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COMMENTARY

# The Effects of Alzheimer's Disease: Gender, Race, & Ethnicity

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## Introduction

Alzheimer's is the most common form of dementia, a term which stems from Latin that refers to, "a state out of mind" [1]. Dementia has been around since ancient times and has been routinely classified as a condition of old age. Individuals with dementia were often seen in an almost age reversing process, as their mental state diminished to an infant-like level. As more studies of dementia have progressed, questions have been raised over whether or not the condition is truly age-bound.

## Alzheimer's Disease (AD)

Dementia is the term used for diseases that impair cognitive abilities. Alzheimer's is a form of dementia and is the sixth leading cause of death in the US. This brain disorder can occur in two age groups; there are those that experience early onset between their 30's to 60's and others experience onset between the mid 60's to late 80's [2]. A major indicator of Alzheimer's is Mild Cognitive Impairment (MCI), an early stage of memory loss. Not everyone with this diagnosis develops Alzheimer's, but it is a common indicator. Neurological mechanisms are affected when you have AD and, unfortunately, the damage is widespread. Neurons stop functioning and lose connection with other neurons and eventually die. Over time, individuals with AD slowly lose their ability to function independently due to lack of brain cell communication.

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## Disease Progression & Effects of AD on Patients

The brains of individuals with AD show signs of moderate atrophy of the limbic lobe structure which affects consciousness and emotional state. The lobe is responsible for communication to other parts of the brain and for fight or flight responses. Thus, when the lobe is atrophied, the loss of cells causes impairment of individuals and sporadic behaviors [3]. Taking Alzheimer's disease's neuropathology as an example, memory loss is one of the first symptoms that patients with Alzheimer's disease report. Working memory, long-term memory, and declarative memory are all impacted in the early stages of the disease.

Alzheimer's progresses gradually depending on the level of severity the individual encounters. Diagnosis of Alzheimer's is difficult, and because there is no cure, treating the disease is difficult. People who develop AD become disoriented, confused, unable to tell time, recognize people, or recall recent events.

Individuals with AD lose brain function gradually and forget how to perform tasks that require the use of cognitive skills. This includes reading, writing, speaking, and understanding. As to why AD patients start to lose these skills, the NIH has stated that "Alzheimer's disease causes brain cells to die, so the brain works less well over time. This changes how a person acts" [4]. Aggression is one of the most common behaviors exhibited in individuals. Wandering, paranoia, confusion, and hallucinations are also common developments [5]. As the disease progresses, these behavioral changes will also begin to amplify within the individual. The rate at which the individual is lucid (aware) also becomes less frequent and conditions tend to worsen with time.

AD has an impact not just on the individual but also on the people around them. Family members must deal with work-related stress, such as the need to change their schedule because they are caring for a loved one.
According to a recent study, 57% of caregivers had to work late, leave early, or take time off; 16% had to miss work, 18% had to switch from full-time to part-time employment. In another study, 9% had to quit their job completely, and 6% had to retire early [6]. As a result, family members stop caring for their loved ones, which leads to individuals with AD being placed in long-term care facilities, or causing AD to progress into severe stages at faster rates because there is no available caretaker.

## Alzheimer's in America: Race & Ethnicity

The occurrence of AD in people aged 65 or older is about 1 in 10. However, minorities tend to develop AD at an alarming rate. Race and ethnicity are vast risk factors for developing AD. The CDC states in preceding order that, "... African Americans (13.8 %), followed by Hispanics (12.2 %) ..." are more prone to developing AD. The CDC even stated that, "By 2060…there will be [an estimated] 3.2 million Hispanics and 2.2 million African Americans with AD" [7]. Factors that may be contributing to this disparity are high blood pressure and diabetes which are more prevalent in these communities. Both conditions contribute to a greater prevalence of AD because blood vessels in the brain are more susceptible to damage due to hypertension [8]. Data has also shown that blacks are about two times more likely than whites to have AD, while Hispanics are about 1.5 times more likely. Black individuals are also more likely to experience delusions, hallucinations, aggression, and irritability, in comparison to other race groups.

## Gender Prevalence

Although both men and women are able to develop AD, women have been proven to be more susceptible. Of the 6 million people in the U.S. with AD, women make up more than half of this number. Studies have given some explanation to this issue, expressing results that support women being at much greater risk. This may be because women live longer than men. Additionally, according to Harvard Health Publishing, "…women are twice as likely to have an autoimmune disease compared to men." [9] On the other hand, men begin exhibiting signs of lucidity before women. In essence, women are slower to show the side effects of AD, like mental decline, compared to men. They have appeared to surpass males when conducting memory tests in the first stages of Alzheimer's [10]. However, this does in fact change as amyloid plaque, proteins which form in the creases of nerve cells, increases in females, unfortunately, so does lucidity; meaning that the disease grows exponentially faster in later stages of AD in women [11].

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## Diagnosis

There is no way to know if an individual truly has AD. The only accurate way to diagnose an individual is post-mortem during autopsy. If an individual is diagnosed with Alzheimer's (based on symptoms and factors), the development of AD to death ranges 4-20 years [12].

