Exploring the Treatment Options Available for Adults with Alzheimer's Disease in the United States

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Research Question

What are the treatment options for adults living with Alzheimer's disease in the United States?

Abstract

The United States population is aging. This trend is showing an increased prevalence of age-related diseases, like Alzheimer's disease, and other chronic diseases. Alzheimer's disease is heavily studied, yet there is no cure for the disease and very few effective interventions. With a cure seeming to be far in the future, research on possible interventions has gained immense interest. The treatment options found in this literature review come from multiple peer-reviewed journal articles found in academic databases. The results found that medication, non-pharmacological therapies, and non-invasive radiologic techniques are at the forefront of Alzheimer's disease treatments. These treatment options allow people with Alzheimer's disease to improve their quality of life and improve various aspects of their health. As the United States is aging, further research on treatments, and a cure, on Alzheimer's disease is needed. Further research can also be conducted to bridge the gap between varying ethnic and racial groups and the treatment of Alzheimer's disease.

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Introduction

Alzheimer's disease is a brain disease caused by damage to neurons in the brain that ultimately inhibit efficient thinking, memory, and language (CDC, 2020). A person with Alzheimer's disease experiences many changes in the brain. Scientifically, the beta-amyloid protein accumulates outside of neurons and the tau protein is present in twisted strands inside the neurons (CDC, 2020). These biological changes ultimately lead to the death of neurons and damage to brain tissue, in addition to inflammation and atrophy of brain tissue (CDC, 2020). The symptoms of Alzheimer's disease include memory loss that disrupts daily life, difficulty planning or solving problems, confusion with time or place, and difficulty completing familiar tasks (Alzheimer's Association, 2024).

Alzheimer's disease is the most common form of dementia, accounting for 60%-80% of all dementia cases (Alzheimer's Association, 2024). In 2019, Alzheimer's disease ranked as the seventh leading cause of death across the world (World Health Organization, 2024). Alzheimer's is a burdensome disease. The disability-adjusted life years (DALYs) from Alzheimer's disease doubled between 2000 and 2019 (CDC, 2020). One DALY represents the loss of the equivalent of one year of full health lost due to disease.

Due to the significance of Alzheimers' disease, the World Health Organization recognized the disease as a public health priority (CDC, 2020). The World Health Assembly endorsed a Global Action Plan (GAP) on the Public Health Response to dementia that aims to improve the lives of people with dementia, their families and people who care for them (World Health Organization, 2024). The GAP focuses on a myriad of areas including raising awareness, reducing the risk, increasing diagnosis accessibility, improving care and treatment, supporting caregivers, and increasing research (World Health Organization, 2024).

In the United States, there are an estimated seven million Americans living with Alzheimer's disease (Alzheimer's Association, 2024). Within the 50 U.S. states, some counties have a prevalence of Alzheimer's disease prevalence ranging from 15.0% to 16.6% (Alzheimer's Association, 2024). In 2021, Alzheimer's disease in the United States was the seventh leading cause of death (Alzheimer's Association, 2024a). The number of Americans aged 65 years or older is projected to reach 14 million people by 2060 (Alzheimer's Association, 2024).

With the growing incidence of Alzheimer's disease, it is important to assess effective treatment options for older adults with the disease. Due to the current incurable nature of Alzheimer's disease, researching treatment measures is beneficial to the aging population. Unless Alzheimer's disease can be effectively treated or prevented, the number of people with the disease will increase significantly. Although substantial research has been completed on Alzheimer's disease, there is a gap in the literature regarding the treatment of the disease. The purpose of this literature review is to explore the treatment options available to older adults living with Alzheimer's disease in the United States.

