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Impact of reducing dietary greenhouse gas emissions on micronutrient intakes: preliminary results from the MyPlanetDiet randomised controlled trial

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Simultaneously improving diet quality and minimising dietary environmental impacts are central to the development of sustainable healthy diets. Altering dietary patterns to increase the proportion of plant-based foods and reduce animal-source foods has the potential to reduce dietary greenhouse gas emissions (GHGEs) and other environmental indicators[1]. However, data evaluating the impacts of these dietary changes on micronutrient intakes are scarce[2].

The MyPlanetDiet randomised controlled trial (RCT) was conducted in healthy adults across the island of Ireland [NCT05253547]. Participants were randomly assigned to follow a diet with reduced GHGEs (intervention group), or a diet based on national dietary guidelines (control group), for 12 weeks. Otherwise, all study procedures were identical. Dietary intake was assessed at baseline and endpoint using three non-consecutive 24-hour recalls, collected remotely using the Foodbook24 web-based dietary assessment tool[3]. Dietary GHGEs and micronutrient intakes were calculated from food sources only. Data were analysed using paired t-tests to assess for withingroup differences between baseline and week 12, and one-way analysis of covariance (ANCOVA) to test for differences between groups at week 12, whilst controlling for baseline intakes.

Here, we present data from one of three sites (University College Cork). Of the 127 participants enrolled, 108 completed the trial ($n = 57$, intervention group; $n = 51$, control group). The mean (SD) age of participants was 42.2 (11.9) years and 59% were female. Ninety-three percent of participants were white and 88% completed third-level education. At baseline, mean (SD) GHGEs were 7.3 (3.1) kg CO_2 equivalents/day. GHGEs reduced significantly in the intervention group ($p<0.001$), and GHGEs were significantly lower in the intervention group compared to the control group at week 12 (4.6 (1.5) vs. 6.8 (2.9) kg CO_2equivalents/day, $p<0.001$).

In the control group, intakes of carotene, vitamins B12 and C increased significantly from baseline ($p<0.05$), whereas vitamin E reduced significantly ($p = 0.005$). In the intervention group, intakes of retinol, riboflavin, niacin equivalents, vitamins B6 and B12, biotin, pantothenate, calcium, phosphorous, zinc, and potassium reduced significantly ($p<0.05$).

Compared to the control group at week 12, the intervention group had significantly higher intakes of vitamin E ($p = 0.015$) and significantly lower intakes of retinol, thiamin, riboflavin, niacin equivalents, vitamins B6 and B12, biotin, pantothenate, calcium, phosphorous, zinc and potassium ($p<0.05$). There were no differences in carotene, retinol equivalents, total folates, vitamin C, magnesium, iron, copper, or selenium.

Micronutrient intakes generally remained similar or improved in the healthy control group, whereas the low-GHGE diet resulted in reductions in some key micronutrients. Further analysis of dietary composition, the prevalence of inadequate intakes, and biomarkers of nutritional status will enable a more comprehensive understanding of the impacts of such a dietary transition on nutritional status.

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