Alcohol consumption and kidney function decline in the elderly

Vandana Menon1, Ronit Katz2, Kenneth Mukamal3, Bryan Kestenbaum4, Ian H. de Boer4, David S. Siscovick5, Mark J. Sarnak1 and Michael G. Shlipak6

Abstract

Background. Alcohol consumption appears to be protective for cardiovascular disease; however, its relationship with kidney disease is unclear.

Methods. This prospective cohort study included 4343 subjects from the Cardiovascular Health Study, a longitudinal, community-based cohort of persons aged ≥65 from four US communities. We used previously defined categories based on weekly alcohol consumption: none, former, <1 drink, 1–6 drinks, 7–13 drinks and ≥14 drinks. Cystatin C was measured at baseline, year 3 and year 7; eligible subjects had at least two measures. Estimated GFR$_{cys}$ was calculated from cystatin C. The primary outcome was rapid kidney function as an annual estimated GFR (eGFR$_{cys}$) loss >3 mL/min/1.73 m$^2$/year.

Results. Eight percent of the cohort reported former alcohol use and 52% reported current alcohol consumption. During a mean follow-up of 5.6 years, 1075 (25%) participants had rapid kidney function decline. In adjusted logistic regression models, there was no association between alcohol use and kidney function decline (odds ratio, 95% confidence interval: none = reference; former = 1.18, 0.89–1.56; <1 drink = 1.20, 0.99–1.47; 1–6 = 1.18, 0.95–1.45; 7–13 = 1.10, 0.80–1.53; ≥14 = 0.89, 0.61–1.13). Results were similar with kidney function decline as a continuous outcome.

Conclusions. Our results suggest that moderate alcohol consumption has neither adverse nor beneficial effects on kidney function. Although clinicians will need to consider the potential deleterious effects associated with alcohol consumption, there does not appear to be a basis for recommending that older adults discontinue or initiate light to moderate alcohol consumption to protect against kidney disease.

Keywords: alcohol; kidney disease; outcomes; progression

Introduction

Cardiovascular disease (CVD) and chronic kidney disease (CKD) share pathophysiologic features, and several CVD risk factors are also risk factors for progression of CKD. While alcohol consumption appears to be protective for CVD, the relationship with kidney disease is complex. Alcohol may lead to kidney disease by directly damaging the kidney [1] or by elevating blood pressure [2]. Conversely,
alcohol consumption may reduce the risk for diabetes and CVD and thus protect against the development of kidney disease [3,4]. In addition, the antioxidant properties of red wine may mitigate kidney injury induced by oxidative stress [5]. Given that CKD is a problem of growing magnitude worldwide [6], the question of whether alcohol consumption is a modifiable risk factor for the development and/or progression of kidney disease has significant public health impact.

The epidemiological literature on alcohol and kidney function decline reports mixed observations. Some studies suggested that moderate to heavy alcohol consumption increased the risk for development and progression of kidney disease [7,8], whereas other studies found no association [9,10] or suggested that it was associated with lower risk for development and progression of CKD [11–13]. Given a rapidly expanding older population and high prevalence of CKD among older people, it is particularly important to investigate whether lifestyle factors impact the risk and progression of CKD in this population. Therefore, we evaluated the association between alcohol consumption and kidney function decline among older adults who participated in the Cardiovascular Health Study (CHS).

Materials and methods

Study population

The CHS is a community-based longitudinal study of adults who were 65 years of age or older at baseline [14]. A main cohort of 5201 participants was recruited between 1989 and 1990 from four US communities (Sacramento County, CA; Forsyth County, NC; Washington County, MD; and Allegheny County, PA) [15]. An additional 687 African-American persons were recruited in 1992 and 1993; the baseline visit for these additional participants was the year 3 visit for the original cohort. Eligible participants were sampled from Medicare eligibility lists in each area. Subjects were excluded if they were institutionalized, required a proxy to give consent, were planning to move out of the area within 3 years after recruitment, required a wheelchair in the home, were receiving hospice care or were undergoing radiation or chemotherapy for cancer. Institutional review board approval for the data collection procedures of the CHS was obtained at each of the four clinical sites and at the Data Coordinating Center (University of Washington). Participants with at least two measurements of cystatin C and no missing alcohol data were included in this analysis (n = 4343).

Alcohol consumption

At baseline, participants were asked their usual frequency of consumption of alcoholic beverages (daily, weekly, monthly, yearly or rarely/never). Participants then reported the usual number of 12-oz cans or bottles of beer, 6-oz glasses of wine and shots of liquor that they drank on each occasion. The number of drinks and frequency of use of beer, wine and liquor were determined individually. We used previously defined categories based on weekly alcohol consumption: none, former, <1 drink, 1–6 drinks, 7–13 drinks and ≥14 drinks [16].

