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Relationship Between Structural Brain Changes and Cognitive Performance in Menopause Women: A Systematic Review

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ABSTRACT

Background:

Numerous studies have shown the adverse impact of menopause on cognitive function, potentially driven by the declining estrogen that also impacts brain structure. Although there is evidence of structural brain changes in menopause, the relationship between these changes and cognitive performance is lacking. This structured review aims to summarize how structural brain changes in menopausal women correlate with measurable differences in cognitive performance systematically.

Method:

We systematically reviewed studies published from 1945 to March 2022 in Medline via Ovid Medline and SCOPUS. The inclusion criteria were studies that used magnetic resonance imaging (MRI) to measure brain volumes in peri- or postmenopausal women while also incorporating cognitive assessments. Six studies met the inclusion criteria.

Results:

Postmenopausal women showed reduced performance in verbal memory tasks, particularly paragraph and paired associates delayed recall which correlated with smaller hippocampal and cortical volumes. Additionally, declines in visuospatial ability, measured by block design tests, were also linked to structural changes in the hippocampus. Working memory and executive function impairments were associated with reduced amygdalar volumes. However, some studies noted preserved cognitive functions despite structural brain alterations.

Conclusion:

Structural brain changes in postmenopausal women are evident but do not always directly correlate with cognitive decline. While changes in brain structure appear to be more sensitive to the hormonal environment during menopause, cognitive deterioration may manifest later or be mitigated by cognitive reserve. Further research is needed to better understand these relationships and their implications for cognitive health during menopause.

Keywords: Menopause; cognitive function; brain structure; MRI; verbal memory

Biodata:

Dr. Nur Zuliani is a lecturer in Anatomy with a PhD in Neuroscience. Her doctoral research focused on the brain's structure, glucose and cholesterol metabolism in vivo using menopause rats model. Her expertise spans anatomical and neurobiological aspects of menopause, contributing significantly to the understanding of cognitive and metabolic changes associated with this life stage.