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Review Article

Factors Contributing to Alzheimer's disease in Older Adult Populations: A Narrative Review

Jalal Uddin[1*], Shahida Sultana Shumi[2], Farhana Khandoker[3], Tazveen Fariha[4]

[1,,3,4]Dept. of Social and Behavioral Health, University of Nevada, Las Vegas, Las Vegas, USA
[2]Dept. of Physiotherpay, Saic College of Medical Science and Technology, Dhaka, Bangladesh

**Corresponding Author: jalal.uddin@unlv.edu*

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***Abstract*—Introduction**: Alzheimer's disease and related dementia are clinical neurodegenerative disorder of the brain. The main symptoms are cognitive deterioration and memory impairment, mainly impacting elderly. It is important to comprehend the various factors that contribute to the development risk of AD. This narrative review synthesizes current literature on the various factors influencing the development and progression of AD in older adult populations.
Methods: Literature search were done on online databases such as PubMed, Web of Science, and PsycINFO using relevant keywords such as "Alzheimer's disease," "risk factors," "genetics," "environmental factors," and "lifestyle." Studies published between 2000 and 2023 were included, focusing on factors associated with AD in older people over 65 years age.
Results: The review identified several key factors contributing to AD in older adults. Genetic predisposition emerged as a significant risk factor. Environmental factors such as air pollution, pesticides, and heavy metals were also implicated. Furthermore, lifestyle factors lack of exercise, unhealthy eating habits, and smoking were linked to higher chances of developing Alzheimer's disease. Chronic conditions such as diabetes and cardiovascular diseases were found to exacerbate cognitive decline in older adults.
Conclusion: AD presents a complex interplay of vascular, lifestyle, and social factors influencing its onset and progression. While uncertainties remain regarding specific causal pathways, there is growing optimism about the efficacy of preventive measures. Effective management of vascular risk factors such as hypertension, obesity, and diabetes in midlife can significantly delay the onset of dementia by preserving cerebral blood flow and reducing cerebrovascular incidents. Similarly, promoting an active and socially integrated lifestyle through cognitive, physical, and social activities shows promise in reducing AD risk and enhancing cognitive resilience. Early educational attainment and ongoing cognitive engagement play crucial roles in maintaining cognitive function into older age. Cognitive training programs for individuals with mild dementia offer supportive interventions to sustain cognitive abilities and improve quality of life.

Keywords— Alzheimer's disease, older adults, risk factors, genetics factors, environmental factors, lifestyle factors

1. Introduction

Within the aging population, Alzheimer's and dementia cases are increasing. The number is probably going to be higher in the future (Alzheimer's Association, 2022). Presently, in the United States, there are approximately 6.2 million cases of Alzheimer's disease (Alzheimer's Association, 2022). The prevalence of AD is rising worldwide due to demographic shifts and increasing life expectancy, placing substantial socioeconomic burdens on healthcare infrastructures and societies. The economic impact of AD is immense, including direct medical costs, long-term care expenses, and productivity losses for caregivers and affected individuals. In the United States alone, total annual healthcare expenditures for AD and related dementias exceed $355 billion, a figure expected to rise alongside demographic aging trends (Alzheimer's Association, 2022).

Beyond clinical and genetic factors, social determinants of health significantly influence AD risk and outcomes. Socioeconomic status, education, and occupational complexity play crucial roles in shaping cognitive reserve—a concept reflecting the brain's ability to withstand neuropathological damage and maintain cognitive function in the face of aging and disease (Xu et al., 2016).

Environmental factors, such as exposure to air pollution, pesticides, and heavy metals, have been implicated in AD pathogenesis through mechanisms involving oxidative stress, neuroinflammation, and neurotoxicity (Calderón-Garcidueñas et al., 2021). Addressing environmental risks through regulatory policies and community interventions is essential for mitigating AD risk and promoting brain health across populations.

Improving access to preventive healthcare services, early detection tools, and dementia-friendly community resources is essential for addressing health disparities and enhancing AD care equity. Public health initiatives aimed at raising awareness, promoting cognitive screenings, and supporting caregivers are critical for reducing the burden of AD on vulnerable populations and enhancing the quality of life for affected individuals.

2. Related Work

While aging itself is inevitable, understanding its role in ADRD helps shape public health policies aimed at early diagnosis and intervention. Gender differences also play a critical role, with women being disproportionately affected by Alzheimer's disease, which necessitates gender-specific public health strategies (Livingston et al., 2020).

