

Multidimensional Approach for Managing Cognitive Dysfunction in Aging Adults

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Abstract

The rapidly aging global population has led to an increase in age-related neurodegenerative diseases such as Alzheimer's disease and dementia, highlighting the urgent need to address cognitive impairment. This research paper outlines a comprehensive narrative of multidisciplinary approaches to treat cognitive impairment in older adults. This review focuses on pharmacological interventions, non-pharmacological interventions, and novel treatments. A systematic search of electronic databases was performed to identify relevant articles and scored against pre-defined inclusion and exclusion criteria. Data from selected studies were combined and grouped into different sections to highlight different strategies used to treat cognitive impairment. The results highlight the importance of individualized care planning, close monitoring, and collaboration between health professionals, patients, and caregivers. Pharmacological interventions, such as cholinesterase inhibitors and memantine, play an important role but have variable efficacy and potential side effects. Nonpharmacological interventions such as cognitive stimulation, physical activity, diet and social support have shown beneficial effects on cognitive function and overall well-being. Integrating different interventions into individual care plans can improve treatment effectiveness and quality of life. In addition, new therapeutic modalities such as non-invasive brain stimulation and disease-modifying therapies are also promising but require further research. This research paper highlights the importance of an interdisciplinary approach, future research areas, and the social and economic importance of treating cognitive impairment in the elderly. By adopting a holistic paradigm, medical professionals can manage the complexities of cognitive impairment and improve the lives of those affected.

Keywords: Cognitive Dysfunction; Geriatrics; Dementia; Multidisciplinary Approach

1. Introduction

In a world where the population is rapidly aging and age-related neurodegenerative diseases like Alzheimer's and dementia are on the rise, the impact of cognitive impairment cannot be ignored. It poses a significant challenge for the elderly, affecting their independence, daily functioning, and overall quality of life. The treatment of cognitive impairment in older adults is no simple task, requiring a comprehensive and collaborative approach involving various healthcare professionals, diverse care settings, and a range of interventions [1].

To address this complex issue, a multidisciplinary approach emerges as the key to effectively combat cognitive impairment in the elderly population. This approach entails a careful combination of pharmacological and non-pharmacological interventions, tailored to the unique needs of each individual [2]. By optimizing cognitive function, promoting independence, and enhancing overall quality of life, this approach seeks to improve the lives of older adults battling cognitive impairment. Achieving such outcomes requires

the seamless collaboration of medical professionals, patients, and caregivers, ensuring thorough assessment, personalized care planning, and continuous monitoring of patient progress [3].

Within the realm of this narrative review lies a comprehensive exploration of the multidisciplinary approaches employed to treat cognitive impairment in older populations. It sheds light on the pivotal roles played by various healthcare professionals, delves into the realm of pharmacological and non-pharmacological interventions, and underscores the significance of individualized care. The ultimate goal is to emphasize the importance of this holistic approach while also identifying areas for future research, with the aim of advancing the understanding and management of cognitive impairment in older adults.

The consequences of cognitive impairment in the elderly extend far beyond the individual level; they have profound implications for societies worldwide. In fact, the World Health Organization (WHO) predicts a threefold increase in the global prevalence of

dementia by 2050, with a staggering 152 million people affected. Alongside the personal and emotional burdens, the economic burden is also immense, with projected costs surpassing \$2 trillion by 2030. It is evident that addressing cognitive impairment in older adults is not only a matter of healthcare but also a pressing social and economic imperative [4].

2. Research Methodology

This narrative review seeks to offer a comprehensive understanding of the various multidisciplinary approaches employed in the treatment of cognitive impairment among the elderly population. The review specifically focuses on three key areas: pharmacological interventions, non-pharmacological interventions, and emerging therapies. In order to achieve this goal, the review follows a specific methodology outlined as follows [5].

