RESEARCH
Original Research

No Association between Dietary Patterns and Risk for Cognitive Decline in Older Women with 9-Year Follow-Up: Data from the Women's Health Initiative Memory Study

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ABSTRACT

Background Data on the association between dietary patterns and age-related cognitive decline are inconsistent.

Objective To determine whether dietary patterns assessed by the alternate Mediterranean diet score (aMED), the Healthy Eating Index-2010 (HEI-2010), the Alternate Healthy Eating Index 2010 (AHEI-2010), or the Dietary Approach to Stop Hypertension (DASH) diet score are associated with cognitive decline in older women, and to examine whether dietary patterns modify the risk for cognitive decline in women with hypertension.

Design Prospective, longitudinal cohort study. Food frequency questionnaires were used to derive dietary patterns at baseline. Hypertension was defined as self-report of current drug therapy for hypertension or clinic measurement of systolic blood pressure ≥140 mm Hg or diastolic blood pressure ≥90 mm Hg.

Participants and setting Postmenopausal women (N=6,425) aged 65 to 79 years who participated in the Women's Health Initiative Memory Study and were cognitively intact at baseline.

Main outcome measures Cognitive decline was defined as cases of mild cognitive impairment (MCI) or probable dementia (PD). Cases were identified through rigorous screening and expert adjudication.

Statistical analyses performed Cox proportional hazards models with multivariable adjustment were used to estimate the relative risk for developing MCI or PD.

Results During a median follow-up of 9.11 years, we documented 499 cases of MCI and 390 of PD. In multivariable analyses we did not detect any statistically significant relationships across quintiles of aMED, HEI-2010, DASH, and AHEI-2010 scores and MCI or PD (*P* values for trend=0.30, 0.44, 0.23, and 0.45). In women with hypertension, we found no significant association between dietary patterns and cognitive decline (*P* values for trend=0.19, 0.08, 0.07, and 0.60).

Conclusions Dietary patterns characterized by the aMED, HEI-2010, AHEI-2010, or DASH dietary score were not associated with cognitive decline in older women. Adherence to a healthy dietary pattern did not modify the risk for cognitive decline in women with hypertension.

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COGNITIVE DECLINE IS AN INCREASING HEALTH problem.[1] Diet may play a role for preserving cognitive health.[2-4] A healthy dietary pattern is known to modulate vascular risk factors such as hypertension and to exhibit neuroprotective properties. Adherence to a healthy dietary pattern may thus provide benefits for brain functioning and may be protective against dementia.[5] To this point, investigations of various dietary approaches are gaining increasing attention and dietary patterns emerge as a potential target for reducing the burden of cognitive decline.[6]

Previous findings suggest that adherence to a Mediterranean-style diet, which emphasizes the consumption of plant foods, fish, nuts, legumes, and high intake of monounsaturated fat with olive oil as the principal source,[7] may be able to slow cognitive decline[4,8] and lower the risk for mild cognitive impairment (MCI) and primary dementia (PD)[9,10] in individuals aged 65 years or older. However, results have been inconsistent and no definitive recommendation can be made at this point.[11-14] Remaining questions include whether solely a Mediterranean-style dietary pattern or also other generally healthy dietary approaches may be

protective against cognitive decline and if a healthy dietary pattern modifies the risk for cognitive decline in those already experiencing vascular risk factors. The effects of following a healthy diet reflected in the Healthy Eating Index (HEI) 2010,[15] the Alternate Healthy Eating Index (AHEI) 2010,[16,17] or the Dietary Approach to Stop Hypertension (DASH) score[8,18] in relation to cognitive health have not been thoroughly investigated and comprehensive analyses are sparse.[8,17-19]

The Mediterranean diet assessed by the alternate Mediterranean dietary score (aMED)[20,21] and reflected by the HEI-2010, AHEI-2010, or DASH diet score have many similarities, as all emphasize vegetables, fruits, and whole grains, but there are also distinctive differences.[22] For example, the aMED emphasizes intake of monounsaturated fatty acids, fish, nuts, whole grains, and legumes but does not limit sodium consumption as do the HEI-2010, AHEI-2010, and the DASH diets, which attempt to counter the relationship between excess sodium consumption and hypertension.

The purpose of this study was to compare healthy dietary patterns assessed by the aMED, HEI-2010, AHEI-2010, and DASH diet score on the risk of cognitive decline in postmenopausal women aged 65 to 79 years. Second, we examined whether adherence to a healthy dietary pattern modified the risk for decreased cognitive performance in women with hypertension. We hypothesized that a healthy dietary pattern would be associated with a decreased risk for cognitive decline. Furthermore, we anticipated that a healthy dietary pattern would be related to a decreased risk for cognitive decline in women with hypertension.

