

Influence of Confluent White Matter Hyperintensities on the Mechanics of Memory

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Abstract:

Introduction: Dementia affects approximately 55 million people worldwide and is characterized by cognitive function deterioration in areas like attention and memory. Given the high prevalence of dementia and its contribution to significant psychiatric morbidity globally, it is a critical health issue in geriatric care.

White matter hyperintensities (WMH) are associated with an increased risk of dementia and cognitive impairment. Confluent WMH (C-WMH), with larger WMH volumes, are associated with greater cognitive decline than non-confluent WMH (NC-WMH).

Presently, the pathogenesis of cognitive impairment due to WMH remains largely unknown. A better understanding of the type of memory loss in C-WMH would allow for earlier detection of individuals at risk of cognitive decline and opportunities for early interventions to slow down memory loss.

Objective: To identify the stage(s) of memory (attention, encoding, and retrieval) affected in non-demented individuals with and without C-WMH in a Southeast Asian population.

Methods: In this cross-sectional study, 496 non-demented adults were recruited from Singapore. Using magnetic resonance imaging, they were



classified as either having C-WMH or NC-WMH based on the Staals' criteria. Neuropsychological assessment tests were conducted to assess the global cognition scores and attention, encoding, and retrieval abilities of the subjects. A one-way ANCOVA with Bonferroni correction for age and years of education was performed.

Results: Individuals with C-WMH had significantly lower global cognition scores and significantly worse encoding abilities ($P=0.037$) compared to those with NC-WMH. However, the attention ($P=0.813$) and retrieval abilities ($P=0.215$) were not significantly different in C-WMH & NC-WMH adults.

Conclusion: C-WMH is associated with significantly poorer performances in encoding abilities, but not in attention and retrieval, even in adults without dementia. Understanding the specific stage of memory affected in C-WMH individuals could help guide cognitive training interventions for non-demented individuals with pre-existing WMH to reduce the future risk of cognitive decline.

Keywords:

Dementia, White Matter Hyperintensities, Memory, Global Cognition, Geriatric Care