3. Literature Review

An extensive and systematic search was conducted across electronic databases, namely PubMed, MEDLINE, and the Cochrane Library, to identify pertinent articles published until March 2023. The search strategy encompassed a combination of carefully selected keywords and MeSH terms to maximize the relevance and scope of the retrieved literature. The search terms employed included but were not limited to "cognitive dysfunction," "geriatrics," "Alzheimer's disease," "dementia," "mild cognitive impairment," "pharmacological interventions," "nonpharmacological interventions," "multidisciplinary approach," "emerging therapies," "cognitive stimulation," "physical activity," "nutrition," "social support," "brain stimulation," and "disease-modifying therapies." This comprehensive approach aimed to capture a wide range of relevant studies for the research paper.

4. Criteria for Inclusion and Exclusion

For the purpose of this research paper, a rigorous inclusion and exclusion criteria were applied to ensure the selection of highly relevant articles. Only papers that specifically addressed pharmacological or non-pharmacological interventions targeting cognitive impairment in the elderly population, as well as those discussing novel treatments in this domain, were considered for inclusion. To maintain the consistency and focus of the study, articles that were not in the English language, primarily focused on non-elderly populations, or did not provide substantial and pertinent information pertaining to the treatment of cognitive impairment were excluded from the analysis. This approach was implemented to enhance the quality and applicability of the chosen literature to the research paper.

5. Study Selection

The initial phase involved assessing the pertinence of the titles and abstracts of the identified articles. Subsequently, full-text articles were thoroughly evaluated to determine their relevance, applying the predetermined inclusion and exclusion criteria. Additionally, the reference lists of the included articles were examined to identify any additional studies that met the criteria for relevance. This comprehensive approach was employed to ensure a comprehen-

sive and meticulous selection of studies for the research analysis.

6. Data extraction and Synthesis

To present a comprehensive overview of multidisciplinary approaches for addressing cognitive impairment in older populations, data from the included studies were extracted and synthesized. The extracted information encompassed crucial aspects such as the type of intervention employed, the characteristics of the study population, the primary outcome measures, and the corresponding results. These findings were then categorized into distinct sections focusing on pharmacological interventions, non-pharmacological interventions, and emerging treatments. This systematic organization of results facilitates a clear and structured presentation of the diverse strategies employed in managing cognitive impairment in older adults.

7. Quality Assessment

The methodological rigor of the included studies was evaluated through the utilization of recognized assessment tools, such as the Cochrane Risk of Bias tool for randomized controlled trials and the Newcastle Ottawa Scale for observational studies. These tools enabled a comprehensive assessment of the methodological quality and potential biases in the studies under review. When presenting the results and drawing conclusions, careful consideration was given to the overall strength of the evidence, taking into account factors such as study design, sample size, methodology, and the quality of the included studies. This approach ensures a balanced and informed interpretation of the findings within the context of the available evidence.

8. Pharmacological Management

The treatment of cognitive impairment in older adults often involves the use of pharmacological interventions, including cholinesterase inhibitors (such as donepezil, rivastigmine, and galantamine) and memantine. These medications have shown to slow down cognitive decline in Alzheimer's disease and are typically administered on a daily basis. They have been moderately effective in improving overall functioning. Cholinesterase inhibitors work by increasing the levels of acetylcholine, a neurotransmitter crucial for memory and learning. On the other hand, memantine modulates the activity of glutamate, another neurotransmitter involved in memory and learning processes [6].

However, it's important to note that the effectiveness of these drugs can vary from person to person and may not be suitable for all types of dementia or cognitive impairment. For instance, cholinesterase inhibitors have demonstrated limited efficacy in patients with vascular dementia and mixed dementia, and their effectiveness in treating mild cognitive impairment (MCI) is still being studied. Furthermore, pharmacological interventions can lead to side effects such as gastrointestinal discomfort, dizziness, and headaches, which can impact a patient's adherence to treatment and overall quality of life.

Therefore, individualized treatment plans and close monitoring of

patient response are crucial. This includes regular assessments of cognitive function, daily functioning, and potential side effects. Effective communication and collaboration among healthcare professionals, patients, and caregivers are essential components of this monitoring process.

