





Association between Neurodegenerative and Cardiovascular Diseases: Perspectives for Healthy Aging

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ABSTRACT

Population aging poses a significant challenge to global healthcare systems. By 2025, it is projected that 20% of the world's population will be 65 years or older, with the majority residing in low- and middle-income countries. Given this projected increase, it is imperative to strengthen clinical services to manage the growing burden of disease and its associated risks. A critical consideration is the relationship between cardiovascular and neurodegenerative diseases, as the presence of the former in midlife is closely associated with the subsequent development of dementia. However, this risk can be mitigated through the adoption of healthy lifestyles, particularly optimal nutrition and regular physical exercise. Furthermore, hypertension is linked to both cognitive and physical decline in older adults, necessitating its inclusion as a priority in health promotion, prevention, and intervention programs.


Keywords: Aged, Mortality, Indicators of morbidity and mortality, Preventive health services

Asociación entre enfermedades neurodegenerativas y cardiovasculares: Perspectivas para un envejecimiento saludable

RESUMEN

El envejecimiento poblacional representa uno de los desafíos más significativos para los sistemas de salud globales. Según estimaciones previas, para el año 2025, el 20% de la población mundial tendrá 65 años o más, y la mayoría residiría en países de medianos y bajos ingresos. Ante este incremento, es imperativo fortalecer los servicios clínicos para gestionar la creciente carga de morbilidad y sus riesgos asociados. Un aspecto crítico es la relación entre las enfermedades cardiovasculares y las neurodegenerativas, debido que la presencia de las primeras, en la mediana edad, se vincula estrechamente con el desarrollo posterior de demencia. No obstante, este riesgo es modificable mediante la adopción de estilos de vida saludables, entre los que destacan la nutrición óptima y la práctica regular de ejercicio físico. Asimismo, la hipertensión arterial emerge como un factor determinante en el deterioro físico y cognitivo del adulto mayor, lo que subraya la necesidad de integrarla como eje prioritario en los programas de promoción, prevención e intervención en salud.

Palabras clave: Anciano, Mortalidad, Indicadores de morbimortalidad, Servicios preventivos de salud

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INTRODUCTION

The multifaceted consequences of population aging currently represent one of the most complex challenges for communities and healthcare systems worldwide¹. It is estimated that by 2025, 20% of the world's population will be over 65 years old, with approximately 80% of these older adults residing in low- and middle-income countries².

In this context, there is an imperative need to strengthen clinical and social services focused on prevention, diagnosis, treatment, and rehabilitation. This necessity stems from the steady increase in the burden of disease, the prevalence of risk factors, and the overall decline in health status during this stage of life³. Recent research has identified that the presence of cardiovascular diseases during midlife is associated with a significantly higher risk of developing dementia. However, this risk can be mitigated if lifestyle factors are maintained within recommended levels^{4,5}.

Furthermore, contemporary scientific evidence has documented a close relationship between hypertension and cognitive impairment in adults⁴, highlighting the convergence between cardiovascular health and the nervous system. Consequently, there is a need to address, through a literature review, the association between neurodegenerative and cardiovascular diseases in older adults, aiming to promote healthy and sustainable aging. To this end, a systematic search was conducted using the descriptors: *neurodegenerative diseases*, *cardiovascular diseases*, *older adult*, and *aging*, consulting the PubMed, Google Scholar, Scopus, and SciELO databases.

NEUROPLASTICITY MECHANISMS AND THE ROLE OF PHYSICAL EXERCISE

Neurogenesis or neuroplasticity is defined as the process of hormone production, pathway reorganization, and the generation of new synaptic connections, leading to adaptive structural and functional changes in the Central Nervous System⁶. This phenomenon occurs in response to both internal and external stimuli^{6,7}.

In this field, systematic physical exercise has been determined to be a potent promoter of neurogenesis. Physical exercise increases cerebral blood flow, facilitating the removal of metabolic waste and optimizing nutrient delivery to cells. This process

regulates neurotransmitters and synaptic connections through the use of available macronutrients, ultimately resulting in an integral improvement of metabolic, neurological, and physiological systems⁸.