Methods

In this literature review, the databases PubMed and PsycINFO were utilized. PubMed contains life science and biomedical literature. As this literature review is specific to health and medicine, this database provided a myriad of articles surrounding the research question. A variety of articles were found in relation to the treatment options for Alzheimer's disease from a biological perspective. PubMed includes peer reviewed journal articles, which makes this database a reliable resource to retrieve information from. This database has an efficient tool for ensuring that inclusion and exclusion criteria are met throughout the search process. PsycINFO

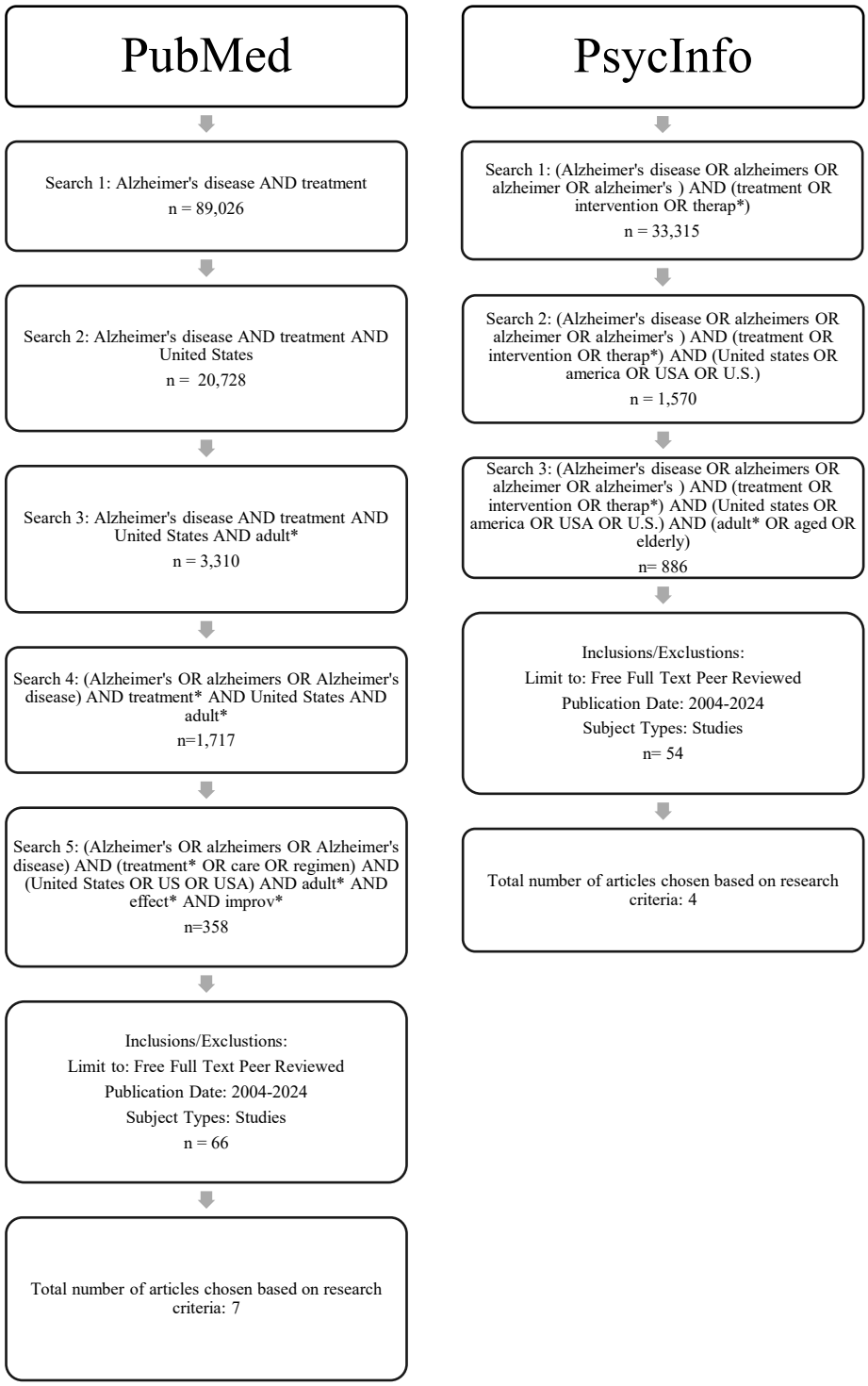
was established by the American Psychological Association. PsycINFO is commonly used to locate high-quality, peer-reviewed academic content. This database specializes in literature related to psychology and other commonly associated disciplines. PsycINFO includes peer reviewed journal articles which enables it to be effective in outsourcing information relative to the research question. The process for selecting the articles applicable to this literature review is detailed and visualized in *Figure 1.*

