



Prevalence And Significance Of Imaging Biomarkers Of Cerebral Small Vessel Disease across dementia Subtypes: A Cross-sectional Study

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Background

The prevalence of dementia is dramatically increasing worldwide. In this context, early diagnosis and identification of presymptomatic individuals at higher risk of developing dementia is crucial. Early interventions through modifiable risk factors can help in reducing the burden of dementia.

Aim

We aim to study the prevalence and significance of Imaging biomarkers of Cerebral small vessel disease (CSVD) across different sub types of dementia in the Indian context

Methods

In this cross-sectional study, 408 participants were included: 103 cognitively normal individuals, 89 with Alzheimer’s disease (AD), 121 with frontotemporal dementia (FTD), and 95 with vascular cognitive impairment (VCI). All participants underwent standardized MRI assessment using STRIVE-based criteria. CSVD imaging biomarkers, a global CSVD burden score (0-4), and regional atrophy measures were evaluated. Cognitive performance was assessed using the Addenbrooke’s Cognitive Examination-III (ACE-III). Multivariable linear regression models were used to examine associations between CSVD burden and cognition

Results

Moderate-severe white matter hyperintensities were most prevalent in VCI (65.3%), followed by AD (36.0%), FTD (27.3%), and cognitively normal individuals (17.5%). Lacunes, cerebral microbleeds, and high-grade perivascular spaces were also most frequent in VCI, whereas moderate to severe medial temporal atrophy predominated in AD. A higher global CSVD burden was independently associated with lower ACE-III scores ($\beta = -2.63$, $p = 0.008$), with a stronger association observed in dementia-only analyses ($\beta = -3.59$, $p = 0.005$). Among individual CSVD markers, white matter hyperintensities showed the most consistent independent association with cognitive performance.

