

The association between alzheimer's disease and heart disease



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Abstract

The rate of Alzheimer's disease is predicted to increase in the next twenty years. Alzheimer's disease is also on the rise in the elderly community. Heart disease has been shown to be associated with Alzheimer's disease. The mechanisms of such are still not fully understood. The risk factors of Alzheimer's disease, blocked blood flow, and genetic components have been studied to see a possible association between heart disease and Alzheimer's. Many studies have been conducted to find these comparisons. Many studies have also concluded that different forms of heart disease are precursors for the development of Alzheimer's disease. This may indicate an association between Alzheimer's disease and heart disease, and this association may aid in better treatments and prevention of each in the future. However, more research on this association and its underlying mechanisms need to be tested.

The leading disability among the elderly community is dementia (Satizabal et al. 2016). Alzheimer's disease is a form of dementia and is on the rise within that population. With this increase, it is important to determine any links or risk factors for this disease. Heart failure has been found to have an association with cognitive decline (Qui et al. 2006). Both this age group and these health-related illnesses are predicted to largely increase by 2030 (Sposato et al. 2017). Different heart diseases such as coronary artery disease and peripheral atrial disease have also been classified as risk factors for cognitive disorders like dementia and Alzheimer's disease (Newman et al. 2005). Recent studies have shown that vascular risk factors affect the rate of dementia developing in this population. These vascular risks include blood

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pressure, serum lipids, diabetes, and stroke which are known to increase the chance of developing dementia and Alzheimer's disease (Chiang et al. 2007). Cardiovascular disease, in general, has been identified as a risk of developing cognitive impaired disorders such as Alzheimer's disease (Haring et al. 2013). This paper utilizes this information to look at the risk factors of Alzheimer's disease, blocked blood flow, and the APOE gene/pathology to find the association between Alzheimer's disease and heart disease.

First, there have been several studies connecting different forms of heart disease as risk factors for Alzheimer's disease. Heart disease is classified in many forms from heart failure to hypertension. A longitudinal population study performed in Stockholm, Sweden found that heart failure and low diastolic blood pressure increase the risk of dementia and Alzheimer's disease. Independently, the study also showed that heart failure increases the risk of developing dementia and Alzheimer's disease (Qui et al. 2006). Another study conducted in Sydney, Australia found that heart disease, specifically coronary heart disease and stroke, had a significant decline in memory and cognition (Lipnicki et al. 2013). These studies show that different forms of heart disease appear to increase the risk of cognitive diseases such as Alzheimer's disease. Stroke being a significant risk factor may be due to artery blockage to the brain when someone experiences a stroke. Any sort of blood loss to the brain could show a cognitive decline.

A third study, known as The Maastricht Aging Study, found that those in their group who had cardiovascular disease had an increase in verbal memory decline and decrease in information processing speed when compared to the group without cardiovascular disease. The researchers also found that <https://assignbuster.com/the-association-between-alzheimers-disease-and-heart-disease/>

myocardial infarction (heart attack), specifically, had a significant decline in verbal memory while angina pectoris and other cardiovascular diseases had a significant decline in information processing speed. The main conclusion of this study was that long-term cardiovascular disease increases a decline in cognition more than not having cardiovascular disease (Schievink et al. 2017). Again, another form of heart disease seems to have a negative effect in cognition to those who have it more than if they do not have it. Results of another study also concluded that older individuals with cardiovascular disease have an increased risk for dementia, and those specifically with peripheral atrial disease were at higher risk of developing Alzheimer's disease (Newman et al. 2005). This study yielded the same results but found an even higher increase of risk for a more specific form of heart disease. Lastly, a study that tested the memory decline in postmenopausal women demonstrated that there is an association between women ages 65 and older with cardiovascular disease and cognitive decline. The results of this study also showed an association between cardiac and aortic atherosclerosis and cognitive decline (Haring et al. 2013). Most studies have demonstrated an association of cardiovascular disease and Alzheimer's disease. This would indicate that heart disease might lead to the increase risk of developing Alzheimer's disease, and specific forms may have a bigger risk than others.