Education has been consistently linked to a lower risk of developing ADRD, highlighting the concept of cognitive reserve. Promoting educational opportunities as a long-term public health measure to combat dementia. Furthermore, socioeconomic status impacts ADRD risk, with lower socioeconomic status often correlating with higher dementia prevalence (Livingston et al., 2020).

Public health initiatives encouraging regular physical exercise can thus play a vital role in dementia prevention. These activities promote neuroplasticity and cognitive reserve, offering protective effects against ADRD (Sommerlad et al., 2018).

Cardiovascular health is closely linked to cognitive health. Hypertension, particularly in midlife (McGrath et al., 2017). Public health strategies targeting the prevention and management of hypertension could therefore be effective in reducing ADRD incidence. Additionally, diabetes mellitus presents mixed findings, but there is evidence suggesting an association between diabetes and increased dementia risk, particularly when diabetes management is poor (Wang et al., 2012). Efforts to improve diabetes management and prevention can thus be crucial in dementia prevention strategies.

Environmental exposures, such as air pollution, have been increasingly recognized as risk factors for ADRD. Chronic exposure to pollutants can lead to neuroinflammation and oxidative stress, which are mechanisms implicated in Alzheimer's disease pathology (Calderón-Garcidueñas et al., 2021). Addressing environmental health issues thus becomes a crucial aspect of public health strategies aimed at reducing ADRD risk. Social factors, including social isolation and lack of social engagement. Enhancing community support and fostering social connections can mitigate this risk, highlighting the importance of social policies in dementia prevention (Livingston et al., 2020).

While this section focuses on modifiable risk factors, it is essential to acknowledge the role of genetics in ADRD. Genetic predispositions, such as the presence of the APOE ε4 allele, significantly increase Alzheimer's disease risk (Kanatsu & Tomita, 2017). Understanding genetic risk can inform public health strategies, although it predominantly serves as a non-modifiable factor.

3. Research Design

This narrative review aims to synthesize and evaluate existing literature on the relationship between genetic factors, modifiable risk factors, and the incidence of AD in older adults. The review focuses on providing a comprehensive overview of current knowledge, and suggesting directions for further research. A systematic approach was employed to identify relevant studies, searching databases such as PubMed, MEDLINE, PsycINFO, and Google Scholar using keywords including "Alzheimer's disease," "genetic factors," "modifiable risk factors," "APOE," "hypertension," "diabetes," "physical activity," "smoking," "diet," and "cognitive decline." peer-reviewed articles were considered to ensure a thorough review.

Inclusion criteria of the study: published in English between 2000 and 2023, focused on older adults aged 50 and above, investigated the relationship between genetic factors (e.g., APOE genotype) and modifiable trigger factors with the incidence of AD, and provided data on cognitive outcomes or AD diagnosis. Studies were excluded if they were case reports, editorials, or commentaries, did not include primary data or detailed methodological information, or focused on populations with pre-existing dementia diagnoses.

A narrative synthesis approach was employed to analyze the data, grouping studies based on common themes such as genetic predisposition (e.g., APOE genotype) and specific modifiable risk factors (e.g., physical activity, diet, cardiovascular health). The relationships between these factors and AD incidence were critically evaluated. As this is a review of existing literature, no new ethical approval was required; however, the review adhered to ethical standards by accurately reporting findings, acknowledging sources, and discussing potential biases and limitations.

4. Results and Discussion

Results

Demographic Characteristics

The review encompasses a broad spectrum of studies reflecting diverse demographic profiles among older adults, revealing significant insights into how age, sex, and racial/ethnic backgrounds influence AD risk.

Age

Age remains the primary non-modifiable risk factor for AD. Mitochondrial dysfunction and oxidative stress, both associated with aging, also contribute to neuronal damage and cognitive decline (Khan et al., 2020). While age is a major risk factor, not all aging individuals will develop Alzheimer's disease. Genetic factors, and modifiable lifestyle factors, including physical activity, heart-healthy diets, social engagement, and cardiovascular health management,

significantly impact the likelihood and progression of AD (2019 Alzheimer's Disease Facts and Figures, 2019).

Sex
Sex differences in AD prevalence and risk have been observed, with a higher prevalence reported among females. Biological factors, including hormonal changes during menopause, genetic predispositions, and differences in brain structure and function, contribute to sex-specific vulnerabilities to AD (Alzheimer's Association, 2019).

