Nutritional Influences on Multiple Sclerosis Disability: An Analysis of Dietary Patterns and Disease Outcomes

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Background and Objectives: Multiple sclerosis (MS) is a chronic inflammatory and neurodegenerative condition incompletely managed with disease-modifying therapies. Lifestyle modifications, such as dietary changes, are of potential benefit. Building upon prior work, we aim to evaluate associations between well-validated dietary indices and MS-related disability, using both objectively-captured and patient-reported outcome measures. We further aim to evaluate specific food groups and nutrients that are associated with MS-related disability.

Methods: Patients with MS cared at the Corinne Goldsmith Dickinson Center for Multiple Sclerosis at Mount Sinai were enrolled in this study. Enrolled participants completed a full 123item food frequency questionnaire (Block 2014 FFQ). Clinical outcomes related to MS-related disability were measured primarily by the Nine-Hole Peg Test (NHPT) and Symbol Digit Modalities Test (SDMT), and will soon include Timed 25-Foot Walk (T25FW) to create the Multiple Sclerosis Functional Composite (MSFC). Patient-reported outcomes were also collected. Our primary analysis employed linear regression models to evaluate the associations between the following dietary indices and baseline MS-related disability measures: Mediterranean Diet Adherence Screener (MEDAS), Dietary Inflammatory Index (DII), PaleoDiet Score, Plant-Based Diet Index (PDI), USDA Healthy Eating Index 2020 (HEI-20), Alternate Healthy Eating Index (AHEI), Dietary Flavonoid Diversity Index (DFDI), Dietary Approaches to Stop Hypertension (DASH)-Fung, and DASH-Mellen. The regression models were adjusted for the following confounder variables in a stepwise fashion: age, biological sex, race/ethnicity, educational attainment, employment status, body mass index, hypertension, diabetes mellitus, hyperlipidemia, smoking status, sleep disturbance, disease course, disease duration, disease-modifying therapy utilization, and time since diagnosis. Future analyses will include additional indices, such as Mediterranean-DASH Intervention for Neurodegenerative Delay Diet (MIND), and further explore the relationships between specific nutrients, disease progression, and other health outcomes in this cohort.

Results: We included 210 patients with MS in this study. The mean age of the patient population is 48.7 years (STD 13.3), 73.6% of the cohort was female, and 74.3% had a relapsing-remitting disease course. In multiple linear regression analyses adjusted by selected covariates, higher MEDAS scores positively predicted better SDMT scores (β =0.030, p=0.005), higher DASH scores predicted better Fatigue Severity Scale (FSS) outcomes (β =-0.38, p=0.045), PDI predicted better Hospital Anxiety and Depression Scale (HADS-Depression) outcomes (β =-0.39, p=0.039),

and healthy PDI (hPDI) predicted better HADS-Anxiety outcomes (β =-0.39, p=0.048). In our assessment of Spearman correlations between included dietary indices, strong positive correlations were observed between HEI-2015 and DASH (Feng) (ρ =0.73, p<0.001), while DII had negative correlations with all other dietary indices, except PaleoDiet Score (p<0.001).

Discussion: Our findings suggest that adherence to certain dietary patterns, such as the Mediterranean diet, may be associated with improved cognitive performance in patients with MS. Additionally, higher DASH and PDI scores were associated with improved fatigue and mental health outcomes, highlighting the potential of dietary modifications in managing MS-related disability. These results underscore the importance of exploring dietary interventions as complementary strategies in MS care.