

Role of B-vitamins as determinants of neuropsychiatric health in ageing

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The number of adults aged 60 years and over is predicted to reach up to 2 billion by 2050 and hence the associated health and socio-economic costs will continue to increase. Cognitive dysfunction, depression and anxiety are significant problems of ageing. Preventing or delaying the onset of these disorders should therefore be a public health priority. Accumulating evidence suggests that low status of folate and the related B-vitamins (B12, B6 and riboflavin) are linked to an increased risk of these conditions^{1,2,3}. The aim of this study is to investigate whether these B-vitamins are determinants of neuropsychiatric health in ageing.

Participants for this investigation were recruited to the Trinity Ulster Department of Agriculture (TUDA) Ageing cohort study and health, clinical, medication, lifestyle and nutritional details were collected (*n* 5186). A non-fasting blood sample was taken for the analysis of B-vitamin biomarkers. Cognitive function was assessed using the Mini Mental State Examination (MMSE), and depression and anxiety were assessed by the Centre for Epidemiologic Studies Depression scale (CES-D) (a score ≥ 16.0 suggestive of depression) and the Hospital Anxiety and Depression (HADS) scale (a score ≥ 11.0 suggestive of anxiety).

B-Vitamin Biomarker ²		Depression ³ (CES-D)			Anxiety ⁴ (HADS)		
		OR	95 % CI	P ¹	OR	95 % CI	P
RBC folate (nmol/l)	Q5: Reference ≥ 1520 Q1: ≤ 623	1.571	1.120–2.202	0.009	0.850	0.543–1.330	0.476
Serum B12 (pmol/l)	Q5: Reference ≥ 373 Q1: ≤ 177	1.443	1.047–1.990	0.025	0.783	0.510–1.200	0.261
Plasma PLP (nmol/l)	Q5: Reference ≥ 96.4 Q1: ≤ 35.6	1.406	1.005–1.967	0.047	1.457	0.943–2.251	0.090
Riboflavin (EGRac)	Q5: Reference ≤ 1.19 Q1: ≥ 1.46	1.574	1.141–2.170	0.006	1.130	0.746–1.713	0.563

¹Binary logistic regression was performed with adjustment for confounding factors as appropriate.

²The highest quintile (Q) of B-vitamin biomarker status was set as the reference category and was compared to the lowest quintile as shown for all biomarkers. P-value < 0.05 was considered significant.

³Depression defined as CES-D score ≥ 16.0 ⁴ Anxiety defined as HADS score ≥ 11.0 .

Abbreviations: RBC, Red Blood Cell; PLP, pyridoxal 5-phosphate; EGRac, erythrocyte glutathione reductase activation coefficient.

Those in the lowest quintile of status for each of the four B-vitamin biomarkers were at the greatest risk of depression, with a 40–57 % increased risk compared to those with the best status, after adjustment for confounding factors. No significant association was found between any B-vitamin and anxiety. Likewise, when similar analysis was performed to examine the impact of fortified food consumption, those with the highest intake (at least one portion of fortified food a day) had a significantly lower risk of depression than those who depended on natural sources of B vitamins (OR = 0.542, 95 % CI = 0.409–0.718, $P \leq 0.001$). These results suggest that a better status of B-vitamins can have a positive impact on mental health. Confirmation of these findings must await the outcomes of randomised controlled trials.

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2. Hooshmand B, Solomon A, Kareholt I, *et al.* (2012) Associations between serum homocysteine, holotranscobalamin, folate and cognition in the elderly: a longitudinal study *J Intern Med* **271** 204–212.
3. Smith D (2008) The worldwide challenge of the dementias: A role for B vitamins and homocysteine? *Food Nutr Bull* **29** S143–S172.