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Impacts of fortified foods and supplement use on B-vitamin status in older adults: findings from the TUDA study

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Sub-optimal status of one or more of the interrelated B-vitamins (folate, B12, B6 and riboflavin) is common among older adults[1], and considerable observational evidence links low B-vitamin status (and/or elevated concentrations of the related metabolite, homocysteine) with a higher risk of agerelated diseases[2,3]. These nutrients are interlinked though their roles in one-carbon metabolism, but very few studies have investigated the major contributors to status of all four B-vitamins or the trends in B-vitamin biomarkers with advancing age. The aim of this study, therefore, was to investigate the contribution of fortified foods and supplements to dietary intakes and biomarkers of B-vitamins in older adults.

From a total sample of community-dwelling older adults (n = 5,186; ≥ 60 years) initially recruited to the Trinity-Ulster-Department of Agriculture (TUDA) study from 2008–2012, an eligible subset (n = 953) was re-investigated between 2016 and 2019. Dietary intake was assessed using a 4-day food diary (over four consecutive days) in combination with a food-frequency questionnaire. Mean daily energy and B-vitamin intakes were calculated using a customised version of the nutritional software package Nutritics (V.4). Non-fasting blood samples were collected at initial sampling and at follow-up to measure corresponding B-vitamin biomarkers. Statistical differences between categories of fortified food consumption and supplement use were assessed using ANCOVA (with adjustment for relevant covariates), while relationships between dietary and corresponding biomarker variables were examined using Pearson correlation coefficients.

As dietary intakes of fortified foods increased (from 0 to > 7 portions per week), biomarkers of each B-vitamin improved in a stepwise manner ($P<0.001$), and there was a corresponding decrease in plasma homocysteine concentrations ($P<0.001$), and the highest B-vitamin biomarkers were observed in those taking B-vitamin supplements. Although mean values for B-vitamin biomarkers generally compared favourably with normal ranges, deficient status of individual B-vitamins at initial sampling (2008 – 2012) was identified in: serum folate (8%), vitamin B12 (8%), vitamin B6 (8%), riboflavin (23%). Non-consumers of fortified food or supplements were at greatest risk of deficiency for each B-vitamin. Dietary intakes from foods were significantly correlated with corresponding biomarkers for serum folate ($r = 0.458$, $P<0.001$), plasma pyridoxal-5-phosphate (PLP; $r = 0.192$, P 0.002) and erythrocyte glutathione reductase activation coefficient (EGRac; $r = -0.197$, P 0.001), whereas no significant correlation was observed for vitamin B12 intake with status.

In conclusion, regular consumption of fortified foods is an effective means to improve intakes and status of folate and related B-vitamins, reduce homocysteine concentrations and lower the prevalence of B-vitamin deficiency. These results emphasise the importance of fortified foods and supplements in contributing to status and highlight potential opportunities for the food industry to develop a wider range of foods fortified with sufficient levels of B-vitamins to optimise status and support healthy ageing.

References

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