LETTERS

Diabetes is associated with cognitive impairment no dementia in the aging, demographics, and memory study (ADAMS)

Individuals with diabetes mellitus have a 1.39 times increased risk of Alzheimer's disease, a 2.38 times increased risk of vascular dementia, and a faster rate of cognitive decline compared to individuals without diabetes (Lu *et al.*, 2009). In a study, over a 9-year follow-up diabetes was associated with accelerated progression from mild cognitive impairment (MCI) to dementia, but was not associated with progression from no impairment to MCI (Xu *et al.*, 2010). Many previous studies on cognitive impairment and diabetes are limited by the use of cognitive screens to diagnose and assess cognitive impairment. A few studies diagnosing cognitive impairment with comprehensive neuropsychological batteries provide mixed results. For instance, Luchinger *et al.* (2007) found that diabetes was correlated with the presence of MCI, whereas diabetes was not associated with the presence of dementia versus no dementia in the Aging, Demographics, and Memory Study ADAMS; (Llewellyn *et al.*, 2010).

In the current study, we aimed to determine whether the presence of diabetes was associated with: (1) cognitive impairment, no dementia (CIND; a classification of MCI due to diverse etiologies) or dementia, or (2) increased risk of developing CIND or dementia over a four-year timeframe. In ADAMS, CIND is defined as either participant's or caregiver's report of functional impairment not meeting criteria for dementia or performance on neuropsychological measures more than 1.5 standard deviations below published norms on any test of a cognitive domain. Study strengths include the longitudinal design and combined use of comprehensive neuropsychological tests, medical screening/charts, and expert consensus in determining cognitive diagnostic status: normal ($n = 307$), CIND ($n = 241$), or dementia ($n = 308$). We conducted analyses using data from the ADAMS Supplement to the Health and Retirement Study (2007), which is sponsored by the National Institute of Aging (grant number NIA U01AG009740). It was conducted jointly and approved by Institutional Review Boards at Duke University and the University of Michigan.

Participants with CIND at baseline were followed up at 16 to 18 months ($n = 180$) and 36 to 48 months ($n = 83$) to determine whether they developed dementia; those diagnosed as having no cognitive impairment at baseline were followed up at 36 to 48 months only ($n = 189$). Three logistic regression analyses were used to determine predictors of (1) normal versus CIND at baseline, (2) CIND versus dementia at baseline, and (3) conversion from normal or CIND to dementia at follow-up. All analyses were adjusted for age, gender, education (high school or greater than high school), race (Caucasian or African American), and ethnicity (Non-Hispanic or Hispanic). Nine participants were excluded from analyses due to missing information on the presence or absence of diabetes.

The mean age of participants ($N = 847$) was 81.6 years ($SD = 7.11$). Diabetes was associated with 2.19 times increased risk of CIND versus normal cognition at baseline ($CI = 1.01$ to 4.76). Age ($OR = 1.13$, $CI = 1.08$ to 1.18), and education ($OR = 0.45$, $CI = 0.26$ to 0.79) were also significant predictors in this logistic regression analysis. In the second analysis, age predicted an increased risk of dementia versus CIND ($OR = 1.07$, $CI = 1.02$ to 1.13), but no other predictors were significant. In our third analysis, only age ($OR = 1.13$, $CI = 1.06$ to 1.02) predicted conversion from normal or CIND to dementia.

This investigation is consistent with previous studies supporting cross-sectional associations between diabetes and the presence of CIND (e.g. Luchinger *et al.*, 2007). Diabetes was not, however, associated with the presence of dementia or with conversion to dementia (from normal or CIND). Of note, the ADAMS did not measure blood glucose as an estimate of pre-diabetes, which may provide a more sensitive marker of the effect of diabetes on the brain and cognitive functioning (Xu *et al.*, 2010). Our study does not address the role of diabetes in predicting dementia conversion in young-old adults, who fall in the age range of 65 to 74. In addition to the exclusion of young-old adults, ADAMS differs from many other studies in its rigorous classification of participants into cognitive diagnostic categories using comprehensive neuropsychological and medical information (versus cognitive screens or sparse neuropsychological tests). Our study is limited to information about the presence of diabetes, and at least one previous study found pre-diabetes

status as a stronger predictor of conversion to dementia (Xu *et al.*, 2010). Sensitive physiological indicators (e.g. levels of HbA1c to estimate average plasma glucose concentration) to detect poorly controlled diabetes or pre-clinical stages could predict dementia conversion and serve to clarify whether successfully controlling diabetes or pre-clinical states prevents cognitive decline in middle-old and old-old adults.

Acknowledgment

Conflict of interest

None.

Description of authors' roles

C. Gould designed the study, conducted the statistical analyses, and contributed to the writing of the letter. S. Beaudreau designed the study and contributed to the writing of the letter. H. Salman contributed to the design of the study.

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Predictors of Complementary and Alternative Medicine (CAM) use in two cohorts of Australian women

Complementary and Alternative Medicine (CAM) use has been researched widely; however, studies with older adults and Australian populations are limited. The profile of Australian women CAM users has been mapped using the 1996 data from the ALSWH (Adams *et al.*, 2003). Mid-age adults were frequent CAM users (28%) followed by young adults (19%) and older adults (15%). No consistent characteristics of CAM users across age groups were identified. Generally, CAM users lived in non-urban settings, and reported poorer physical and mental health. Predictors of CAM use for Australian women have not yet been explored.

Predictive factors of CAM use by women were explored in ALSWH in the second (1998/1999) and fifth (2007/2008) surveys for two age groups: mid-age (born 1946–1951) and older (born 1921–1926). Self-report measures of physical health, mental health, stress, common physical symptoms, medical history, and an index of accessibility and remoteness were used.

There were more non-CAM than CAM users in 1999 compared to 2007 in the mid-age adult cohort ($N = 12,338$; Age: $M = 49.52$, $SD = 1.46$, $p < 0.001$) and significantly less CAM users and less non-CAM users in 1998 compared to 2008 in the older adult cohort ($N = 10,434$; Age: $M = 84.20$, $SD = 1.44$, $p < 0.016$).

In the mid-age cohort, 3,882 (67.4%) non-CAM users were included in the logistic regression. Differences between included and excluded cases (due to missing data) were found on marital and