Race/Ethnicity
Racial and ethnic disparities in AD prevalence and risk highlight the influence of genetic variability, cultural practices, socioeconomic factors, and access to healthcare. African American and Hispanic populations, for instance, exhibit higher rates of AD compared to Caucasians, attributed to genetic predispositions, social determinants of health, and disparities in healthcare utilization (Hippius & Neundörfer, 2003). Addressing these disparities is crucial for equitable healthcare delivery and improving outcomes in diverse populations (Alzheimer's Association, 2022).

Hypertension
Chronic high blood pressure is also responsible for developing AD, attributed to its effects on cerebral blood flow regulation, vascular integrity, and neurovascular coupling. Hypertension-induced vascular damage and microvascular dysfunction contribute to white matter lesions, cognitive impairment, and accelerated neurodegeneration (McGrath et al., 2017). Managing hypertension through lifestyle modifications and antihypertensive medications may mitigate AD risk, highlighting the importance of integrated cardiovascular and brain health management in older adults.

Diabetes Mellitus
The relationship between diabetes mellitus and AD is complex, with evidence suggesting bidirectional associations between insulin resistance, hyperglycemia, and neurodegenerative processes. Diabetes-related metabolic dysregulation, oxidative stress, and chronic inflammation contribute to neuronal damage, cognitive decline, and increased AD risk (Wang et al., 2012). Optimizing glycemic control, promoting healthy lifestyle behaviors, and early diabetes management may reduce AD risk and delay cognitive decline in older adults with diabetes. Targeted interventions addressing both diabetes and neurodegenerative pathways are essential for comprehensive AD prevention strategies.

Hypercholesterolemia
Elevated cholesterol levels, is a significant risk factor for AD through mechanisms involving neurotoxicity, lipid dysregulation, and oxidative stress. Cholesterol-lowering therapies and dietary interventions may attenuate neuroinflammatory responses, preserve neuronal function, and mitigate AD progression (Solomon et al., 2007).

Smoking
Smoking contributing to cerebrovascular dysfunction. The harmful impact of smoking on vascular function and brain function are compounded by interactions with genetic susceptibility factors, such as the APOE ε4 allele, highlighting the need for smoking cessation programs and targeted interventions to reduce AD risk (Zhong et al., 2015).

Alcohol Consumption
Patterns of alcohol consumption influence AD risk, with chronic and heavy drinking associated with neurotoxicity, cognitive impairment, and accelerated brain aging. Moderate alcohol consumption, however, may confer neuroprotective effects through antioxidant mechanisms and improved cerebrovascular function, necessitating balanced approaches to alcohol consumption and brain health promotion (Langballe et al., 2015).

Obesity
Midlife obesity independently increases AD risk, potentially through adipose tissue-derived inflammation, insulin resistance, and metabolic dysfunction. Obesity-related comorbidities, including hypertension and diabetes, exacerbate neurovascular damage and cognitive decline, underscoring the importance of weight management and lifestyle modifications in mitigating AD risk (Serrano-Pozo & Growdon, 2019).

Physical Activity
Physical activity promote neuroplasticity, synaptic connectivity, and cognitive resilience. Regular exercise enhances cerebral blood flow, neurotrophic factor production, and mitochondrial function, counteracting age-related neurodegeneration and preserving cognitive function in older adults (Serrano-Pozo & Growdon, 2019).

Cognitive Activities
Engagement in intellectually stimulating activities throughout life is linked to lower AD risk, enhancing cognitive reserve, synaptic plasticity, and neural network efficiency. Mental stimulation, social interactions, and lifelong learning promote neurogenesis, neuronal connectivity, and adaptive brain function, offering protective benefits against age-related cognitive decline and neurodegeneration (Sommerlad et al., 2018).

Socioeconomic and Educational Factors
Education
Higher educational attainment is inversely associated with AD risk, reflecting cognitive reserve, critical thinking skills, and lifelong learning benefits. Educational achievements enhance brain resilience against neuropathological changes, delaying symptom (Xu et al., 2016).

Socioeconomic Status
Socioeconomic disparities impact AD risk through access to healthcare. Lower socioeconomic status is linked with higher AD prevalence, attributed to limited access to health care, higher stress levels, and disparities in health-promoting resources. Addressing socioeconomic determinants of health is essential for reducing AD disparities and improving outcomes in vulnerable populations (Alzheimer's Association, 2022).