In addition to cholinesterase inhibitors and memantine, ongoing research is exploring other pharmacological approaches for the treatment of cognitive impairment in the elderly population. For example, antidepressants like selective serotonin reuptake inhibitors (SSRIs) and norepinephrine reuptake inhibitors (SNRIs) are recommended for patients with cognitive impairment, as these conditions often coexist and can worsen cognitive decline. These medications have been successfully used to treat depression and anxiety in older adults. Antipsychotics such as risperidone and olanzapine are sometimes prescribed to manage behavioral and psychological symptoms of dementia (BPSD) such as agitation, aggression, and psychosis. However, their usage should be carefully monitored due to potential side effects and increased risk of adverse events in the elderly [7,8,9].

Furthermore, addressing vascular risk factors such as hypertension, hyperlipidemia, and diabetes can indirectly contribute to the treatment of cognitive impairment by reducing the risk of cerebrovascular events and promoting brain health. Thus, adopting a comprehensive pharmacological approach that addresses both cognitive symptoms and comorbidities is crucial for optimizing the treatment of cognitive impairment in older adults [10].

In conclusion the elderly. However, their effectiveness varies among individuals and may be limited in certain types of dementia or cognitive impairment. It is important to develop personalized treatment plans, closely monitor patient response, and carefully consider the potential benefits and risks of medication. Integrating pharmacological interventions with non-pharmacological approaches and novel therapies can further enhance treatment efficacy and improve the quality of life for older adults with cognitive impairment.

9. Non-pharmacological Interventions

Non-pharmacological interventions are just as essential as pharmacological ones and form an integral part of the holistic management of cognitive impairment. These interventions are employed in conjunction with pharmacotherapy to optimize cognitive function, improve daily functioning, and enhance the overall quality of life for adults who are experiencing a decline in their cognitive abilities [11].

10. Cognitive Stimulation and Training

Cognitive stimulation and exercise are valuable interventions aimed at engaging older adults in mentally stimulating activities to enhance their cognitive function. These activities encompass a wide range of tasks, from memory exercises to intricate problem-solving exercises. Numerous studies have provided evidence for the effectiveness of cognitive stimulation and exercise in im-

proving cognitive function and slowing down cognitive decline among older adults with mild cognitive impairment (MCI) and dementia. Importantly, these interventions have also demonstrated benefits for both individuals with cognitive impairment and their caregivers, fostering improved communication and overall quality of life [11].

11. Physical Activity

Engaging in regular physical activity has proven to offer numerous advantages for older adults dealing with cognitive impairment. These benefits encompass enhanced cognitive function, reduced risk of cognitive decline, and improved overall physical and mental well-being. Tailored physical activity programs, specifically designed to accommodate individual abilities, preferences, and health conditions, are highly recommended as a fundamental component of a comprehensive approach to treating cognitive impairment in the elderly population [13].

12. Nutrition and Dietary Interventions

Maintaining a healthy diet is strongly linked to enhanced cognitive function and a decreased risk of cognitive decline among older adults. Emerging evidence indicates that specific dietary patterns, such as the Mediterranean diet, which emphasizes the consumption of fruits, vegetables, whole grains, and healthy fats, exhibit protective effects against cognitive decline and the onset of dementia. Moreover, targeted nutritional interventions that address nutrient deficiencies, including vitamin B12 and omega-3 fatty acids, hold promise in benefiting older adults with cognitive impairment [12,14]. Incorporating these dietary strategies into the management of cognitive impairment among the elderly population offers potential avenues for promoting cognitive well-being and overall brain health.

13. Social Support and Environmental Modifications

Ensuring sufficient social support and creating suitable environments are crucial for promoting independence and daily functioning among older adults with cognitive impairment.

Implementing interventions such as support groups, respite care, and adult day care programs can offer both emotional and practical assistance to individuals with cognitive impairment as well as their caregivers. Additionally, making environmental modifications such as simplifying daily tasks, enhancing home security measures, and employing reminders can significantly aid older adults with cognitive disabilities in navigating their surroundings more efficiently. By incorporating these supportive measures, individuals with cognitive impairment can experience improved quality of life and maintain a greater level of autonomy in their daily lives [12,15].

