Alcohol consumption patterns and cognitive impairment in older women

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Abstract

OBJECTIVES—Few studies have investigated changes in alcohol consumption and risk of cognitive impairment among oldest old adults.

METHODS—In a prospective study of 1309 women ≥ 65 years old, alcohol use was assessed at repeated visits and used to estimate average change in alcohol consumption over 16 years. Clinically significant cognitive impairment (mild cognitive impairment and dementia) was assessed at year 20.

RESULTS—Compared to the reference group (slight decrease in alcohol consumption by 0-0.5 drinks/week, 60.4%), increasing consumption over time (>0 drinks/week) was not associated with risk of cognitive impairment (5.0%, OR=1.00, 95% CI 0.54-1.85). Decreasing consumption by >0.5 drinks/week was associated with increased risk (34.5%, OR=1.34, 95% CI 1.05-1.70). Adjustment for age, education, diabetes, smoking, BMI, and physical activity attenuated the magnitude of the effect slightly and resulted in borderline statistical significance.

CONCLUSION—Women in their 9th and 10th decade of life who decrease alcohol use may be at risk of cognitive impairment.

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Keywords

cognitive impairment; dementia; alcohol

OBJECTIVE

The association between alcohol use and dementia is controversial. Results from several prospective studies suggest that the relationship follows a u-shaped curve in which moderate alcohol use is associated with lower risk of cognitive impairment while abstinence and heavy drinking are associated with increased risk (1).

Despite the dynamic nature of alcohol use, only a small number of studies have considered long-term approaches to evaluating the relationship between drinking and cognitive impairment. Most have limited observation periods, between 2 to 10 years (2, 3), but longitudinal surveys indicate that frequency of alcohol use may fluctuate over extended periods of time, with both increases and decreases depending on the subgroup of consumption frequency (4). Moreover, few studies have assessed patterns of alcohol consumption in the oldest old, the population of adults 85 and older.

In this study, we investigated the long-term relationship between changes in alcohol use and cognitive impairment in a cohort of women in their 9th and 10th decade of life.

METHODS

Participants were enrolled in the Women Cognitive Impairment Study of Exceptional Aging (WISE) an ancillary study of the Study of Osteoporotic Fractures (SOF), n=9704 (5, 6). At baseline (September 1986 - October 1988), community-dwelling women aged 65 years and older were recruited from population based listings. Women did not have a previous diagnosis of dementia at baseline, and follow-up visits were repeated every 2 to 4 years. At year 20 (November 2006 - September 2008), women from three of the four SOF sites, Minneapolis, Minnesota; Portland, Oregon; and Monongahela Valley, Pennsylvania, participated in WISE, to evaluate clinical cognitive status, n=1534. Our study cohort consisted of the 1309 women from the original SOF cohort with at least 2 completed visits and cognitive evaluation; 191 were excluded due to incomplete alcohol use data (these women were less likely to complete high school, more likely to be smokers, and to have MCI/dementia compared to women included in the analysis, p<0.05 for all), and 39 women had missing or indeterminate cognitive data. This study was approved by the committees on human research at each site and at the coordinating center, the University of California, San Francisco.

Alcohol Use

At baseline, years 6, 8, 10, and 16, women were asked about the frequency (how often) and amount (number of drinks on each occasion) of alcohol consumed in the past 30 days. One drink was defined as one 12 oz beer, one 5 oz glass of wine, or one drink with 1-1.5 oz of liquor. Average number of drinks per week was calculated from these responses. Current alcohol use was categorized into four groups, nondrinker: 0 drinks per week, light: >0 to <3

drinks per week, moderate: 3 to 7 drinks per week, and heavy drinkers, women who consumed > 7 drinks per week, and possible binge drinking was estimated as reporting consumption of >4 drinks on one occasion (7). Linear regression was used to estimate average change in alcohol consumption frequency between baseline and up to year 16 with random effects included for slope and intercept. Using this estimated slope, average change in alcohol consumption over 16 years was categorized into three groups: an average decrease (Reference) between 0 to 0.5 drinks per week (this cutoff was based on the median change over 16 years which was −0.5 drinks per week), Decrease: average decrease >0.5 drinks per week, and Increase: average increase >0 drinks per week.

Clinical Cognitive Status Evaluation

At year 20, cognitive impairment was determined in a two-step process described in more detail by Yaffe et al (6). At risk women were identified by 1) score<88 on the Modified Mini-Mental State Examination; 2) score<4 on the California Verbal Learning Test delayed recall; 3) score 3.6 on the Informant Questionnaire on Cognitive Decline in the Elderly; 4) previous dementia diagnosis; or 5) nursing home residence. Women who screened negative were considered cognitively normal. In the second step, a panel of clinical experts adjudicated the cognitive status of each woman who screened positive using data from the expanded neuropsychological battery, functional status, depression, medication use, and medical history. A diagnosis of dementia was made based on DSM-IV criteria (8) and mild cognitive impairment (MCI) was diagnosed using a modified Petersen Criteria (9, 10). In this study, cognitive impairment was defined as diagnosis of dementia or MCI.

Covariates

Baseline characteristics included age, education, race, and smoking. Participants also self-reported medical history (physician diagnosed with hypertension, stroke, diabetes, or myocardial infarction) as well as medication use in the past 30 days (use of medications for sleep or for anxiety, nerves or as a muscle relaxant). We calculated body mass index (BMI) from measured height (kg) and weight (meters). Physical activity was measured by evaluating participation in recreational activities, walking, and stair climbing in the past year and calculating total kilocalories burned per week (11, 12). Geriatric Depression Scale was used to measure depressive symptoms; a score of 6 or higher was considered consistent with depression (13).