Table 1: Summary of Modifiable Risk Factors for Alzheimer's Disease

Risk Factor	Association with AD	Citation
Hypertension	Increases risk, linked to amyloid plaques and NFTs	(McGrath et al., 2017)
Diabetes Mellitus	Mixed findings, some studies show association	(Wang et al., 2012)
Hypercholesterolemia	Elevated midlife levels associated with increased risk	(Solomon et al., 2007)
Smoking	Increases risk among non-APOE ε4 carriers	(Zhong et al., 2015)
Alcohol Consumption	Frequent consumption linked to increased risk	(Langballe et al., 2015)
Obesity	Midlife obesity increases risk independently	(Serrano-Pozo & Growdon, 2019)
Physical Activity	High activity levels associated with reduced risk	(Serrano-Pozo & Growdon, 2019)
Education	Higher education levels reduce risk	(Xu et al., 2016)
Cognitive Activities	Engagement reduces risk	(Sommerlad et al., 2018)

Discussion

There are number factors that trigger Alzheimer's disease (AD). While uncertainties remain regarding their precise roles in pathogenesis and clinical presentation, there is optimism surrounding primary prevention strategies.

Managing midlife vascular risk factors such as hypertension, obesity, high blood sugar, and DM is crucial for AD prevention. These conditions target vascular pathways implicated in AD pathophysiology. Long-term hypertension can lead to structural changes in cerebral blood vessels, reducing cerebral blood flow and contributing to AD. It is associated with increased amyloid-beta deposition and tau pathology, both hallmarks of AD. Managing hypertension through lifestyle changes, medication, and regular monitoring is essential for reducing AD risk (Qiu et al., 2007).

Obesity is also associated with insulin resistance and hyperinsulinemia, leading to impaired glucose metabolism in the brain, further exacerbating AD pathology. Public health initiatives focused on promoting healthy eating habits, physical activity, and weight management can help reduce obesity rates and lower the risk of AD (Serrano-Pozo & Growdon, 2019).

Diabetes also promotes vascular damage and increases the risk of cerebrovascular disease, compounding neurodegenerative processes in AD. Effective management of diabetes through diet, exercise, and medication is crucial for minimizing the risk of AD (Biessels & Despa, 2018).

Heart failure and extreme blood pressure fluctuations can adversely affect cerebral blood flow. Maintaining stable blood pressure ensures adequate brain perfusion and prevents recurrent cerebrovascular events. These events can precipitate dementia in older adults by exacerbating neuronal damage and promoting AD pathology. Effective management of heart failure and blood pressure can mitigate these risks and preserve cognitive function. Healthcare providers should prioritize cardiovascular health and educate patients on the importance of blood pressure management in reducing AD risk.

Moreover, specific nutrients like vitamin E, vitamin D, and folate have garnered attention for their potential neuroprotective effects. Vitamin E, found in nuts, seeds, and leafy greens, acts as an antioxidant, scavenging free radicals that damage brain cells (Livingston et al., 2020). Vitamin D, primarily obtained through sunlight exposure and fortified foods, supports cognitive function by regulating calcium levels crucial for neuronal signaling (Livingston et al., 2020). Folate, abundant in green leafy vegetables and legumes, plays a role in methylation processes critical for neurotransmitter synthesis and brain health (Livingston et al., 2020).

Public health initiatives promoting dietary guidelines aligned with brain health can significantly impact AD prevention and management. Educating individuals about the benefits of a balanced diet, providing access to nutritious foods, and supporting dietary interventions tailored to older adults can mitigate nutritional risk factors linked to AD. Integrating nutritional counseling into healthcare settings and community programs empowers individuals to make informed dietary choices that promote cognitive resilience and enhance overall well-being.

Furthermore, biomarker research has identified blood-based and cerebrospinal fluid (CSF) markers that reflect AD pathology, offering potential non-invasive tools for early detection and risk stratification (Jack et al., 2018). Pharmacogenomics, for instance, explores how genetic variations influence individual responses to AD medications, paving the way for targeted therapies that optimize efficacy and minimize side effects (Jack et al., 2018).

Telehealth and digital health technologies are transforming AD care by enhancing accessibility to specialized services, facilitating remote monitoring, and providing support for caregivers. Mobile apps and wearable devices enable real-time monitoring of cognitive function, medication adherence, and daily activities, empowering patients to actively participate in their care management (Jack et al., 2018).