Decline in kidney function

As previously reported, cystatin C was measured in frozen sera from the visits at baseline, year 3 and year 7 [17] using a BNII nephelometer (Dade Behring, Inc., Deerfield, IL). Estimated GFR (eGFRcys) was calculated from cystatin C using the equation eGFRcys = 76.7 × cysC−1.19 [18]. Rates of change were calculated using the two or three available cystatin C measurements, and annualized change in eGFR was calculated using a least-squares regression slope. Rapid progressors were defined as the top 25% of the cohort with the largest decline in eGFR by cystatin C. This threshold corresponds to a decline >3 mL/min/1.73 m2/year and is associated with increased risk of mortality in this population [17].

Data analysis

We present baseline characteristics of the study sample across previously defined alcohol consumption categories. We performed unadjusted and serially adjusted logistic regression models with non-drinkers as the reference group to assess associations of categories of weekly alcohol consumption with the outcome of rapid progression. We selected potential

Table 1. Participant characteristics by categories of alcohol consumption

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>None (n=1395)</th>
<th>Former (n=1334)</th>
<th>&lt;1 drink (n=1412)</th>
<th>1–6 drinks (n=1395)</th>
<th>7–13 drinks (n=1335)</th>
<th>≥14 drinks (n=1335)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of drinks per week</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean no. of drinks</td>
<td>73 (5)</td>
<td>72 (5)</td>
<td>72 (5)</td>
<td>72 (5)</td>
<td>72 (5)</td>
<td>72 (5)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>1042 (61%)</td>
<td>213 (63%)</td>
<td>133 (21)</td>
<td>133 (21)</td>
<td>132 (21)</td>
<td>138 (21)</td>
</tr>
<tr>
<td>Female (%)</td>
<td>3302 V</td>
<td>3302 V</td>
<td>3302 V</td>
<td>3302 V</td>
<td>3302 V</td>
<td>3302 V</td>
</tr>
<tr>
<td>Physical activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HDL cholesterol (mg/dL)</td>
<td>51 (15)</td>
<td>51 (15)</td>
<td>51 (15)</td>
<td>51 (15)</td>
<td>51 (15)</td>
<td>51 (15)</td>
</tr>
<tr>
<td>LDL cholesterol (mg/dL)</td>
<td>136 (21)</td>
<td>136 (21)</td>
<td>136 (21)</td>
<td>136 (21)</td>
<td>136 (21)</td>
<td>136 (21)</td>
</tr>
<tr>
<td>Hypertension (%)</td>
<td>1042 (61%)</td>
<td>213 (63%)</td>
<td>133 (21)</td>
<td>133 (21)</td>
<td>132 (21)</td>
<td>138 (21)</td>
</tr>
<tr>
<td>C-reactive protein (mg/dL)</td>
<td>51 (15)</td>
<td>51 (15)</td>
<td>51 (15)</td>
<td>51 (15)</td>
<td>51 (15)</td>
<td>51 (15)</td>
</tr>
<tr>
<td>Fibrinogen (mg/dL)</td>
<td>32 (63)</td>
<td>32 (63)</td>
<td>32 (63)</td>
<td>32 (63)</td>
<td>32 (63)</td>
<td>32 (63)</td>
</tr>
</tbody>
</table>

*Median [interquartile range].
Table 2. Association of alcohol consumption with rapid kidney function decline (dichotomous outcome eGFR_cys >3)

<table>
<thead>
<tr>
<th>No. of drinks per week</th>
<th>None</th>
<th>Former</th>
<th>&lt;1</th>
<th>1–6</th>
<th>7–13</th>
<th>≥14</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>1720 (40%)</td>
<td>338 (8%)</td>
<td>863 (20%)</td>
<td>792 (18%)</td>
<td>266 (6%)</td>
<td>364 (8%)</td>
</tr>
<tr>
<td>Baseline eGFR_cys mean (SD) mL/min/1.73 m²</td>
<td>77 (19)</td>
<td>77 (20)</td>
<td>78 (19)</td>
<td>80 (18)</td>
<td>87 (78)</td>
<td>84 (17)</td>
</tr>
<tr>
<td>Odds ratio (95% confidence intervals)</td>
<td>1.00 (ref)</td>
<td>1.33 (1.02, 1.73)</td>
<td>1.17 (0.92, 1.35)</td>
<td>1.15 (0.90, 1.33)</td>
<td>1.05 (0.73, 1.35)</td>
<td>1.00 (0.66, 1.15)</td>
</tr>
</tbody>
</table>

Adjusted for age, gender, race and smoking.

