Depression in later life is associated with blood pressure dependent frontal lobe hypoperfusion

Robert Briggs, Daniel Carey, Sean Kennelly, Rose Anne Kenny
The Irish Longitudinal Study on Ageing, Trinity College Dublin, Dublin, Ireland

Background: Frontal lobe white matter disease has been implicated in late life depression. Frontal lobe hypoperfusion has been suggested as a potential mechanism for this, however studies to date have generally involved small numbers, used neuroimaging rather than bedside testing and have not controlled for important covariates. The aim of this study is to examine the association between depression and frontal lobe perfusion during orthostasis in a large cohort of community-dwelling older people.

Methods: Over 2,500 participants aged ≥50 years were included and underwent measurement of orthostatic blood pressure (BP) by finometry and frontal lobe perfusion by near-infrared spectroscopy (NIRS). Depression was assessed by the 8-item Centre for Epidemiological Studies Depression Scale (CES-D).

Real-time frontal lobe cerebral oxygenation was measured by the Portalite System, detecting changes in frontal lobe perfusion and reporting a % Tissue Saturation Index (TSI).

Results: Almost 8% (209/2,616) of the study sample met criteria for depression. Multilevel models demonstrated a significantly lower TSI in participants with depressive symptoms compared to the non-depressed group at both 60 and 90 seconds post-stand with coefficients of −0.43 (95% CI: −0.63 − −0.22) and −0.37 (95% CI: −0.57 − −0.16) respectively. Controlling for relevant covariates, such as cardiovascular disease, stroke, antidepresant and antihypertensive use, did not significantly attenuate these associations.

After addition of systolic BP this association was no longer significant however, suggesting lower BP may modify this relationship.

Conclusion: This study demonstrates that depression is associated with lower frontal lobe perfusion after standing in a cohort of community-dwelling older people and that this association is BP dependent.

This finding is important because, given the established longitudinal association between hypotension and incident depression in later life, cerebral hypoperfusion may represent an underlying mechanism for a causative relationship and therefore a potential therapeutic target.