As technological innovations continue to evolve, integrating these advancements into clinical practice and public health initiatives holds promise for advancing AD research, enhancing diagnostic accuracy, and improving outcomes for affected individuals and their families. Collaborative efforts between researchers, healthcare providers, technology developers, and policymakers are essential for harnessing the full potential of technology in combating AD and promoting brain health across the lifespan.

Engaging in regular physical activity is one of the most effective lifestyle interventions for reducing AD risk. Exercise enhances neuroplasticity, promotes neurogenesis in the hippocampus, and improves vascular health, contributing to cognitive resilience. Aerobic exercise is associated with increased brain volume and improved cognitive performance in older adults (Erickson et al., 2011). Physical activity also reduces systemic inflammation and oxidative stress, both implicated in AD pathogenesis. Public health campaigns should encourage individuals to incorporate regular exercise into their daily routines, emphasizing cognitive and overall health benefits.

Maintaining strong social connections and an active social life can significantly mitigate AD risk. Social engagement stimulates cognitive processes and emotional well-being, crucial for brain health. Studies show that individuals with extensive social networks provide mental stimulation, reduce stress, and promote a sense of purpose, all contributing to cognitive resilience (Fratiglioni, 2004). Community centers, clubs, and social groups can provide opportunities for social interaction, and public health campaigns can highlight the importance of social engagement for brain health.

Engaging in cognitively stimulating activities builds cognitive reserve and delays AD symptoms. Cognitive reserve refers to the brain's ability to compensate for damage and maintain function despite AD pathology. Higher cognitive reserve is associated with delayed dementia symptoms and a slower rate of cognitive decline (Stern, 2012). Educational programs and workshops encouraging cognitive engagement can be widely available. Libraries, community centers, and online platforms can offer resources and opportunities for mentally stimulating activities.

Educational attainment in early life plays a protective role against AD by enhancing cognitive reserve. Individuals with higher levels of education tend to have more robust neural networks and greater brain volume, buffering against AD pathology. Early-life education promotes lifelong cognitive engagement and encourages skill development that enhances cognitive flexibility and problem-solving abilities (Habib et al., 2021). Policies and programs ensuring access to quality education from a young age are crucial for building cognitive resilience. This includes investing in early childhood education, supporting literacy programs, and providing resources for underprivileged communities to close the education gap.

Encouraging continuous learning throughout life can further enhance cognitive reserve and delay AD symptoms. Lifelong learning and continuous mental stimulation help maintain cognitive function and reduce AD risk (Valenzuela & Sachdev, 2006). Educational programs, vocational training, and intellectual pursuits throughout life build cognitive reserve. Public health campaigns should emphasize the importance of lifelong learning and provide information on accessible learning opportunities. Fostering an environment that values and supports lifelong learning helps individuals maintain cognitive health into old age.

Cognitive training programs often involve structured exercises targeting memory, attention, problem-solving, and other cognitive domains. Studies demonstrate that cognitive training improves cognitive performance and daily functioning in individuals with different level of dementia (Qiu et al., 2009). Healthcare providers and caregivers should have access to these programs to support patients effectively. Cognitive training programs can be integrated into community centers and senior care facilities for accessibility.

Ongoing support and rehabilitation efforts are crucial for individuals with AD. Multidisciplinary approaches, including medical management, physical therapy, occupational therapy, and social support, improve outcomes and enhance quality of life for patients and caregivers. Providing education and resources to caregivers is essential, as they play a vital role in AD care and management. Support groups, counseling services, and respite care help caregivers cope with the challenges of caring for someone with AD. Policies providing financial support and resources for caregivers can alleviate burdens and improve the overall care experience.

Policymakers and healthcare providers must prioritize implementing preventive strategies for AD. Investment in public health campaigns, community programs, and healthcare services promoting healthy lifestyles and early intervention for vascular risk factors is essential. Public health initiatives should focus on educating the population about AD risk factors and preventive measures. Collaboration between government agencies, healthcare organizations, and community groups can create a supportive environment for implementing these strategies. Policies supporting research funding and resource allocation for AD prevention can drive progress in this field.