Figure 1. Prevalence of CSVD Imaging Biomarkers Across Dementia Subtypes

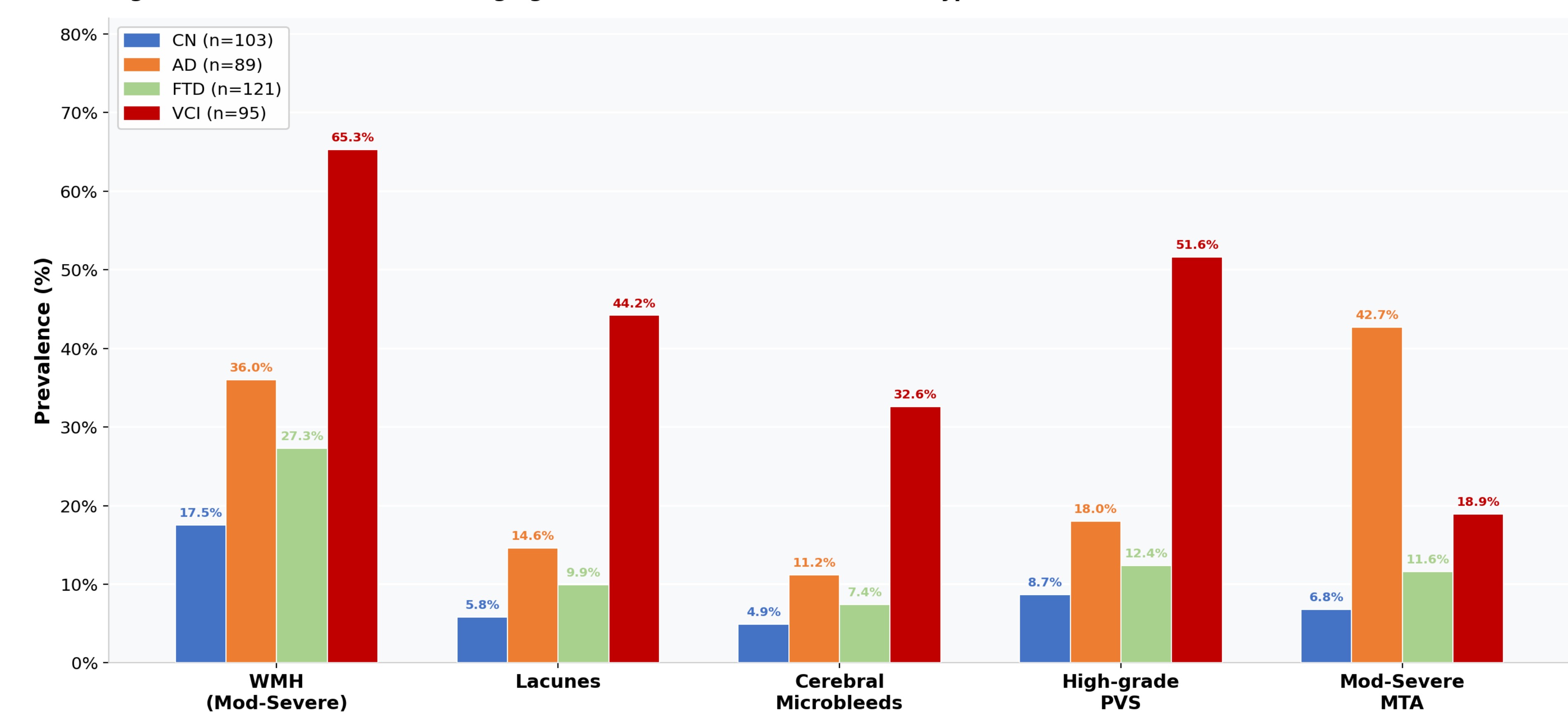
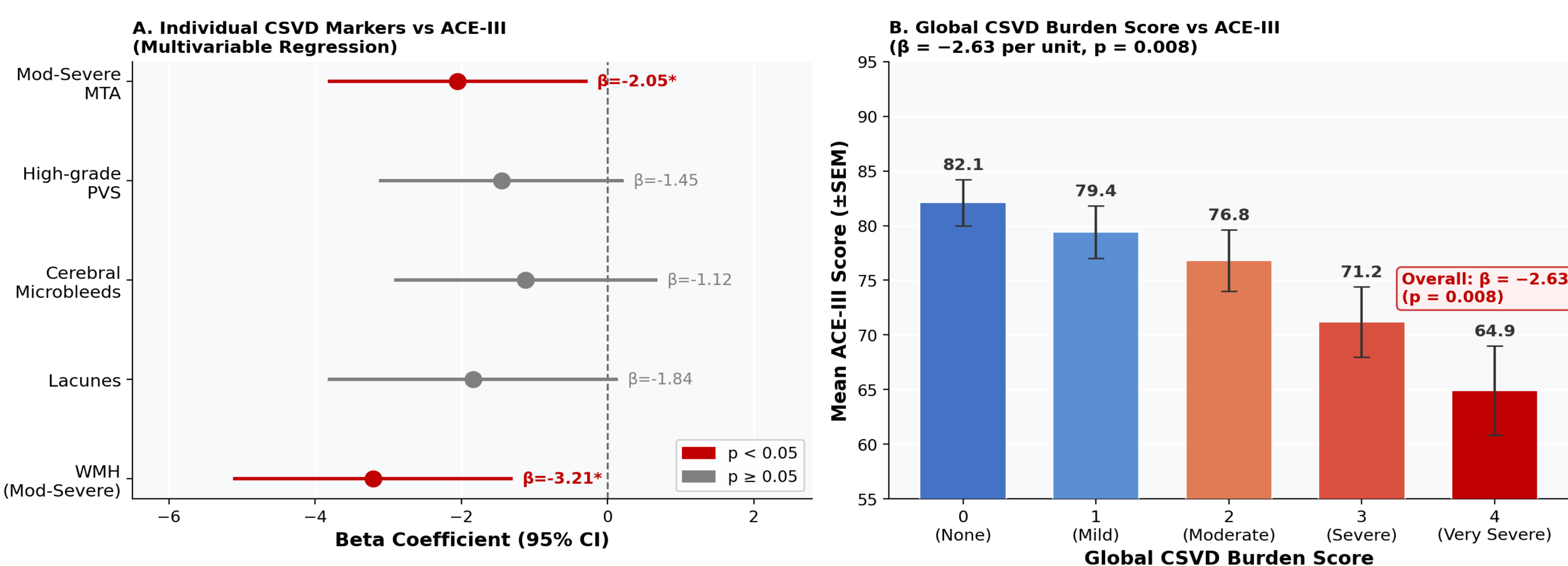


Figure 2. Association Between CSVD Burden and Cognitive Performance (ACE-III)



Conclusion CSVD imaging biomarkers are common across dementia subtypes and cognitively normal individuals; however, only white matter hyperintensities demonstrate a consistent independent association with cognitive performance.

Study Design & Methods

Cross-Sectional Study | n = 408 Participants | NIMHANS, Bangalore

CN
n = 103

Cognitively Normal

AD
n = 89

Alzheimer's Disease

FTD
n = 121

Frontotemporal Dementia

VCI
n = 95

Vascular Cognitive Impairment