

Hemoglobin and anemia in relation to dementia risk and accompanying changes on brain MRI

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Study objective and summary result

This study examined whether hemoglobin levels are associated with the risk of incident dementia, and it found that both low and high hemoglobin levels are associated with increased risks of incident dementia.

What is known and what this paper adds

Some past investigations have reported that low and high hemoglobin levels are associated with increased risks of incident dementia, but these investigations had limitations such as short follow-up durations. This investigation provides robust evidence for the reported U-shaped association.

Participants and setting

The investigators analyzed data from 12,305 initially dementia-free individuals (57.7% female; mean baseline age, 64.6 ± 9.5 years) who participated in the Rotterdam Study, a population-based cohort study that follows residents of Rotterdam's Ommoord suburb recruited in 1990–1993, 1999–2001, or 2005–2008.

Design, size, and duration

At baseline, hemoglobin levels were measured with a colorimetric method on nonfasting venous blood samples. The participants underwent quadrennial assessments that included dementia screenings with the Mini-Mental State Examination and the Geriatric Mental Schedule, and further cognitive assessment if required. Digital medical records were continuously surveilled to identify cases of incident dementia. Suspected cases were reviewed by a consensus panel that included a neurologist. Each participant was followed until death, loss to follow-up, a diagnosis of dementia, or January 1, 2016, whichever came first. Cox proportional hazards models were used to analyze the relationship between baseline hemoglobin levels and incident dementia.

Main results and the role of chance

Over follow-up (mean duration, 12.1 years), 1,520 participants (12.4%) developed dementia. Both low and high

Table Relationship between baseline hemoglobin levels and incident dementia

Baseline hemoglobin (hemoglobin level range)	Adjusted hazard ratio (95% confidence interval) for incident dementia
First quintile (<8.11 mmol/L)	1.29 (1.09–1.52)
Second quintile (8.11–8.56 mmol/L)	1.14 (0.97–1.34)
Third quintile (8.57–8.99 mmol/L)	Reference
Fourth quintile (9.00–9.40 mmol/L)	1.17 (0.99–1.39)
Fifth quintile (>9.40 mmol/L)	1.20 (1.00–1.44)
Anemia (for men: <8.06 mmol/L; for women: <7.45 mmol/L)	1.34 (1.11–1.62)

baseline hemoglobin levels were associated with increased risks of incident dementia ($p = 0.005$).

Bias, confounding, and other reasons for caution

The results might have been affected by residual confounding.

Generalizability to other populations

The reliance on data from a cohort of predominantly northern European ancestry may limit the generalizability of the results.

Study funding/potential competing interests

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