Increased funding for AD prevention and treatment research is crucial. Understanding disease mechanisms and identifying effective interventions require ongoing scientific investigation. Research should focus on developing new therapies and improving existing ones provide better outcomes for individuals at risk or diagnosed with AD. Collaborative efforts between academic institutions, research organizations, and pharmaceutical companies can accelerate progress. International collaborations facilitate knowledge and resource sharing, leading to more comprehensive and effective research efforts.

The healthcare system must support the multi-dimensional approach to AD prevention and management. This includes training healthcare providers to recognize and address AD risk factors, offering comprehensive care for individuals with AD, and providing resources for caregivers.

6. Conclusion and Future Scope

Conclusion

AD presents a complex interplay of vascular, lifestyle, and social factors influencing its onset and progression. While uncertainties remain regarding specific causal pathways, there is growing optimism about the efficacy of preventive

measures. Effective management of vascular risk factors in midlife can significantly delay the progression of dementia by preserving cerebral blood flow and reducing cerebrovascular incidents. Similarly, promoting an active and socially integrated lifestyle through cognitive, physical, and social activities shows promise in reducing AD risk and enhancing cognitive resilience. Early educational attainment and ongoing cognitive engagement play crucial roles in maintaining cognitive function into older age. Cognitive training programs for individuals with mild dementia offer supportive interventions to sustain cognitive abilities and improve quality of life.

Future Scope

Future research should focus on several key areas to advance our understanding and management of Alzheimer's disease:
Mechanistic Insights: Investigating the precise mechanisms linking vascular health, lifestyle factors, and social engagement to AD pathogenesis could provide targeted intervention strategies.

Personalized Medicine: Developing personalized approaches to AD prevention and management based on individual risk profiles and genetic predispositions can optimize treatment outcomes.

Longitudinal Studies: Conducting long term observational studies over the lifespan could validate their efficacy and refine recommendations.

Intervention Strategies: Exploring novel intervention strategies, such as pharmacological agents targeting vascular health or lifestyle modification programs tailored to different populations, could broaden the arsenal of AD prevention strategies.

Health Policy and Public Awareness: Enhancing public awareness about modifiable risk factors for AD and advocating for policies that support healthy aging and cognitive wellness are essential for broader impact.

Data Availability

The study analyzed all data from publicly available literature cited in the manuscript's references. Researchers looking for specific datasets or more information should refer to these original sources for complete access and retrieval information

Study Limitations

This review has several limitations that should be considered. First, the reliability of our findings hinges on the quality and accuracy of data reported in the literature we reviewed, which may vary across studies. Second, there is a potential for publication bias, where studies with negative results or smaller sample sizes may be underrepresented. Third, methodological variability among included studies, including differences in study design and definitions, may impact the comparability and synthesis of results. Finally, our review focused on studies published between 2000 and 2023, which may have excluded more recent developments or emerging research in the field.

Conflict of Interest

The authors declare no conflicts of interest related to this manuscript.

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Authors' Contributions

Jalal Uddin: Developed the study framework and methodology, performed data analysis, wrote the initial manuscript draft, and made critical revisions to enhance its intellectual substance.
Tazveen Fariha: Provided guidance and supervision throughout the study, offered critical feedback on the manuscript's content and structure, and played a role in approving the final version for submission.
Shahida Sultana Shumi: Reviewed and proofread the manuscript, and played a role in approving the final version for submission.
Farhana Khandoker: Reviewed and proofread the manuscript, and played a role in approving the final version for submission.

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References

[1] A. Serrano-Pozo, J.H. Growdon, "*Is Alzheimer's Disease Risk Modifiable?"Journal of Alzheimer's Disease*, Vol.**67**, No.**3**, pp.**795–819**, **2019**.

[2] A. Solomon, I. Kåreholt, T. Ngandu, et al., "*Serum cholesterol change s after midlife and late-life cognition: twenty-one-year follow-up study*," *Neurology*, Vol.**68**, No.**10**, pp.**751**–**756**, **2007**.

[3] A. Sommerlad, J. Ruegger, A. Singh-Manoux, et al., "Marriage and risk of dementia: systematic ireviewiandimeta- analysis of observational studies," Journal of Neurology, Neurosurgery, and Psychiatry, Vol.**89**, No.**3**, pp.**231**–**238**, **2018**.

[4] A.K.M.R.R. Habib, M.M. Alam, M.R. Islam, "*Design of a mobile aeration system for aquaculture and proof of concept," In the Proceedings of the 2021 International Conference on Computer, Communication, Chemical, Materials and Electronic Engineering (IC4ME2)*, Rajshahi, Bangladesh, pp.**1-4**, **2021**.

