

Alzheimer's Disease

1. Summary of Disorder

We may all experience forgetfulness from time to time but as we age, we may increasingly have more memory loss and lapses in attention, however, distinct cognitive impairments over the age of 65 may be a sign of Alzheimer's Disease. Alzheimer's disease is the most common cause of cognitive impairments in the elderly population 65 years of age or older. An estimated 5.8 million Americans have Alzheimer's disease and it is the sixth leading cause of death in the United States estimated to triple by the year 2050 (Alzheimer's Association, 2019). Research indicates that between the years 2000 and 2017, Alzheimer's disease increased by 145% yet all other major causes of death (stroke, heart disease, prostate cancer, breast cancer) decreased (Alzheimer's Association, 2019). One of the possible theories is due to the aging baby boomer's population along with genetic inheritance, environmental and lifestyle factors (Alzheimer's Association, 2019).

1.1 Symptoms

Although the symptomology of Alzheimer's unfolds in the geriatric years, research indicates that a person most likely has the disease developing 20 years prior. This is called stage one, the preclinical Alzheimer's stage. In stage two, mild symptoms begin appearing and can be classified as mild cognitive impairment (MCI) due to Alzheimer's disease and the third stage is dementia due to Alzheimer's disease (Alzheimer's Association, 2019).

Symptoms of Alzheimer's include cognitive impairments such as memory loss, difficulty focusing, concentrating and following a sequential thought patterns to name a few. Alzheimer's is a degenerative disease, meaning it gets worse with time, therefore a mild neurocognitive disorder will usually be given in the early stages of the disease (typically around age 65) and

majority of those patients will go on to receive a major neurocognitive disorder by their mid-70s (Comer, 2014). According to the Diagnostic Statistics Manual (DSM-5), those diagnosed with a major neurocognitive disorder experience a “significant decline in at least one or often more than one area of cognitive functions, such as memory and learning, attention, perceptual-motor, planning and decisions making, language ability or social cognition” (Comer, 2014, pg. 485). This diagnosis often interferes with a person’s ability to express independence in the world and their symptoms usually increase in severity over time. Those whose independence is not impacted and only portray a modest decline in one or more areas may be diagnosed with a mild neurocognitive disorder (Comer, 2014).

In addition to the symptomology of Alzheimer’s, we now know that there are two protein biomarkers of the disease in the brain, beta-amyloids and Tau proteins. The accumulation of the protein beta-amyloid, also seen as plaques, play a role outside the neurons by potentially killing the cells and this therefore effects the communication between cells. Simultaneously, this productions abnormal forms of the protein tau living inside the neurons which may tangle and block the transfer of nutrients (Alzheimer’s Association, 2019). Formation of plaques in the brain are a natural part of aging but is exceptionally high in patients with Alzheimer’s disease (Comer, 2014). Other biomarker identifiers are levels of certain proteins in the cerebral spinal fluid, levels of groups of proteins in blood and lastly, levels of glucose metabolism in the brain as shown on PET imaging using specific dye (Alzheimer’s Association, 2019).

1.2 Current Trends

Currently, the cause of Alzheimer’s can be multi-factor in nature. There is a genetic component that puts some at risk for developing the disease. Researchers have identified that around 30% of the population carry the ApoE gene (apolipoprotein), which has been found to

promote excessive formation of the beta-amyloid proteins in turn helping the formation of plaques which eventually kill brain cells leading to difficulty with attention, concentration, memory, etc. (Comer, 2014). However, there are 4 variations of this gene and type of variation a child inherits from either parent is indicative of the risk. Other potential theories that could contribute to the development of the disease are high levels of zinc, lead or other toxins, immune system disruptions such as autoimmune disease or a virus (Comer, 2014). The latest research is beginning to see a link between diet and onset of symptoms as well as diet and reduction in cognition impairments and increase in executive functioning skills once symptoms appear (Lehtisalo, Jenni et al. 2019).

Although some risk factors for Alzheimer's are nonmalleable, latest research indicates there are risk factors that can be changed to reduce the risk of development in the first place. Some of the malleable risk reductions are physical exercise, diet, education, social circle, and limitations of traumatic brain injuries.

Cardiovascular disease increases risk for Alzheimer's and factors associated with cardiovascular disease are smoking, diabetes, high cholesterol and obesity (Alzheimer's Association, 2019). We know that brain health is affected by the health of the heart and blood vessels. A healthy heart ensures that enough blood is pumped to the brain, while healthy blood vessels provide the oxygen and nutrient rich blood to the brain so it can function optimally. Therefore, regular physical activity is associated with a risk reduction of dementia. Although, researchers have yet to pin down which specific types of exercise, frequency and duration are most beneficial in the reduction (Alzheimer's Association, 2019). Strong evidence is also pointing to a "heart healthy diet consisting of fruits, vegetables, whole grains, fish, chicken, nuts

and legumes while limiting saturated fats, red meat and sugars have shown a decrease in the risk of dementia” (Alzheimer’s Association, 2019, pg. 329).

One interesting finding was regarding education. People with more years of formal education are at lower risk for Alzheimer’s due to what researchers call building up a “cognitive reserve.” A cognitive reserve refers to the brain’s ability to make flexible and efficient use of neural networks to enable a person to continue to carry out cognitive tasks despite brain changes. (Alzheimer’s Association, 2019). Formal education was a factor but also researchers found that just having a stimulating job and engaging in stimulating mental activities helps reduce the risk. These findings make sense when looking at the flipside of the coin and the correlations with less education on one’s health. According to the Alzheimer’s Association, 2019, having a lower socio-economic status may increase the likelihood of possibly living in a food desert or not being able to afford nutrient rich foods. The lack of access and affordability can lead to poor nutrition and possible increase cardiovascular risk. An increase in cardiovascular risk this leads to increased risk for Alzheimer’s. Another way to build up cognitive reserve is engaging in socially and mentally activities throughout your life, although more research is needed on this. Lastly, contact sports such as rugby or football increase one’s risk for a TBI (traumatic brain injury) which are divided on a continuum from mild TBI, moderate TBI and severe TBI. Chronic blows to the head resulting in a TBI are associated with the development of dementia.

