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Higher dietary nitrate intake is associated with lower likelihood of first clinical diagnosis of central nervous system demyelination in Australian women

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Dietary nitrate is a precursor to nitric oxide, for which plausible mechanisms exist for both beneficial and detrimental influences in multiple sclerosis (MS)[1,2]. Whether dietary nitrate has any role in MS onset is unclear. We aimed to test associations between nitrate intake from food sources (plant, vegetable, animal, processed meat, and unprocessed meat) and likelihood of a first clinical diagnosis of central nervous system demyelination (FCD). We used data from the Ausimmune Study (264 cases, 474 controls). Case participants (aged 19–59 years) presenting to medical professionals in four latitudinally different regions of Australia were referred to the study with an FCD. The Australian Electoral Roll was used to recruit one to four controls per case, matched by age (± 2 years), sex and study region. Habitual dietary intake representing the 12-month period preceding the study interview was assessed to determine dietary nitrate intake. In addition to matching variables, data on education, smoking history, and history of infectious mononucleosis, weight and height were collected. A blood sample was taken for measurement of serum 25-hydroxyvitamin D concentration, which was de-seasonalised. To test associations, we used logistic regression with full propensity score matching. We used two levels of covariate matching: in model 1, cases and controls were matched on the original matching variables (age, sex, and study region); in model 2, cases and controls were additionally matched on well-established/potential risk factors for MS (education, smoking history, and history of infectious mononucleosis) and dietary factors (total energy intake and dietary misreporting). In females only (n = 573; 368 controls and 205 cases), higher nitrate intake (per 60 mg/day) from plant-based foods (fully adjusted odds ratio [aOR] = 0.50, 95% CI, 0.31, 0.81, $p < 0.01$) or vegetables (aOR = 0.44, 95% CI, 0.27, 0.73, $p < 0.01$) was statistically significantly associated with lower likelihood of FCD. No association was found between nitrate intake (any sources) and likelihood of FCD in males. To our knowledge, this is the first study to investigate dietary nitrate intake in relation to FCD. Our result that higher intake of nitrate from plant-based foods (mainly vegetables) was associated with lower likelihood of FCD in females supports our previous findings showing that following a Mediterranean diet (rich in vegetables) associates with lower likelihood of FCD[3]. The lack of association in males may be due to low statistical power and/or differing food preferences and pathological processes among males and females. Our results support further research to delineate the independent effect of nitrates form other dietary factors and explore a possible beneficial role for plant-derived nitrate in people at high risk of MS.

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