[5] Alzheimer's Association. "*2022 Alzheimer's disease facts and figures. More Than Normal Aging: Understanding Mild Cognitive Impairment*," *Alzheimer's & Dementia*, Vol.**18**, pp**.321-387**, **2022**.

[6] B. Bayzid, S.M.M. Kabir, M.H. Rahman, J. Uddin, M.S. Hosen, S.S. Shumi, "*A cross-sectional survey on socio-demographic profile and work-related health risks of Bangladeshi female sex workers*," *International Journal of Women's Health Care*, Vol.**5**, No.**2**, pp.**38-41**, **2020**.

[7] B.T. Hyman, C.H. Phelps, T.G. Beach, et al., "*National Institute on Aging-Alzheimer's Association guidelines for the neuropathologic assessment of Alzheimer's disease*," Alzheimer's & Dementia, Vol.**8**, pp.**1–13**, **2012**.

[8] C. Qiu, D. De Ronchi, L. Fratiglioni, *"The epidemiology of the dementias an update," Current Opinion in Psychiatry*, Vol.**20**, No.**4**, pp.**380–385, 2007**.

[9] C. Van Cauwenberghe, C. Van Broeckhoven, K. Sleegers, "*The genetic landscape of Alzheimer disease: clinical implications and perspectives," Genetics in Medicine*, Vol.**18**, No.**5**, pp.**421–430, 2016**.

[10] C.R. Jack Jr., D.A. Bennett, K. Blennow, et al., *"NIA-AA Research Framework: Toward a biological definition of Alzheimer's disease," Alzheimer's & Dementia*, Vol.**14**, No.**4**, pp.**535–562, 2018**.
[11] E.M.Langballe, H. Ask, J. Holmen, et al., *"Alcohol consumption and risk of dementia up to 27 years later in a large, population-based sample: the HUNT study, Norway European Journal of Epidemiology*, Vol.**30**, No.**9**, pp.**1049–1056, 2015**.
[12] E.R. McGrath, A.S. Beiser, C. DeCarli, et al., "Blood pressure from mid- to late life and risk of incident dementia," *Neurology*, Vol.**89**, No.**24**, pp.**2447-2454, 2017**.
[13] G. Livingston, A. Sommerlad, V. Orgeta, S.G. Costafreda, J. Huntley, D. Ames, et al., "*Dementia prevention, intervention, and care: 2020 report of the Lancet Commission," The Lancet*, Vol.**396**, No.**10248,** pp**. 413-446, 2020**.
[14] G. Zhong, Y. Wang, Y. Zhang, et al., "*Smoking is associated with an increased risk of dementia: a meta-analysis of prospective cohort studies with investigation of potential effect modifiers," PloS One*, Vol.**10**, No.**3**, **e0118333, 2015**.
[15] H. Hippius, G. Neundörfer, "*The discovery of Alzheimer's disease," Dialogues in Clinical Neuroscience*, Vol.**5**, No.**1**, pp.**101–108, 2003**.
[16] H.W. Querfurth, F.M. LaFerla, "*Alzheimer's disease," The New England Journal of Medicine*, Vol.**362**, No.**4**, pp.**329–344, 2010**.
[17] J. Uddin, M. Greene, L. Dubbin, M. Deutsch, J. Flatt, "*Examining the role between social antecedents and depression among LGBTQ+ older adults eligible for low income housing," OBM Geriatrics*, Vol.**7**, No.**4**, pp. **1-19, 2023**.
[18] J.A. Soria Lopez, H.M. González, G.C. Léger, "*Alzheimer's disease," Geriatric Neurology*, pp.**231–255, 2019**.
[19] Jack, C.R., Jr, Bennett, D.A., Blennow, K., Carrillo, M.C., Dunn, B., Haeberlein, S. B., & Silverberg, N. (2018). *NIA-AA Research Framework: Toward a biological definition of Alzheimer's disease. Alzheimer's & Dementia*, Vol**.14,** No**.4**, pp.**535–562**.
[20] K. Kanatsu, T. Tomita, "*Molecular mechanisms of the genetic risk factors in pathogenesis of Alzheimer disease," Frontiers in Bioscience (Landmark edition)*, Vol.**22**, No.**1**, pp. **180–192**, **2017**.
[21] K.C. Wang, L.C. Woung, M.T. Tsai, et al., "*Risk of Alzheimer's disease in relation to diabetes: a population-based cohort study," Neuroepidemiology*, Vol.**38**, No.**4**, pp.**237–244**, **2012**.
[22] M.S. Islam, M.M. Alam, A. Ahamed, S.I. Ali Meerza, "*Prediction of diabetes at early stage using interpretable machine learning," In the Proceedings of the SoutheastCon*, Orlando, FL, USA, pp. **261-265**, **2023**.
[23] R.C. Petersen, O. Lopez, M.J. Armstrong, et al., "*Practice guideline update summary: Mild cognitive impairment: Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology," Neurology*, Vol.**90**, No.**3**, pp.**126–135**, **2018**.
[24] S. Khan, K.H. Barve, M.S. Kumar, "*Recent Advancements in Pathogenesis, Diagnostics and Treatment of Alzheimer's Disease," Current Neuropharmacology*, Vol.**18**, No.**11**, pp.**1106–1125**, **2020**.
[25] S.M.M. Kamal, M.F. Kabir, M.H. Rahman, J. Uddin, M.S. Hosen, S.S. Shumi, "*Impact of home quarantine due to COVID-19 among Bangladeshi population," International Journal of Public Health Science*, Vol.**10**, No.**1**, pp. **1-7**, **2021**.
[26] T.J. Montine, C.H. Phelps, T.G. Beach, et al., "*National Institute on Aging-Alzheimer's Association guidelines for the neuropathologic assessment of Alzheimer's disease: a practical approach," Acta Neuropathological*, Vol.**123**, No.**1**, pp.**1–11**,**2012**.
[27] W. Xu, L. Tan, H.F. Wang, et al., "*Education and Risk of Dementia: Dose-Response Meta-Analysis of Prospective Cohort Studies," Molecular Neurobiology*, Vol.**53**, No.**5**, pp.**3113–3123**, **2016**.