14. Multicomponent Interventions

Emerging research highlights the remarkable advantages of integrating diverse non-pharmacological interventions, including cognitive stimulation, physical activity, and nutritional counseling, into personalized and holistic care plans for older adults grappling with cognitive impairment. These multicomponent interventions

have garnered attention for their potential to enhance cognitive function, optimize daily living capabilities, and elevate overall quality of life among individuals affected by mild cognitive impairment (MCI) and dementia. By intertwining these various approaches, healthcare professionals can foster comprehensive and tailored strategies that address the multifaceted needs of older adults with cognitive impairment [13,16, 17,18].

15. Emerging Therapies

Amidst the established interventions, both pharmacological and non-pharmacological, researchers are actively delving into innovative therapeutic approaches to combat cognitive impairment in older adults. These novel treatments strive to target the root causes of cognitive decline, alleviate symptoms, and enhance the overall well-being of this population.

One such pioneering avenue revolves around the exploration of non-invasive brain stimulation techniques, including transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS). Preliminary findings indicate their potential in augmenting cognitive function and potentially mitigating symptoms of depression in individuals with mild cognitive impairment and dementia. However, further comprehensive investigations are warranted to unveil their long-term efficacy and safety profiles [19,20]. Another promising frontier lies in the development of disease-modifying therapies, which aim to tackle the underlying pathological processes implicated in cognitive impairment, such as amyloid beta accumulation and neuroinflammation. Ongoing clinical trials are investigating the efficacy of various investigational drugs, such as anti-amyloid monoclonal antibodies and small molecules targeting tau protein, for the treatment of Alzheimer's disease and other dementias. While some of these interventions have exhibited encouraging results in impeding cognitive decline, additional research endeavors are necessary to validate their effectiveness and safety conclusively [21].

16. Conclusion

In the quest to address cognitive impairment in the elderly population, a multidisciplinary approach emerges as the key to unlocking effective treatment strategies. This approach encompasses a comprehensive range of interventions, spanning both pharmacological and non-pharmacological realms, finely tailored to individual needs and preferences. Recent breakthroughs have underscored the immense potential of cognitive stimulation therapy, physical activity, healthy dietary choices, social support, and environmental modifications in enhancing cognitive function and elevating the quality of life for older adults grappling with cognitive impairment.

The collaborative synergy between various healthcare professionals proves instrumental in ensuring a holistic approach to care, involving thorough assessment, personalized care planning, and diligent monitoring of each patient's progress. Nevertheless, further research endeavors are essential to unravel the optimal combinations of interventions and to forge individualized care strategies

catered to the diverse array of cognitive impairments.

Simultaneously, concerted efforts within the realm of public health are imperative, as they spearhead the mission of raising awareness, promoting early detection and intervention, and fostering a nurturing environment for both older adults with cognitive impairment and their devoted caregivers.

By embracing this multidisciplinary paradigm, health professionals become equipped to effectively navigate the intricate landscape of cognitive impairment in older populations, facilitating the preservation of independence and the sustenance of a gratifying quality of life. As we forge ahead, let us remain steadfast in our pursuit of knowledge, driven by the relentless pursuit of understanding, and unwavering in our commitment to empower those affected by cognitive impairment. In doing so, we illuminate a brighter path towards a future enriched with compassion, support, and transformative care.

Declaration

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References

1. Randhawa, S. S., & Varghese, D. (2022). Geriatric Evaluation and Treatment of Age-Related Cognitive Decline. In StatPearls [Internet]. StatPearls Publishing.
2. Eshkoo, S. A., Hamid, T. A., Mun, C. Y., & Ng, C. K. (2015). Mild cognitive impairment and its management in older people. *Clinical interventions in aging*, 687-693.
3. Paúl, C., Ribeiro, O., & Santos, P. (2010). Cognitive impairment in old people living in the community. *Archives of gerontology and geriatrics*, 51(2), 121-124.
4. Starr, J. M. (2010). Cognitive impairment in older adults: a guide to assessment. *Clinical Medicine*, 10(6), 579.
5. Zucchella, C., Sinforiani, E., Tamburin, S., Federico, A., Mantovani, E., Bernini, S., ... & Bartolo, M. (2018). The multidisciplinary approach to Alzheimer's disease and dementia. A narrative review of non-pharmacological treatment. *Frontiers in neurology*, 9, 1058.
6. Huisa, B. N., Thomas, R. G., Jin, S., Oltersdorf, T., Taylor, C., & Feldman, H. H. (2019). Memantine and acetylcholinesterase inhibitor use in Alzheimer's disease clinical trials: Potential for confounding by indication. *Journal of Alzheimer's Disease*, 67(2), 707-713.
7. Birks, J. S., & Cochrane Dementia and Cognitive Improvement Group. (1996). Cholinesterase inhibitors for Alzheimer's disease. *Cochrane database of systematic reviews*, 2016(3).
8. Birks, J., & Harvey, R. J. (2006). *Cochrane Database Syst.*

