

Associations Between Higher Dietary Inflammatory Index Scores And Blood-based Biomarkers Of Dementia



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Higher Dietary Inflammatory Index scores were associated with higher plasma YKL-40 and NfL

INTRODUCTION

We have previously found a relationship between higher DII scores (i.e., pro-inflammatory) and increased risk of all-cause and Alzheimer’s disease dementia. Therefore, we evaluated whether higher Dietary Inflammatory Index (DII) scores were associated with blood-based biomarkers of dementia in the community-based Offspring Framingham Heart Study (FHS).

METHODS

1888 adults completed a validated 126-item Food Frequency Questionnaire (FFQ). We created a DII score (based on the published method by Shivappa et al. 2014) based on previous studies linking individual dietary factors to six inflammatory markers (i.e., C-reactive protein, interleukin (IL)-1β , IL-4, IL-6, IL-10 and tumor necrosis factor-alpha), consisting of 36 components. A cumulative DII score was calculated by averaging across two FFQs (administered at examination cycles 8 (2005-2008) and 9 (2011-2014)).

Plasma blood-based biomarkers Glial fibrillary acidic protein (GFAP) and Neurofilament light chain (NfL), YKL-40, Cluster of Differentiation 14 (CD14), Ubiquitin C-terminal hydrolyse-L1 (UCH-L1), Phosphorylated tau 181 (P-tau 181) were collected at exam cycle 9. Therefore, examination cycles 9 was considered as study baseline. We used linear regression to relate the cumulative DII score to blood-based biomarkers of dementia.

Characteristics	Overall study sample
Age, years	70 ± 8
Women, n (%)	1057 (56)
Apolipoprotein ε4 allele, n (%)	393 (21)
Body Mass Index (kg/m ²)	28.3 ± 5.3
Average daily Physical Activity Index score, Median [Q1, Q3]	34.1 [31.0, 37.7]
Total caloric intake	1978 ± 749
Current smokers, n (%)	99 (5)
Estimated Glomerular Filtration Rate, Median [Q1, Q3]	76.0 [63.3, 87.0]
Dietary Inflammatory Index score	-0.76 ± 2.04
Neurofilament light pg/mL	17.6 [12.8, 24.8]
Glial fibrillary acidic protein pg/mL	173.3 [126.2, 247.7]
YKL-40 pg/mL	40021.5 [25029.5, 69477.0]
Cluster of Differentiation 14 pg/mL	1577.0 [1370.0, 1816.9]
Ubiquitin C-terminal hydrolyse-L1 ng/mL	25.0 [19.0, 37.8]
Phosphorylated tau 181 pg/mL	2.33 [1.71, 3.26]

Mean ± SD reported, unless specified otherwise.
Baseline demographic and clinical characteristics were defined at examination 7.
Abbreviations: kg, kilogram; m, meter; ng/mL, nanograms per milliliter; n, number; pg/mL, picograms per milliliter.

RESULTS

Associations between Dietary Inflammatory Index (DII) and blood-based biomarkers of dementia				
	Model 1 β ± SE*	P-value†	Model 2 β ± SE*	P-value†
DII score	0.004± 0.005	0.36	0.006 ± 0.006	0.32
DII score	0.010± 0.005	0.04	0.006 ± 0.006	0.36
DII score	0.025± 0.008	0.003	0.028± 0.010	0.01
DII score	0.001 ± 0.002	0.83	-0.001 ± 0.003	0.69
DII score	-0.008± 0.009	0.380	-0.007± 0.011	0.54
DII score	0.003± 0.005	0.52	0.006± 0.006	0.34

Model 1: Age and sex
Model 2: Model 1 + Apolipoprotein e4, body mass index, smoking status, total energy intake and estimated Glomerular Filtration Rate.
*Outcomes are log transformed. †A P-value <.05 was considered statistically significant.

Higher cumulative DII scores, were associated with higher NfL and YKL-40 concentrations after adjustment for age and sex. After additional adjustments for apolipoprotein e4 (APOE4), body mass index, smoking status, total energy intake and estimated Glomerular Filtration Rate the relationship did not hold between DII and NfL but did for DII and YKL-40.

Stratified analyses (i.e., Model 1 adjusted for age and sex) showed relationships between higher DII and higher NfL concentrations (0.016±0.006, p=0.01) among APOE4 non-carriers, but not among APOE4 carriers (-0.011±0.011, p=0.34).

CONCLUSION

Higher DII scores were associated with higher YKL-40 concentrations, but not with other dementia markers. It may be because YKL-40 captures glial-mediated systemic inflammation. Additionally, we confirmed findings of a previous study, which reported on the relationship between higher Empirical DII scores and higher NfL concentrations, among APOE4 non-carriers only.

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