AUTHORS PROFILE

Jalal Uddin is a Master of Public Health student in the Social and Behavioral Health Department at the University of Nevada, Las Vegas (UNLV). With a Bachelor of Science in Physiotherapy from Bangladesh, Jalal's research interests span Alzheimer's disease, Parkinson's disease, and other neurological conditions in older adults, alongside issues affecting gender and racial minorities. Motivated by a passion for reducing health disparities, Jalal actively contributes as a Graduate Research Assistant, adept in data analysis using SPSS and SAS. His work includes designing survey methodologies, collaborating with organizations like the Alzheimer's Association, and American Public Health Association.

Tazveen Fariha is an emerging researcher with a Master of Public Health from the University of Creative Technology in Bangladesh, and upcoming pursuit of a PhD in Public Health at the University of Nevada Las Vegas (UNLV) starting Fall 2024. Currently serving as an Academic Coordinator at Chattogram International Nursing College, she oversees course planning and faculty supervision while contributing to nursing education advancements. Tazveen's research focuses on mental health among nursing students and empathy in nursing practice, with recent conference presentations and publications in nursing journals highlighting her commitment to advancing healthcare education and research.

Shahida Sultana Shumi is a researcher specializing in Physical Therapy, holding a Bachelor's degree from Saic College of Medical Science and Technology in Bangladesh. She gained valuable experience during her internship at the Center for Rehabilitation of the Paralysed in Dhaka. Her research focusing on musculoskeletal and reproductive health issues in pregnant women. In addition to her research pursuits, Shahida has accumulated extensive practical experience as a Physical therapist, particularly in treating patients with neurological disorders, pediatric conditions, and sports injuries. Her diverse background highlights her commitment to advancing healthcare through both research and clinical practice.

Farhana Khandoker is a researcher with a Master of Emergency Management and Homeland Security from Arkansas Tech University and an upcoming PhD student in Public Health at the University of Nevada, Las Vegas, starting Fall 2024. Her research focuses on digital health literacy among older adults, mental health, workplace wellness programs, and the role of social networks in health behaviours. Farhana has served as a Graduate Assistant at Arkansas Tech University, supporting students with disabilities and assisting in research. She also holds an MBA in Human Resource Management from the University of Asia Pacific, Bangladesh, and has administrative experience at the Honorary Consulate of the Czech Republic in Bangladesh. Her diverse background reflects a strong commitment to advancing public health.