For PubMed, the first search terms included "Alzheimer's disease AND treatment" which yielded 89,026 results. This search provided articles that were broad to the research question, and it yielded a large quantity of articles. Because this search yielded broad information, the sequential searches aimed at narrowing the scope of the articles found. The second search included the terms "Alzheimer's disease AND treatment AND United States" to narrow the scope of the search to the United States, specifically. This search yielded 20,728 articles. The third search included the terms "Alzheimer's disease AND treatment AND United States AND adult*" to further narrow the scope of the produced articles. The asterisk was used to include all terms related to adults. This search yielded a total of 3,310 articles. The fourth search included the terms "(Alzheimer's OR alzheimers OR Alzheimer's disease) AND treatment* AND United States AND adult.*" The asterisks were used to include articles that may refer to Alzheimer's disease and treatments in other term variations. This search yielded 1,717 articles. The fifth search included the terms "(Alzheimer's OR alzheimers OR Alzheimer's disease) AND (treatment* OR care OR regimen) AND (United States OR US OR USA) AND adult* AND effect* AND improv*" to narrow the results further. The inclusion of terms related to United States allowed articles using other variations to be included. The addition of asterisks on effect and improv aimed at including articles with variations of those terms to be included. This search

produced 258 articles. The articles were then limited to free full text articles and peer-reviewed articles. The publication dates were restricted to only include articles published between 2004-2024. The articles were then limited to studies only. After these inclusions and exclusions were established, 66 articles remained. Of the 11 total articles included in this literature review, seven were from PubMed.

For the PsychInfo database, the first search terms included "(Alzheimer's disease OR alzheimers OR alzheimer OR alzheimer's) AND (treatment OR intervention OR therap*). This search yielded 33,315 articles. In order to narrow the scope, more terms specific to the research question were included. The second search included the terms "(Alzheimer's disease OR alzheimers OR alzheimer OR alzheimer's) AND (treatment OR intervention OR therap*) AND (United states OR america OR USA OR U.S.). This search yielded 1,570 articles. The third search included the terms "(Alzheimer's disease OR alzheimers OR alzheimer OR alzheimer's) AND (treatment OR intervention OR therap*) AND (United states OR america OR USA OR U.S.) AND (adult* OR aged OR elderly). This search yielded 886 articles. Including extra terms regarding treatments and the population in question, allowed the articles to be more specific to the research question. The articles were then limited to free full text articles and peer-reviewed articles. The publication dates were restricted to only include articles published between 2004-2024. The articles were then restricted to studies only. After these inclusions and exclusions were applied, 54 articles remained. Of the 11 total articles included in this literature review, four were chosen from PsychInfo.

Figure One: Article Selection Process



Results

Alzheimer's disease continues to be an increasingly common disease in the United States with several treatment options being researched. The current treatment options focus on symptom alleviation, rather than stopping the progression of the disease. The eleven articles selected for this literature review provide important information regarding the current treatment options available for people with Alzheimer's disease. The current data available on the subject show that there are three main treatment options—medications, non-pharmacological treatments, and non-invasive radiologic therapies. For a more detailed summary of the articles reviewed, refer to *Table 1. Detailed Summary of Articles Reviewed.*

Medication

Few pharmacological treatments are available for Alzheimer's disease, yet positive outcomes in patients using medications is substantial (Havreng-Thery et al., 2024). Two common drug classes have been developed to address Alzheimer's disease's effects on memory and cognition. The two drug classes are memantine and cholinesterase inhibitors (Atri et al., 2008). Cholinesterase inhibitors serve to increase levels of acetylcholine to improve communication between brain cells (Atri et al., 2008). Acetylcholine is a neurotransmitter that is critical in memory and learning (Atri et al., 2008). Memantine targets the glutamate system to reduce symptoms associated with cognitive decline (Atri et al., 2008). While these two medicines can be a treatment option on their own, the use of them in a combination therapy has yielded greater outcomes (Havreng-Thery et al., 2024). The combined use of cholinesterase inhibitors and memantine can slow the rate of functional and cognitive decline (Atri et al., 2008). Compared to people with no pharmacological treatment, those who receive combination therapy

show significantly different outcomes (Atri et al., 2008). Combination therapy also leads to a reduced mortality rate in people with Alzheimer's disease (Atri et al., 2008).