To further demonstrate how heart disease is a risk factor for Alzheimer's disease, more studies will be discussed. One study performed with non-demented elderly women concluded that even if the subjects were free of coronary heart disease, the more risk they had for the disease showed their cognitive/memory functioning was worse than those with less risk for the

disease (Wang et al. 2010). Not only is heart disease a risk factor for a decline in cognitive/memory function, but the risk of heart disease itself seems to be a risk factor. Another study concluded that with the decline in incidence of dementia, there was an improvement of cardiovascular health (Satizabal et al. 2016). This study seems to support the previous study by showing that when heart disease is improved, risk for developing any cognitive declining disease is lowered. This shows there might be an association between heart diseases and cognitive diseases like Alzheimer's disease.

Now, a risk factor found in both heart disease and Alzheimer's disease is obesity. A major conclusion from a study in Taiwan showed an association between obese individuals and people who smoke. Both groups had an increased risk of developing Alzheimer's disease. For the study, two groups were made. The Multiple Risk factors for Major Disease (MRMD) made up of 16, 693 residents in 12 towns in Taiwan and the community-based Cancer Screening Program (CSP) made up of 23, 943 residents from 7 towns in Taiwan. All subjects answered questionnaires based on health history, had blood drawn, and had both serological and biochemical assays done. Out of all the subjects, 157 were confirmed to have dementia. There was 81 in the MRMD group and 76 in the CSP group. Vascular dementia and Alzheimer's disease were the most common in both groups. Results demonstrated that both groups had no differ in significance for cardiovascular risk. BMI and history of cardiovascular risks had a significance for all forms of dementia (Chiang et al. 2007). This study showed that obese individuals and those with heart issues had a significant increase in risk for Alzheimer's disease.

Since obesity is also known for being a risk factor for heart disease and heart disease seems to be one for Alzheimer's disease, it is plausible to assume that obesity leads to heart disease which leads to Alzheimer's rather than obesity leads to Alzheimer's disease. This could also be connected to a previous study that was discussed where just the risk of heart disease increased the risk of Alzheimer's disease and that is why obese individuals have an increased risk of Alzheimer's disease.

Another mechanism in which Alzheimer's disease and heart disease are correlated is through blocked blood flow. Several studies have looked at this specific mechanism from blocked arteries in heart disease to blocked hippocampal blood flow. Cognitive impairment in those with chronic heart failure and depression is thought to be because of problems within the hippocampus. The hippocampus is the part of the brain that has a role with memory, and any reduction of the gray matter and cerebral blood flow negatively impacts the memory of those with Alzheimer's disease. Therefore, a study questioned if there was an association between abnormal hippocampal blood flow, depression, heart failure, and cognitive decline. This study used a sample size of 116 people with chronic heart failure. Of the sample, 56 were asymptomatic and 60 symptomatic. Clinical characteristics such as smoking, diabetes, and hypertension were also considered. The results demonstrated that the symptomatic group had worse memory impairment than the asymptomatic group. Hippocampus cerebral blood flow was lower for asymptomatic group than symptomatic group for the whole hippocampus. There was also a significant association between the most posterior portion cerebral blood flow and the cognitive impairment and

postero-posterior hippocampus for depression for symptomatic patients with chronic heart failure (Suzuki et al. 2016). This concluded that there is some sort of association between blood flow, heart disease, and cognitive decline. This would mean that there is some correlation between heart disease and Alzheimer's disease.

Another study that investigated a similar association took 1037 men and women ranging from ages 60-90 without dementia and had trained psychology graduates test them in attention/processing, memory, language, and executive function. Factors that were taken into consideration were older age, marriage, hypertension, smelling ability, different heart diseases, diabetes, history of depression, mental activity, physical activity, social activity, health status, smoking, alcohol consumption, and vision. The results of this study showed men had more of an increase in heart disease and diabetes than women. Women, however, had more of an increase in higher cholesterol than men. Heart disease, specifically coronary heart disease and stroke, had a significant decline in memory and cognition (Lipnicki et al. 2013). This study showed that there is an association between blocked blood flow, heart disease and Alzheimer's. This is because in the study, stroke, which is known to be caused by blood flow being blocked, had a significant decline in memory. A decline in memory and cognition are symptoms of Alzheimer's disease, so it can be suggested that blood flow from heart disease influences the development of Alzheimer's disease.

