Winter Conference 2023, 5-6 December 2023, Diet and lifestyle strategies for prevention and management of multimorbidity

Pro-inflammatory diets are associated with higher C-reactive protein and lower plasma concentrations of vitamins with anti-inflammatory potential, in the EPIC-Norfolk cohort

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The development of multiple long-term conditions (MLTC) has been shown to be associated with low-grade chronic inflammation[1]. The Dietary Inflammatory Index (DII®) is a literature-based dietary score that was developed to measure the potential impact of diet on the inflammatory status of an individual[2]. In this study, we aimed to validate the DII® score against biomarkers, including high-sensitivity C-reactive protein (hs-CRP), and plasma concentrations of vitamin C, retinol and α- tocopherol in European Prospective Investigation Into Cancer and Nutrition (EPIC)-Norfolk participants, aged 39–79 years at baseline[3].

The DII® score was calculated using a 130-item Food Frequency Questionnaire collected at baseline, between 1993 and 1997. The dietary intakes were adjusted to a 2000 kcal/day diet, to assess diet quality independently of diet quantity. Non-fasting serum cholesterol, hs-CRP, and plasma α- tocopherol, vitamin C and retinol concentrations were also measured at this time-point. Data collected via a self-administered Health and Lifestyle Questionnaire were used to establish classification of a number of variables. Analyses were conducted on sub-samples with a DII® score and measures of hs-CRP (8,034 men and 9,861 women), and concentrations of vitamin C (9,866 men and 11,702 women), retinol (3,673 men and 3,517 women) and cholesterol-adjusted α- tocopherol (3,623 men and 3,476 women). Analysis of covariance and linear regression were used to study associations across sex-specific quintiles of the DII® score (adjusted for age, BMI, smoking status, physical activity, social class and educational level), where a higher score indicates a more pro-inflammatory diet.

Mean concentrations in men and women were 2.99 and 3.09 mg/L for hs-crp, 47 and 59 μmol/L for vitamin C, 53 and 50 μg/dL for retinol and 4.34 and 4.42 μmol/mmol for cholesterol-adjusted α- tocopherol, respectively. In both men and women, mean hs-CRP was higher if the diet was more pro-inflammatory (p-trend = 0.02 in men and 0.07 in women), while concentrations of vitamin C, retinol and α-tocopherol were significantly lower (p-trend < 0.001). Positive associations for hs-CRP, but negative associations for plasma concentrations of vitamin C, retinol and α-tocopherol were evident in both men and women, after adjustments for covariates (p-trend < 0.001). The differences between Q1 and Q5 adjusted means for hs-CRP, vitamin C, retinol and α-tocopherol were +9.4%, -22.1%, -3.9% and -8.6% in men and +7.9%, -17.5%, -4.8% and -7.6% in women, respectively.

We observed statistically significant positive associations between the DII® score and hs-CRP, a well-known inflammatory biomarker, whilst significant negative associations were found for circulating concentrations of three anti-inflammatory vitamins, after adjustment for covariates. These findings indicate that the DII® score is a valid measure of the inflammatory potential of diet in these middle-aged and old adults, making it possible to study the inflammatory role of diet in MLTC development.

References

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