Non-Pharmacological Therapies

Non-pharmacological therapies for Alzheimer's disease are connected to lifestyle changes in the patient. In the context of the literature, lifestyle changes commonly include regular exercise and cognitive therapy (Ornish et al., 2024). Regular aerobic exercise in people with Alzheimer's disease show greater functional ability than those with limited exercise (Morris et al., 2017). Increasing aerobic exercise improves cardiorespiratory fitness which benefits memory performance and volume change, which can slow cognitive decline (Morris et al., 2017). Moderate-to-high intensity aerobic exercise has a direct relationship with positive changes in cognition (Sobol et al., 2018). The intensity of exercise and changes in peak oxygen uptake are directly corelated to changes in neuropsychiatric symptoms in patients with Alzheimer's disease (Sobol et al., 2018).While subtle changes in activity level aid in the delay of disease progression, changes lasting 20 weeks or longer show significantly greater outcomes (Isaacson et al., 2018). Recollection based therapies have been found to improve cognitive functions and reduce depression among people with Alzheimer's disease (Kim, 2020). Recollection based therapies include physical, horticultural, musical, and artistic activities (Kim, 2020).Similarly, mind-body therapies can improve biomarkers associated with Alzheimer's disease and improve cognitive function, sleep, mood, and quality of life (Innes et al., 2018).

Non-invasive Radiologic Therapies

A variety of non-invasive radiologic therapies have newly emerged as a treatment option for Alzheimer's disease. These unique therapies target specific parts of the brain most commonly affected in a person with Alzheimer's disease. Transcranial Electromagnetic Treatment (TEMT)

has been linked to cognitive enhancement and enhanced brain connectivity (Arendash et al., 2019). TEMT is accomplished by utilizing a head-device specific to each patient that relay electromagnetic ways to various parts of the forebrain (Arendash et al., 2019). TEMT can be used in familiar settings, like a person's home which makes this treatment option extremely convenient (Arendash et al., 2019). TEMT shows disease-modifying effects in Alzheimer's disease (Arendash et al., 2019). Similarly, precuneus magnetic stimulation can be beneficial in slowing down cognitive and functional decline in people with Alzheimer's disease (Koch et al., 2022). Repetitive transcranial magnetic stimulation (rTMS) occurs directly on the precuneus region of the brain that plays a key role in Alzheimer's disease and cognitive function as a whole (Koch et al., 2022). The use of an ultrasound to open the blood-brain barrier creates an opportunity to effectively treat brain disorders, like Alzheimer's disease (Rezai et al., 2020). This technique provides a reversible opening that can be sed to facilitate the delivery of therapeutics and reverse the buildup of proteins associated with Alzheimer's disease (Rezai et al., 2020).

Table 1. Detailed Summary of Articles Reviewed

	Authors	Year	Article Title and Journal	Purpose of Article	Sample Info	Type of Research	Research Finding	Limitations of Article
1	Arendash, G Cau, C Abulaban, H Baranowski, R Wisniewski, G Becerra, L Andel, R Lin, X Zhang, X Wittwer, D Moulton, J Arrington, J Smith, A	2019	A Clinical Trial of Transcranial Electromagnetic Treatment in Alzheimer's Disease: Cognitive Enhancement and Associated Changes in Cerebrospinal Fluid, Blood, and Brain Imaging *Journal of Alzheimer's disease*	To evaluate the safety and initial clinical efficacy of TEMT against Alzheimer's disease	Eight patients with mild/moderate Alzheimer's disease were treated with TEMT in-home by their caregivers for two months using a unique head device	Clinical Trial	The study found that the administration of TEMT provided cognitive enhancement, changes to CSF/blood Alzheimer's disease markers, and evidence of enhanced brain connectivity.	The sample population is extremely small which makes it more difficult to generalize the results.
2	Atri, A Shaughnessy, L Locascio, J	2008	Long-term course and effectiveness of combination	To compare the real-world clinical effectiveness in patients with	382 patients with probable Alzheimer's disease	Clinical Trial	The study found that the group who were treated with the	The sample population is extremely small which