HYPERTENSION AS A DETERMINANT OF CEREBROVASCULAR RISK

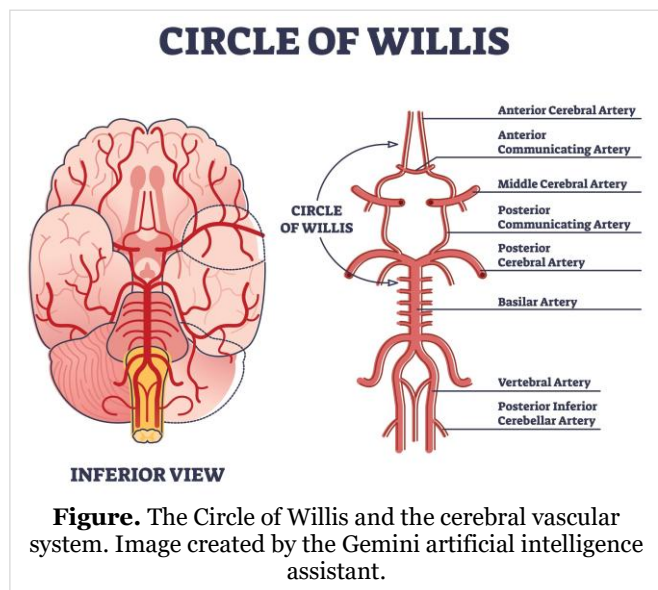
Hypertension is a Non-Communicable Chronic Disease with high prevalence and morbidity/mortality rates worldwide⁹, having severe repercussions on Health-Related Quality of Life (HRQoL)⁹⁻¹². Its etiology is closely linked to unhealthy lifestyles, such as sedentary behavior, smoking, and inadequate nutrition – factors that healthcare professionals must prioritize in control and intervention strategies¹³⁻¹⁵.

In the elderly, hypertension constitutes the primary cause of cardiovascular disease and systemic degenerative complications^{13,14,16}. Sustained increases in blood pressure predispose individuals to Cerebrovascular Accidents, of which 80% are ischemic and 20% are hemorrhagic in nature^{17,18}. Events such as aneurysms and hypertensive vasculopathy affect cortical and subcortical functions depending on the compromised vascular territory (**Figure**), directly impacting neuronal and axonal reserves¹⁹⁻²².

FROM COGNITIVE IMPAIRMENT TO DEMENTIA: CLINICAL EVIDENCE

Scientific literature emphasizes that recurrent vascular damage is a critical precursor to neurodegenerative pathologies, especially vascular dementia and Alzheimer's disease^{15,18,23}. It has been reported that three months after a cerebrovascular accident, between 20% and 30% of patients are diagnosed with dementia, while 10% to 35% present mild cognitive impairment²¹.

The progression from this cognitive impairment to chronic states is alarming: longitudinal studies have shown that up to 50% of subjects with mild cognitive impairment progress to dementia within a five-year period^{15,24}. In postmenopausal women, this risk appears to be accentuated due to the decline in estrogen levels, which play a protective role in autonomic function and endothelial vasodilation²⁵⁻²⁷. However, the use of combined hormone therapies remains a subject of debate due to the associated risk of thromboembolic events and coronary artery disease²⁸⁻³³.



AFFECTIVE COMORBIDITY AND COMPREHENSIVE GERIATRIC APPROACH

A critical aspect of post-stroke recovery is depression, which affects 31% of survivors up to five years after the event²¹. Depression is not only a consequence of neurobiological damage but also an independent risk factor for mild cognitive impairment and dementia^{34,36}. In clinical practice, depressive symptoms (apathy, loss of motivation, and concentration failures) often mask the neurodegenerative condition³⁷⁻³⁹, hindering an accurate differential diagnosis⁴⁰⁻⁴³.

For an adequate approach, it is essential to implement the Comprehensive Geriatric Assessment^{44,46}. This instrument allows for an interdisciplinary exploration encompassing the physical, cognitive, and mental health, as well as the social environment of the elderly, ensuring that interventions are carried out in safe and familiar environments that favor the restoration of functional autonomy as much as possible^{45,47}.

CONCLUSIONS

It is imperative to redesign public health programs for the elderly to serve as effective cornerstones in the prevention of chronic and neurodegenerative diseases. These programs must be grounded in education on healthy lifestyles and the promotion of regular physical activity, the latter being a decisive

preventive strategy to mitigate the onset of cardiovascular pathologies closely linked to neurodegenerative complications.

Furthermore, addressing modifiable risk factors in the geriatric population, such as smoking, alcohol consumption, and sedentary behaviors, is a high priority. In this regard, the implementation of the Comprehensive Geriatric Assessment becomes indispensable as an integral diagnostic tool to accurately assess the physical, cognitive, functional, and social domains of the patient.

Finally, the need to foster longitudinal studies that delve deeper into the association between cardiovascular and neurodegenerative pathologies is highlighted, alongside strengthening the continuous training of healthcare personnel to ensure an interdisciplinary approach. It is essential that these actions are supported by public policies that guarantee affordable and equitable access to healthcare services, together with the development of intersectoral community strategies that promote the overall well-being and active participation of this population.

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