Statistical Analysis

Baseline demographics and risk factors were compared by categories of 16 year change in alcohol use frequency using Kruskal-Wallis, Fisher's Exact, or chi-square tests, as appropriate. Logistic regression analysis was used to evaluate the association between cognitive impairment and alcohol use. We calculated odds ratios and 95% CI, and models were adjusted for covariates that were previously associated with cognitive impairment or varied significantly by baseline alcohol consumption. For all other analysis, significance testing was 2-sided with significance level set at $p<0.05$. Analyses were performed using SAS, version 9.2 (SAS Institute, Inc., Cary, NC).

RESULTS

At baseline, the mean age was 68.3 (standard deviation (SD)=2.8, range=65.0-81.0), and 778 (59.4%) were current alcohol drinkers with 42.1% reporting light alcohol consumption, 13.8% reporting moderate consumption, and 3.6% reporting heavy consumption. Among women who were current drinkers at baseline, the mean number of drinks consumed per week was 2.7 (SD=4.1).

At year 20, 526 (40.2%) women developed cognitive impairment (17.5% dementia and 22.7% MCI). Baseline drinking level was not associated with risk of developing cognitive impairment (43.1% for nondrinkers, 38.8% for light drinkers, 36.1% for moderate drinkers, and 38.3% for heavy drinkers, $\chi 2$=3.64, df=3, p=0.30)

Over the 16 years, women's average change in alcohol use frequency was −0.47 (SD=0.30) drinks per week. Most women, 60.4%, reported an average slight decrease in alcohol consumption frequency of 0 to 0.5 drinks per week, while 34.5% reported an average decrease of greater than 0.5 drinks per week, and 5.0% reported an average increase in alcohol consumption (>0 drinks per week) over the 16 years. Changing patterns of alcohol use varied significantly by BMI and smoking, p<0.05 (Table).

Women who increased use over time were not more likely to development cognitive impairment compared to the reference group (Increase: 31.8% vs Reference: 38.4%; OR=1.00, 95% CI 0.54-1.85, $\chi 2$=0.00, df=1, p=0.99) while women who decreased alcohol consumption were significantly more likely to develop cognitive impairment compared to the reference group (Decrease: 44.5% vs Reference: 38.4%; OR=1.34, 95% CI 1.05-1.70, $\chi 2$=5.66, df=1, p=0.02). After adjusting for age, education, diabetes, BMI, physical activity, and smoking, the association with increased drinking remained non-significant (OR= 1.04, 95% CI 0.56-1.95, $\chi 2$=0.02, df=1, p=0.90), and the association between decreased alcohol use and risk of cognitive impairment was reduced slightly and became of borderline statistical significance (OR=1.26, 95% CI 0.98-1.61, $\chi 2$=3.29, df=1, p=0.07).

CONCLUSIONS

In this cohort of women in their 9th and 10th decade of life, moderate alcohol use did not provide a protective benefit while decreasing alcohol consumption over time may be associated with an increased risk for cognitive impairment.

A number of studies of have observed a protective effect of moderate alcohol consumption on cognitive outcomes (1). In other studies that have examined longitudinal alcohol consumption patterns, the relationship between patterns of use and risk of cognitive impairment has been inconsistent. Among older Japanese American men, those who maintained moderate use over 18 years (measured with two time points) had better cognitive performance compared to nondrinkers and men who decreased use (14). However, in another study of older men and women, rates of change in alcohol use, assessed by trajectories, were not associated with cognitive performance (15). Our study suggests that decreasing alcohol consumption may be associated with elevated risk of dementia/MCI among very old women. It is possible that women who reduced alcohol use over time may

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be at increased risk because they are no longer maintaining the protective benefits of moderate alcohol use. Alternatively, higher rates of decline in alcohol consumption are often associated with poor health (16) including increased medication use, comorbidities, and social isolation (17, 18), all of which may be associated with cognitive impairment.

These results highlight the need for continued studies that examine the life course relationship between alcohol use and dementia risk, particularly studies that examine changes in use over time in vulnerable populations.

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Table 1

Characteristics, n (%), of women by change in alcohol use patterns over time, n=1309

	Drinks/week			
	Reference (0 to −0.5) N=791	**Decrease (≤ −0.5) N=452**	**Increase (>0) N=66**	**p-value**[a]
Age, years, mean (SD)	68.1 (2.7)	68.6 (3.0)	67.8 (2.2)	0.08 [b]
Race, White	787 (99.5)	451 (99.8)	66 (100.0)	0.74[c]
Education ≥ 12 years	671 (84.8)	383 (84.7)	57 (86.4)	0.94[d]
Depression	13 (1.6)	10 (2.2)	1 (15)	0.76[d]
Medical History				
Diabetes	28 (3.5)	8 (1.8)	0 (0.0)	0.07[d]
Hypertension	236 (29.8)	130 (28.8)	13 (19.7)	0.22[d]
Stroke	6 (0.8)	3 (0.7)	0 (0.0)	0.99[c]
Myocardial infarction	24 (3.5)	10 (2.7)	1 (16)	0.59[d]
Body mass index, kg/m², mean (SD)	26.6 (4.4)	26.7 (4.3)	24.9 (3.3)	0.004[b]
Physical Activity, total kcal/wk, mean (SD)	2035.8 (1771.1)	2048.2 (1759.4)	2284.6 (1450.6)	0.08[b]
Current smoker	29 (3.7)	29 (6.4)	8 (12.2)	0.003[d]
Current sleep medication use	121 (15.3)	78 (17.3)	14 (21.2)	0.36[d]
Current anxiety medication use	121 (15.4)	67 (14.9)	7 (10.6)	0.58[d]

[a]Degrees of freedom=2 for all tests

[b]Kruskal-Wallis

[c]Fisher's

[d]Chi-square