Lastly, a connection between these two diseases have been shown through studies on a specific gene and both of their pathologies. Microparticles (MPs) have been shown to play a role in Alzheimer's disease pathology. Specific <https://assignbuster.com/the-association-between-alzheimers-disease-and-heart-disease/>

microparticles, endothelial MPs (EMPs) and platelet MPs (PMPs) have been found in Alzheimer's disease. They have also been shown to be associated with coronary syndromes, hypertension, and multiple sclerosis. A study tested if Alzheimer's disease does influence EMP level and MPs. It found that PMPs are associated with risk factors in those with Alzheimer's disease. The study, however, was not able to show the association between EMPs and PMPs. Since PMPs were shown to have a risk component for Alzheimer's disease, it seems that clotting does happen in those with Alzheimer's disease. Clotting also happens in those with specific heart diseases, so they could be related in this way (Hosseninzadeh et al. 2018).

Another cellular component of these diseases is Apolipoprotein E (APOE). APOE is a known genetic risk factor for the development of Alzheimer's disease and found in those with heart disease. It is also an important cholesterol carrier for the brain. Another type of dementia caused by cholesterol is Lewy body dementia. With this information, a study hypothesized that the APOE allele and hypercholesterolemia may interact in some way to cause the development of Alzheimer's and Lewy body dementia. The results of the study supported the researchers' hypothesis. The study found that not only is the APOE allele a genetic risk factor for Alzheimer's, but it is also a risk factor for Lewy body dementia. The subjects who had Alzheimer's disease had more of a prevalence of hypercholesterolemia than the Lewy body dementia group and the control group. Although, there was no difference of prevalence in other health problems among all groups, only hypercholesterolemia (Borroni et al. 2006). Since high cholesterol is known to cause heart disease, this study shows that

high cholesterol could lead to heart disease which would eventually lead to Alzheimer's disease. Again, high cholesterol blocks arteries, so it could affect blood flow to the brain and affect memory and cognition.

After looking at several studies that specifically tried to find an association between Alzheimer's disease and heart disease, it is likely that both diseases correlate in some way. Dementia and Alzheimer's disease have been associated with coronary heart disease. Both coronary heart disease and Alzheimer's disease share the same risk factors. These factors are the ApoE4 allele, hypertension, hypercholesterolemia, and smoking (Bleckwenn et al. 2017). Several studies have found that different types of heart disease are precursors to developing Alzheimer's disease and other cognitive diseases. All the data from these studies show that preventative measures for heart disease will help patients decrease their risk in developing Alzheimer's disease. Several studies have also demonstrated that blocked blood flow, common in many heart diseases, is also a mechanism in increasing the risk of developing Alzheimer's disease. Specifically, hypertension, hypercholesterolemia, diabetes, smoking, and obesity have been proven as problems that can increase the risk of developing Alzheimer's disease later in life. These vascular risks increase development of Alzheimer's due to the reduce blood flow to the brain which can cause neuronal damage. This damage can cause a decline in cognitive function for that person (Eldholm et al. 2018). Lastly, studies have shown some similarities in genetic pathology of both diseases. The APOE allele is a very important genetic component for both heart and Alzheimer's disease. However, there have been a few studies that have not seen an association between these two diseases. In a

Norwegian study, vascular disease and Alzheimer's disease were tested to see any association. This study included 177 people with Alzheimer's disease and 105 with amnesic mild cognitive impairment. All subjects went through comprehensive neuropsychological and physical examinations, same as many other studies. However, this study found no association between the two (Eldholm et al. 2018). This shows that even though other studies have found associations between heart disease and Alzheimer's disease, there is still a chance that there may not be one. Further research is essential into seeing why it appears that heart disease and Alzheimer's disease coexist. One way is to study the underlying mechanisms which are still not known to the extent that they need to be.

In conclusion, even though there are studies that suggest that there is an association between Alzheimer's disease and heart disease, there is still a possibility that it is just coincidental that these two diseases correspond. There is no clear answer to either. Also, the underlying mechanisms of Alzheimer's disease is still unclear. Although most studies do show an association between the two, no one can say for sure that there is one. Therefore, more research needs to be done on this association and the mechanisms of Alzheimer's disease. With more research in these areas, there might be a way to find even better therapies for those who suffer from these diseases. If you can treat and prevent one, you might be able to treat and prevent the other.

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