammation in brain aging and alzheimer's disease [J]. *Free Radical Biology and Medicine*, 2016, 100: 108–122.
- [8] ZHOU S, ZHOU R, ZHONG T, et al. Association of smoking and alcohol drinking with dementia risk among elderly men in China [J]. *Current Alzheimer Research*, 2014, 11(999): 1–1.
- [9] Lack of sleep in middle age may increase dementia risk [EB/OL]. National Institutes of Health, U.S. Department of Health and Human Services, 2021-05-04. [2022-04-10]. <https://www.nih.gov/news-events/nih-research-matters/lack-sleep-middle-age-may-increase-dementia-risk>.
- [10] ANDREW E, BUDSON M D. Sleep well - and reduce your risk of dementia and death [EB/OL]. Harvard Health, 2021-05-03. [2022-04-13]. <https://www.health.harvard.edu/blog/sleep-well-and-reduce-your-risk-of-dementia-and-death-2021050322508>.
- [11] DEVORE E E, GRODSTEIN F, VAN ROOIJ F J A, et al. Dietary intake of fish and omega-3 fatty acids in relation to long-term dementia risk [J]. *The American Journal of Clinical Nutrition*, 2009, 90(1): 170–176.
- [12] Does an unhealthy diet put you at risk of alzheimer's disease? [EB/OL]. Terra Vista of Oakbrook Terrace, 2021-12-10. [2022-04-14]. <https://www.terravista.org/risk-alzheimers-increases-unhealthy-lifestyle/>.

- [13] WLASSOFF V. Environmental factors in development of alzheimer's disease [EB/OL]. Brain Blogger Environmental Factors in Development of Alzheimers Disease Comments, [2022-04-14]. <http://www.brainblogger.com/2017/09/15/environmental-factors-in-development-of-alzheimers-disease/>.
- [14] NAKANO M, KUBOTA K, HASHIZUME S, et al. An enriched environment prevents cognitive impairment in an alzheimer's disease model by enhancing the secretion of exosomal microrna-146a from the choroid plexus [J]. Brain, Behavior, & Immunity - Health, 2020, 9: 100149.
- [15] What are the signs of alzheimer's disease? [EB/OL]. National Institute on Aging, U.S. Department of Health and Human Services [2022-04-16]. <https://www.nia.nih.gov/health/what-are-signs-alzheimers-disease>.
- [16] HIGUERA V, Alzheimer's disease complications: Physical and mental [EB/OL]. Healthline, Healthline Media, 2017-08-04. [2022-04-16]. <https://www.healthline.com/health/alzheimers-disease-complications>.
- [17] How is alzheimer's disease treated? [EB/OL]. National Institute on Aging, U.S. Department of Health and Human Services [2022-04-20]. <https://www.nia.nih.gov/health/how-alzheimers-disease-treated>.
- [18] What can you do to avoid alzheimer's disease? [EB/OL]. Harvard Health, 2019-07-31. [2022-04-22]. <https://www.health.harvard.edu/alzheimers-and-dementia/what-can-you-do-to-avoid-alzheimers-disease>.
- [19] ANDREW S P, LIM M D. Sleep effect on apolipoprotein e ϵ 4 allele [EB/OL]. JAMA Neurology, JAMA Network, 2013-12-01. [2022-04-22]. <https://jamanetwork.com/journals/jamaneurology/fullarticle/1757018>.
- [20] ARKIN S M. Student-led exercise sessions yield significant fitness gains for alzheimer's patients [J]. American Journal of Alzheimer's Disease & Other Dementias, 2003, 18(3): 159–170.
- [21] GÓMEZ GALLEGU M, GÓMEZ GARCÍA J. Music therapy and alzheimer's disease: Cognitive, psychological, and behavioural effects [J]. Neurología (English Edition), 2017, 32(5): 300–308.