	Growdon, J		therapy in Alzheimer disease *Alzheimer Disease and Associated Disorders*	Alzheimer's disease treated with combination therapy of cholinesterase-inhibitors and memantine			combination treatment showed greater results than the none-treatment group.	makes it more difficult to generalize the results.
3	Innes, K Selfe, T Brundage, K Montgomery, C Wen, S Kandati, S Bowles, H Khalsa, D Huysmans, Z	2018	Effects of Meditation and Music-Listening on Blood Biomarkers of Cellular Aging and Alzheimer's Disease in Adults with Subjective Cognitive Decline *Alzheimer's Disease*	To assess the effects of relaxation programs on biomarkers in adults with subjective cognitive decline and to assess the relationship of biomarker changes and cognitive function, quality of life, and psychosocial status	60 independently living older adults experiencing subjective cognitive decline. The participants were at least 50 years old and met the appropriate criteria.	Randomized Clinical Trial	People with cognitive decline may see changes in biomarkers through the use of simple mind-body therapies. Biomarker changes were associated with improvements in cognitive function, mood, quality of life, and sleep.	Relatively small sample size. Participants were all well-educated and motivated, which may limit the generalizability to other populations with memory loss.
4	Havreng-Thery, C Oquendo, B Zolnowski-Kolp, V	2024	Cholinesterase inhibitors and memantine are associated with a reduced mortality in nursing home	To examine the effects of cholinesterase inhibitors, memantine, and combined therapy	25,358 nursing home residents who were divided into groups based on	Longitudinal observational study	This study found that combination therapy is efficient in the treatment of Alzheimer's	This study may have been limited due to the data used. There may be underreporting

	Krolak-Salmon, P Bertin-Hugault, F Lafuente-Lafuente, C Belmin, J		residents with dementia	on Alzheimer's disease.	which medication they were taking		disease. This therapy reduces cognitive and functional decline as well as mortality rate.	or missing information. Comorbidities were the main concern for limitations of this study.
5	Kim, D	2020	The Effects of a Recollection-Based Occupational Therapy Program of Alzheimer's disease: A Randomized control trial *Occupational Therapy International*	To examine the effects of an occupational therapy program (5 categories of nonpharmacological intervention activities) on people with mild stage Alzheimer's disease	35 people with mild stage Alzheimer's who were regularly attending adult daycare.	Randomized Control Trial	The intervention measures assessed found that it was effective in improving cognitive functions, reducing depression, and enhancing the patient's overall quality of life.	This study's limitations include a present difficulty generalizing results to the public. This study also included a smaller number of people. Also, there were no follow-up measures taken to address longevity of results.
6	Koch, G Casula, E Bonni, S Borghi, I Assogna, M Minei, M Pelliciiari, M	2022	Precuneus magnetic stimulation for Alzheimer's disease: a randomized,	To investigate the effectiveness and safety of transcranial magnetic stimulation in targeting the	50 participants with a diagnosis of Alzheimer's disease were randomized	Clinical Trial	This study found that patients who received the TMS targeting the precuneus region showed improvements in	The sample size was small, which makes it harder to generalize the results of the study. The

