



Abstract

Associations between the Dietary Inflammatory Index, the Gut Microbiome, and Nutritional Status in Elderly Individuals [†]

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Abstract: Diet can influence healthy aging through anti- or proinflammatory effects, partly by modulating the gut microbiome composition. This study investigated the relationships between the Dietary Inflammatory Index (DII), the gut microbiome, and nutritional status in elderly individuals. Methods: This cross-sectional analysis included 114 home-dwelling individuals aged over 70 years. The Energy-adjusted DII (E-DII) was calculated from 3-day food diaries, and blood samples were taken to measure micronutrient status, glucose, and lipid metabolism. Body composition was assessed using bioimpedance, and fecal gut microbiome composition was analyzed through 16S rRNA gene sequencing. The participants were categorized into maintaining an anti-inflammatory diet (AD) and a pro-inflammatory diet (PD) based on the median E-DII score. The associations of E-DII groups with blood markers and microbial diversity and composition were examined using the analysis of covariance, permutational analysis of variance, and multivariate linear models. Results: The AD ($n = 57$, 76 ± 3.83 years) and PD ($n = 57$, 75 ± 5.21 years) groups were similar in age but differed in sex distribution, with a higher proportion of females in the AD group ($p = 0.02$). When compared to the PD group and adjusted for sex, the AD group had a lower body mass index, fat mass, fasting insulin level, HOMA-IR (Homeostasis Model Assessment of Insulin Resistance), fasting triglycerides, and serum uric acid concentration (all $p < 0.05$), with higher concentrations of high-density lipoprotein, red-blood-cell folate (RBC), and Omega-3 index (all $p < 0.05$). While the microbial diversity and composition did not differ between the DII groups, folate concentrations were negatively associated with *Agathobacter* and positively associated with *Bacteroides* abundance (both $q = 0.23$). Lower uric acid concentrations were associated with a higher abundance of *Bifidobacterium* ($q = 0.09$) and lower abundance of *Phocaeicola* ($q = 0.11$). Discussion: The study suggests that following an anti-inflammatory diet is associated with improved nutritional status in the elderly. Dietary blood markers, rather than E-DII, were found to be associated with the gut microbiome, suggesting a potential link between the microbiome and changes in nutritional markers independent of diet. Further studies are needed to explore the causal relationship between dietary inflammatory potential, gut microbiome, and healthy aging.



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Data Availability Statement: The data presented in this study are available on request from the corresponding author on reasonable request.

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