METHODS

Study Population

The study population consisted of postmenopausal women enrolled in the Women's Health Initiative Memory Study (WHIMS) study. Details of the study design and the initial screening process have been published previously.[23-27] WHIMS aimed to examine the effect of postmenopausal hormone treatment on cognitive function and was designed as an ancillary study to the Women's Health Initiative (WHI) hormone trials (ie, WHI Estrogen+Progestin trial and WHI Conjugated Equine Estrogen trial).[23-25,27,28] Between May 1996 and December 1999, women aged 65 years or older who were free of dementia were recruited at 40 US clinical centers.[23,25,27] The WHI Estrogen+Progestin trial ended intervention in July 2002[23,25] due to an adverse risk to benefit ratio. The WHI Conjugated Equine Estrogen intervention ended in February 2004.[24,27,28] WHIMS participants continued annual post-trial cognitive assessment through the WHIMS Extension Study until July 2008 and then through the WHIMS-Epidemiology of Cognitive Health Outcomes trial (WHIMS-ECHO) to the present. Institutional review boards at participating institutions approved all protocols and all participants provided written informed consent.

The total study population consisted of 7,479 postmenopausal women. For this analysis, we excluded women with incomplete dietary information or with extreme calorie intake (ie, <600 kcal/day or >5,000 kcal/day) because these reported intakes were judged to be implausible (n=276).[29] Furthermore, women with missing baseline data (n=67), MCI at baseline (n=8), and missing follow-up data (n=240), or covariate data (n=463) were excluded from analysis. Our final study population was 6,425 women who were followed through December 31, 2012, with a median follow-up of 9.11 years.

Assessment of Dietary Patterns

Dietary intake was derived from a self-administered WHI food frequency questionnaire (WHI-FFQ) at baseline.[29-31] The WHI-FFQ is based on a modified Block questionnaire that estimated mean daily nutrient intake during the previous 3-month period.[29,30] It includes 122 composite and single-food line items asking about frequency of consumption and portion size, 19 adjustment questions related to the type of fat intake, and four summary questions about the usual intakes of fruits and vegetables and fats added in cooking or at the table.[29,30] Dietary patterns were subsequently assessed with the following dietary scoring systems: aMED, HEI-2010, AHEI-2010, and DASH. We used the MyPyramid Equivalents Database 2.0 for USDA Survey Foods, 2003-2004 (2008, US Department of Agriculture Food Surveys Research Group) to translate the various consumed food items into standardized quantities of dietary components of interest as previously described.[22]

For calculating aMED the following items were considered[20,21]: fruits, vegetables, nuts, legumes, whole grains, fish, ratio of monounsaturated to saturated fat, red and processed meats, and alcohol. Participants whose intake was above the median for fruits, vegetables, nuts, legumes, whole grains, fish, or ratio of monounsaturated to saturated fat received 1 point for each category. Consumption of red and processed meat below the median was awarded 1 point, and alcohol intake between 5 and 15 g/day was awarded 1 point. The total aMED score ranged from 0 (nonadherence) to 9 (perfect adherence).

The HEI was developed by the US Department of Agriculture's Center for Nutrition Policy and Promotion.[32] It was most recently updated in 2010 through a joint collaboration between the center and the National Cancer Institute to measure conformance to the US Dietary Guidelines for Americans.[15] The HEI-2010 contains 12 components: six components—total vegetables, total fruit, whole fruit, seafood and plant proteins, and total protein foods—are assigned 0 to 5 points, whereas five components—whole grains, dairy, fatty acids ratio (polyunsaturated fatty acids+monounsaturated fatty acids:saturated fatty acids), refined grains, and sodium—are assigned 0 to 10 points; and one component—empty calories (energy from solid fats, added sugars, and any alcohol in excess of 13 g/1,000 kcal)—is assigned 0 to 20 points. All food components except for the fatty acids ratio are scored on a density basis (per 1,000 kcal or as a percentage of energy). The HEI-2010 scores range from 0 to 100 points (perfect conformance).

The AHEI-2010 was designed as an alternative to the HEI-2010 and focuses on food and nutrients predictive of chronic disease risk.[16] The AHEI-2010 includes 11 items and each component scores from 0 (worst) to 10 (best). It emphasizes vegetables, fruits, whole grains, nuts, legumes, vegetable proteins, long-chain n-3 polyunsaturated fatty acids (PUFAs), PUFAs (excluding long-chain n-3 PUFA), moderate alcohol intake, avoidance of *trans* fat, and lower