	Motta, C D'Acunto, A Porrazzini, F Maiella, M Ferrari, C Caltagirone, C Santarnecchi, E Bozzali, M Martorana, A		sham-controlled trial *Brain*	precuneus region of the brain in patients with Alzheimer's disease	into two groups.		cognitive function compared to the placebo group. Specifically, memory and attention were positively affected.	placebo effect may also be in-play
7	Morris, J Vidoni, E Johnson, D Sciver, A Mahnken, J Honea, R Wilkins, H Brooks, W Billinger, S Swerdlow, R Burns, J	2017	Aerobic exercise for Alzheimer's disease *PLOS ONE*	To investigate the effects of physical exercise on executive function, functional ability, depression, and memory.	76 older adults with probable Alzheimer's disease	Randomized Control Trial	In early Alzheimer's disease, aerobic exercise is associated with benefits in functional ability. There were positive findings in cardiorespiratory fitness, improved memory performance, and reduced hippocampal activity.	Because this is a randomized control trial, participants who participate may not be reflective of their demographic.
8	Oliveira, J Gamito, P Souto, T Conde, R	2021	Virtual Reality-Based Cognitive Stimulation on People with Mild	To explore the effect of cognitive stimulation producing several	The sample included 17 older adults with a mean	Pilot Randomized Control Trial	Virtual Reality based cognitive stimulation can have positive	There was no active control group. If there had been a

	Ferreira, M Corotnean, T Fernandes, A Silva, H Neto, T		to Moderate Dementia due to Alzheimer's Disease *International Journal of Environmental Research and Public Health*	instrumental activities of daily living on people with mild to moderate dementia caused by Alzheimer's disease	age of 83 years old. There were varying levels of education.		effects on global cognitive functions in individuals with Alzheimer's dementia	control group included, there would be a greater degree of certainty on the results
9	Ornish, D Madison, C Kivipelto, M Kemp, C McCulloch, C Galasko, D Artz, J Rentz, D Lin, J Norman, K Ornish, A Tranter, S DeLamarter, N Wingers, N Richling, C Kaddurah-Daouk, R Knight, R McDonald, D Patel, L Verdin, E Tanzi, R	2024	Effects of intensive lifestyle changes on the progression of mild cognitive impairment or early dementia due to Alzheimer's disease *Alzheimer's Research and Therapy*	To examine the effects of intense lifestyle changes on individuals with MCI or early dementia due to Alzheimer's disease.	51 adults aged 45-90 with MCI or early-stage dementia due to Alzheimer's disease.	Randomized Controlled Clinical Trial	People with MCI or early dementia due to Alzheimer's disease may see improved cognition and function when comprehensive lifestyle changes are implemented.	Small population size & two participants withdrew from trial. Lack of racial and ethnic diversity, so not generalizable to the population.

	Arnold, S							
10	Rezai, A Ranjan, M D'Haese, P Haut, M Carpenter, J Najub, U Mehta, R Chazen, J Zibly, Z Yates, J Hodder, S	2020	Noninvasive hippocampal blood-brain barrier opening in Alzheimer's disease with focused ultrasound *Proceedings of the National Academy of Sciences of the United States of America*	To explore the potential of using focused ultrasounds as a non-invasive technique to temporarily open the blood-brain barrier in patients with Alzheimer's disease	Six participants with early Alzheimer's disease	Clinical Trial	This study found that focused ultrasounds could be a useful method for enhancing drug delivery to the brain in patients with Alzheimer's disease, leading to the improvement of treatments.	The sample population is extremely small which makes it more difficult to generalize the results.
11	Sobol, N Dall, C Hogh, P Hoffmann, K Frederiksen, K Vogel, A Siersma, V Waldemar, G Hasselbalch, S Beyer, N	2018	Changes in Fitness and the Relation to Change in Cognition and Neuropsychiatric Symptoms After Aerobic Exercise in Patients with Mild Alzheimer's Disease *Journal of Alzheimer's Disease*	To investigate the effect of moderate-to-high intensity aerobic exercise on cardiorespiratory fitness and the association of the changes in VO2peak and changes in cognition and neuropsychiatric symptoms in patients with Alzheimer's disease.	55 participants aged 52-83 years old. 29 people were placed in the intervention group and 26 were placed in the control group	Randomized Controlled Trial	Aerobic exercise improves VO2peak in community-dwelling patients with mild Alzheimer's disease. The positive changes in VO2peak are associated with changes in cognition and neuropsychiatric symptoms	The sample size was relatively small, making it more difficult to generalize this data to a broader population.