## Treatment

There is no cure for Alzheimer's disease but there are ways to slow the progression. Medications are provided to people who are suffering from Alzheimer's, including Cholinesterase inhibitors and Memantine (Namenda) which have both been approved by the FDA. According to Mayo Clinic "...Cholinesterase inhibitors boost the amount of acetylcholine available to nerve cells by preventing its [nerve cells] breakdown in the brain" [13]. This medication can slow the progression but it can't cure AD nor stop the total destruction of nerve cells. A reported problem with this medication is loss of effectiveness over time. This is because as the disease progresses, the brain will produce less acetylcholine, a neurotransmitter of the parasympathetic nervous system that plays a role in memory, learning, and neuroplasticity. The side effects consist of nausea, vomiting, and diarrhea but can be combated by taking the medication with food or receiving treatment in low doses. On the other hand, Memantine is used when the individual is in the late, severe stages of AD. The medication is used for people who are older because the drug regulates glutamate, "a messenger protein widely involved in brain functions including learning and memory" [14]. Memantine is an effective medication as it is said to improve memory; however, side effects include body aches, dizziness, constipation and headaches.

## Research & New Findings

The current understanding of Alzheimer's Disease is limited, and there is no early diagnosis or therapy currently available. Nonetheless, it is agreed that the causes for AD include increasing age, genetics, head injury, vascular disease, infections, and environmental conditions (exposure to heavy metals, trace metals, etc.).

Through the past few years, the understanding of the disease has significantly advanced (diagnosis, prevention, and treatment). But despite the significant progress that has been made, the cause of pathological changes in AD is still unknown. Despite no official theory being confirmed, scientists suggest that an impairment in the cholinergic function is a major risk factor for Alzheimer's disease [15]. Cholinergic medications are a category of pharmaceutical agents that act upon the neurotransmitter acetylcholine, the primary neurotransmitter within the parasympathetic nervous system (PNS). Others believe that an alteration in amyloid B-protein production and processing is the main initiating cause of Alzheimer's disease [16]. This is due to the fact that Amyloid-B peptide is a major component of senile plaques that commonly form in brains affected by AD.

Because of the unknowns affiliated with AD, the number of clinical trials has increased over the last few years. Of these clinical trials, stem cell therapy has been used as a disease-modifying treatment for AD. The number of studies on stem cells increased after the failure to create new drugs for Alzheimer's [17]. Another clinical trial involves drug treatment of AD, and suggests that the pathological changes associated with Alzheimer's begin 2-3 decades before the first symptoms of Alzheimer's appear. Based on data derived from the trials, it has been concluded that pharmacological therapy could benefit individuals in the pre-clinical stage of Alzheimer's (before the disease is diagnosed [18].

In another study, researchers have proposed that Herpes Simplex Virus (HSV-1) can be a risk factor for the development of AD. Studies conducted on mice infected with the HSV-1 have shown neurological degeneration and memory loss that is commonly affiliated with AD. In short, the study suggests that AD may have a viral origin. The study has ultimately raised hopes for a potential HSV-1 vaccine that could in turn diminish the rate at which AD is developed among the general population [19].

## Conclusion & Discussion

It is generally assumed that Alzheimer's is a disease of age, but it has been learned that AD can begin as early as 30 years old [2]. However, research conducted on early-onset AD is limited as the total case makeup is not vast. In studying Alzheimer's, it has been found that the disease causes brain deterioration that results in severe diminishment. Research did not discuss fully, however, the extent of damage that occurs in individuals with AD, nor the fact that deterioration of memory and changes in behavior are typically uneven and untimely. This is

likely due to the fact that the disease progresses in different ages among affected individuals, and that bodily functions (brain mechanisms) can be influenced by many factors (education, environment, etc.).

Additionally, it was found that the disease affects women more than men. This also extends to Hispanic and African American minorities. In relation to women, AD likely develops more frequently because of high life expectancy. Moreover, Hispanic and African Americans are more likely to develop AD due to predisposition to diabetes and high blood pressure. This insight has raised questions in relation to women and the rate of Alzheimer's. It is known that during pregnancy, women are likely to develop gestational diabetes due to hormonal imbalances [20]. This in turn causes high blood pressure which is a catalyst in the development of AD. Women are also susceptible to hormonal imbalances which may account for deficiencies that can lead to brain dysfunction.

Currently there is no cure for AD, but there are medications that help with memory loss and disease progression. It was found that pharmaceutical treatments may help in the prevention of AD [18]. Additionally, studies have found that AD may be linked to HSV-1 (Herpes Simplex Virus) [19]. These findings have been backed by clinical trials and immunology of viruses in relation to cancer and other diseases. Although AD does not root from one specific cause, it is anticipated that the future of treatment for the disease moves in this direction for future disease prevention. There is not one singular way to eradicate this disease in the general population, but it should be noted that education, both of individuals and the disease itself, can help decrease the occurrence of AD.

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