Rev.(18 June 2018), 6.

9. Birks, J. S., & Harvey, R. J. (2018). Donepezil for dementia due to Alzheimer's disease. *Cochrane Database of systematic reviews*, (6).
10. O Akinyemi, R., B Mukaetova-Ladinska, E., Attems, J., Ihara, M., & N Kalaria, R. (2013). Vascular risk factors and neurodegeneration in ageing related dementias: Alzheimer's disease and vascular dementia. *Current Alzheimer Research*, 10(6), 642-653.
11. Liu, X., Wang, G., & Cao, Y. (2023). Association of non-pharmacological interventions for cognitive function in older adults with mild cognitive impairment: a systematic review and network meta-analysis. *Aging Clinical and Experimental Research*, 35(3), 463-478.
12. Klimova B, Kuca K. Physical Activity Programs for Cognitive Impairment in the Elderly Population: A Systematic Review. *J Clin Med*. 2021;10(20):4648.
13. Bherer, L., Erickson, K. I., & Liu-Ambrose, T. (2013). A review of the effects of physical activity and exercise on cognitive and brain functions in older adults. *Journal of aging research*, 2013.
14. Aridi, Y. S., Walker, J. L., & Wright, O. R. (2017). The association between the Mediterranean dietary pattern and cognitive health: a systematic review. *Nutrients*, 9(7), 674.
15. Boyle, P. A., Buchman, A. S., Wilson, R. S., Leurgans, S. E., & Bennett, D. A. (2010). Physical frailty is associated with incident mild cognitive impairment in community-based older persons. *Journal of the American Geriatrics Society*, 58(2), 248-255.
16. Gheysen, F., Poppe, L., DeSmet, A., Swinnen, S., Cardon, G., De Bourdeaudhuij, I., ... & Fias, W. (2018). Physical activity to improve cognition in older adults: can physical activity programs enriched with cognitive challenges enhance the effects? A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 15, 1-13.
17. Carbone, E., Gardini, S., Pastore, M., Piras, F., Vincenzi, M., & Borella, E. (2021). Cognitive stimulation therapy for older adults with mild-to-moderate dementia in Italy: Effects on cognitive functioning, and on emotional and neuropsychiatric symptoms. *The Journals of Gerontology: Series B*, 76(9), 1700-1710.
18. Gil, I., Santos-Costa, P., Bobrowicz-Campos, E., Silva, R., de Lurdes Almeida, M., & Apóstolo, J. (2022). Effectiveness of reminiscence therapy versus cognitive stimulation therapy in older adults with cognitive decline: A quasi-experimental pilot study. *Nursing Reports*, 12(2), 339-347.
19. Lefaucheur JP. Non-invasive brain stimulation in neurology: ethical, clinical, and social responsibility issues. *Lancet Neurol*. 2007;6(12):997-1002.
20. Cotelli, M., Manenti, R., Cappa, S. F., Geroldi, C., Zanetti, O., Rossini, P. M., & Miniussi, C. (2006). Effect of transcranial magnetic stimulation on action naming in patients with Alzheimer disease. *Archives of neurology*, 63(11), 1602-1604.
21. Cummings, J. L., Morstorf, T., & Zhong, K. (2014). Alzheimer's disease drug-development pipeline: few candidates, frequent failures. *Alzheimer's research & therapy*, 6(4), 1-7.

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