1.3 Treatments

Currently Alzheimer’s is a non-curable disease and treatment options are geared toward supporting symptom management. There are currently pharmacological and non-pharmacological treatments. There are now around six pharmacological medication options available for patients with Alzheimer’s. However, the medications do not slow or stop the

disease, rather temporarily improve symptoms by increasing the amount of neurotransmitters in the brain. Non-pharmacological treatments include management and reduction of behavior symptoms such as physical exercise, music therapy, and cognitive stimulation (Alzheimer's Association, 2019).

1.4 Cultural Considerations

There have been many studies regarding the prevalence of dementia on specific racial and ethnic populations. The diversity of ethnic groups living in the United States has increased drastically therefore the migration of various populations lends way for a unique opportunity to study groups of which genetic factors remain the same, but environment changes. Overall, literature review highlights that African American and Hispanics have a higher prevalence and incident rate of Alzheimer's disease than do whites. Native Americans appeared to have lower rates of Alzheimer's disease in comparison to whites whom lived in the United States (Manly & Mayeux, 2004). One of the largest U.S. longitudinal studies in 2001 examined 2,126 elderly residents of New York City looking at the incidence of Alzheimer's disease among three ethnic/racial groups; non-Hispanic, non-Hispanic blacks and Hispanics. The findings indicated that the incidence among non-Hispanic black and Caribbean Hispanics was significantly higher than the non-Hispanic whites (Manly & Mayeux, 2004). Another example of important data regarding the role of immigration and changes in environmental risk factors was examined in several epidemiological studies of elders with Japanese ancestry. The prevalence of dementia among Japanese-American men living in Hawaii was 7.6 percent compared to 4.7 percent for Japanese men living in Japan. The author suggested that environmental or cultural exposures associated with migration from Japan to Hawaii influenced to development of Alzheimer's disease (Manly & Mayeux, 2004).

When looking at other cultures such as Africa and the incident of Alzheimer's within the community, another a study conducted in 1991 investigated indigenous black Africans in Ibadan, Nigeria and found out of 1,122 individuals they found no cases of dementia. The same group looked at 198 brains of autopsy's and found zero AD like pathological changes. But why? This then sparked interests in studying the west African population living in American, Indianapolis to be exact. "The study hoped to take advantage of the fact that African Americans are predominately of the lineage of West African blacks but reside in quite different environments in the US than Nigerians and therefore likely to have different exposures to possible environmental factors. A total of 2,212 African American elders and 2,494 Nigerians were assessed in each population, diagnosis were made using the DSM-II-R and the ICD-10 criteria for AD at the time" (Manly & Mayeux, 2004, pg. 4). The findings indicated a significant lower rate of Alzheimer's Disease among the Ibadan elders (1.4 %) vs (6.24%) among African American elders. This highlighted a possible environments causation for Alzheimer's among west African descendants living in America. According the authors of the study, the Nigerians may have a lower rate of amyloid depositions (the genetic biomarker for Alzheimer's Diseases) as compare to African Americans, a recent study suggests that this is not the case among East Africans (Manly & Mayeux, 2004).

As discovered, African Americans and Hispanics are more likely to develop Alzheimer's disease. According to Alzheimer's Association, 2019, "Variations in health, lifestyle and socioeconomic risk factors across racial groups likely account for most of the differences in risk of Alzheimer's Disease (pg.33).

1.5 Conclusion

In summary, we have come a long way regarding identification of biomarkers for Alzheimer's disease. We have also, very recently, found malleable risk reduction lifestyles that can greatly reduce the risk of developing the disease. Research is also finding that genetic factors do not appear to account for the large differences in prevalence or incidence rates of Alzheimer's among racial and ethnic groups as much as impact that socio-economic status does.

There is much work to be done in the future regarding early identification and detection if we believe the disease starts 20 years prior to symptom development. With this discovery, the ability to identify, interfere and stop the disease would ultimately be the next phase in research development. Current research is underway in finding an inexpensive blood test to use as an identifiable risk factor as we currently have for glucose levels and the development of diabetes (Alzheimer's Association, 2019). Early detection will offer families and the society emotional, medical and financial benefits now and for the future.

References

- Alzheimer's Association Report (March 2019). Alzheimer's Disease Facts and Figures. *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*, 15(3), 321–387.
- Comer, R. (2014). *Fundamentals of Abnormal Psychology* (7th ed). New York, NY: Worth Publishers.
- Lehtisalo, Jenni et al. (2019). Dietary changes and cognition over 2 years within a multidomain intervention trial—The Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability (FINGER) *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*, 15(3), 410-417.
- Manly, J.J., Mayeux, R. (2004). Cultural Perspectives on Racial and Ethnic Difference in Health in Late Life. *National Research Council (US) Panel on Race, Ethnicity, and Health in Later Life* . Washington (DC): National Academies Press (US). Available from: <https://www.ncbi.nlm.nih.gov/books/NBK25532/> doi: 10.17226/11086
- Scheltens, P., Kaj, B., Breteler, M.B.B., Stroper., B.D., & Wiesje M.V.D.W. (2016). Alzheimer's Disease. *The Lancet*, 388(10043), 505-517.