Discussion

Treatments for Alzheimer's disease remains a crucial area of research due to the increasing prevalence of the disease and the accompany impact on patients, families, and the healthcare system overall. Current research has focused on identifying various treatment types that aim to slow cognitive decline, alleviate symptoms, and enhance the quality of life for adults with Alzheimer's disease. The importance of this research lies in addressing the complex nature of Alzheimer's disease and the fact that no cure currently exists. A multifaceted approach to the treatment of Alzheimer's disease may show improvements larger than just a single area.

The use of medications as a treatment option for Alzheimer's disease continues to serve as an important area of research. Specifically, the combined use of cholinesterase inhibitors and memantine can slow the rate of functional and cognitive decline (Atri et al., 2008). The use of both of the medications have shown substantial strides in care and have had lasting impacts on people with Alzheimer's disease. The two medications target specific symptoms that are most common with Alzheimer's disease, which alleviate symptoms and improve the quality of life in patients receiving this care. Though medication alone cannot stop or cure Alzheimer's disease, it remains a critical component of treatment that could be significant alongside other treatment approaches, like non-pharmacological and non-invasive radiologic therapies.

The implementation of non-pharmacological therapies to treat Alzheimer's disease has shown immense progression. This holistic approach to treatment have been important in improving blood flow, memory, mood, and learning in people with Alzheimer's disease (Ornish et al., 2024). The mental stimulation associated with cognitive therapies can allow people to engage with mentally stimulating activities that promote learning and memory, that can overall

delay the progression of Alzheimer's disease (Kim, 2020). Aerobic exercise improves blood flow to the brain and reduces cognitive decline (Sobol et al., 2018). Implementing these therapeutics alongside effective medication usage may show greater outcomes than one treatment alone.

The advancement of non-invasive radiologic therapies to treat Alzheimer's disease has expanded the possibilities of care. Radiological techniques that target specific regions of the brain, linked to Alzheimer's disease, can make innovative treatment more manageable (Rezai et al., 2020). From eliminating plaque associated with Alzheimer's disease to stimulating unique parts of the brain, the innovation behind this technique is showing significant promise. While these options are still fairly new, the reviewed studies show encouraging results for the future of Alzheimer's care. These studies have shown that memory, mood, quality of life, and learning can all be positively impacted by this type of care (Koch et al., 2022). Treatment can be personalized for each patient, making this an opportunity for a novel class of care.

Limitations

This literature provided data from only ten articles. Because this area of research is fairly new, there may be articles that have yet to be published. Many of the studies contained small sample sizes which make it hard to generalize the results to fit the broader population. Some studies were specific to people with Alzheimer's disease in assisted living conditions, which increased the difficulty of adapting the data to people who are not in similar circumstances. Because not all of the articles consisted of the same type of study, they all contain specific limitations that the other studies do not.

Further Research

Because Alzheimer's disease is mostly caused by genetics, further research on the treatment of the disease is crucial. In order to adequately address the need for this research, there must be specific research that can focus on people in all communities and of all backgrounds. Also, expanding research for a definitive cure for Alzheimer's disease would serve the population significantly. With an aging population, Alzheimer's disease could become more evident and finding a disease-modifying cure would improve the overall health of the country.

Further Practices

While expanding research on the treatment of Alzheimer's disease is important, ensuring that people with the disease can access effective care is crucial. The cost of treatments for Alzheimer's disease should not add to the burden already associated. Examining the inequalities in healthcare in the United States and implementing policy that allows people to access appropriate care is important.

Conclusion

In conclusion, the current scientific literature indicates the need for more innovative research on treatments for Alzheimer's disease. Similarly, research that combines the current three treatment options could give insight into the possible positive outcomes. The findings of this literature review will hopefully urge public health and medical efforts to address the currently limited scope of practice in treatment options for Alzheimer's disease. Through improvements in the treatment options for adults living with Alzheimer's disease, the associated burden will be alleviated.

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