Results

Characteristics of study sample

Among the 4343 participants with two or three measures of cystatin C included in this analysis, mean (SD) age was 72 (5) years; 14% of the cohort had diabetes at baseline and 23% had prevalent CVD. Mean (SD) baseline cystatin C and eGFR_cys were 1.03 (0.25) mg/L and 79 (26) mL/min/1.73 m². Mean (SD) annualized change in eGFR_cys was −1.8 (2.6) mL/min/1.73 m². There were no differences in baseline alcohol consumption between participants included in this study versus those who had fewer than two measures of cystatin C (data not shown).

Baseline factors by alcohol consumption

Forty percent of the study sample reported never consuming alcohol, while 8% had consumed alcohol in the past (Table 1). Consistent with prior studies, heavier alcohol

Table 3. Association of alcohol consumption with change in eGFR_cys (continuous outcome)

<table>
<thead>
<tr>
<th>No. of drinks per week</th>
<th>None</th>
<th>Former</th>
<th>&lt;1</th>
<th>1–6</th>
<th>7–13</th>
<th>≥14</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔeGFR-cystC</td>
<td>1720 (40%)</td>
<td>338 (8%)</td>
<td>863 (20%)</td>
<td>792 (18%)</td>
<td>266 (6%)</td>
<td>364 (8%)</td>
</tr>
<tr>
<td>Unadjusted</td>
<td>0 (ref)</td>
<td>−0.25 (−0.56, 0.06)</td>
<td>−0.05 (−0.27, 0.17)</td>
<td>−0.18 (−0.40, 0.04)</td>
<td>−0.12 (−0.46, 0.22)</td>
<td>0.09 (−0.21, 0.39)</td>
</tr>
<tr>
<td>Adjusted</td>
<td>0 (ref)</td>
<td>−0.23 (−0.55, 0.08)</td>
<td>−0.08 (−0.30, 0.13)</td>
<td>−0.20 (−0.42, 0.03)</td>
<td>−0.19 (−0.46, 0.22)</td>
<td>0.07 (−0.24, 0.37)</td>
</tr>
<tr>
<td>Adjusted</td>
<td>0 (ref)</td>
<td>−0.08 (−0.39, 0.23)</td>
<td>−0.12 (−0.33, 0.10)</td>
<td>−0.24 (−0.47, −0.02)</td>
<td>−0.19 (−0.53, 0.15)</td>
<td>0.18 (−0.14, 0.50)</td>
</tr>
</tbody>
</table>

Cell contents represent difference in change in estimated GFR mL/min/1.73 m² (beta coefficients) compared to non-drinkers (with 95% confidence interval).

Adjusted for age, gender, race and smoking.
consumption was more likely among males, smokers and the more physically active. Individuals who reported former alcohol consumption were a sicker group, consistent with the hypothesis that this group consists of individuals who discontinued alcohol consumption secondary to illness. Alcohol consumption was not related to prevalent CKD (defined as eGFRcys <60 mL/min/1.73 m²) at baseline (data not shown).

### Categories of alcohol consumption and kidney function decline

During a mean follow-up of 5.6 years, 1075 (25%) participants had rapid kidney function decline. At baseline, persons with heavier alcohol consumption had higher eGFRcys. The proportion with rapid decline was highest for former drinkers and lowest for the heaviest drinkers, but differences were small in magnitude (Table 2). Participants reporting former alcohol consumption had significantly increased odds for rapid kidney function decline compared to non-drinkers, but this relationship was attenuated and not significant after adjustment for covariates. None of the other associations reached statistical significance and the P-values for trend were also non-significant.

### Additional analyses

We repeated analyses with kidney function decline as a continuous variable (Table 3). Consistent with the dichotomized results, consumers of 14 or more drinks per week had the lowest rate of eGFRcys decline, persons reporting former alcohol consumption had the highest rate of decline, but none of the groups was significantly different from non-drinkers even in unadjusted models. We repeated the logistic regression models for rapid kidney function decline with alcohol consumption categorized as none (reference), former and current (Table 4). Consistent with analyses presented thus far, current alcohol consumption was not associated with rapid kidney function decline, whereas individuals who reported former alcohol consumption had a 33% higher increased odds of rapid kidney function decline in unadjusted analyses but the effect was attenuated by covariate adjustment. Addition of a self-reported measure of health status did not alter the observed associations (data not shown).

Logistic regression models using eGFRcreat were consistent with the eGFRcys models. There was no association between alcohol consumption and kidney function decline in unadjusted models and after adjustment for demographic variables (Table 5). In the fully adjusted model, all categories of alcohol consumption, except the one reporting

### Table 4. Association of alcohol consumption with rapid kidney function decline in logistic regression

<table>
<thead>
<tr>
<th>None (%)</th>
<th>Former (%)</th>
<th>Current (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1720 (40%)</td>
<td>338 (8%)</td>
<td>2285 (53%)</td>
</tr>
</tbody>
</table>

\[ \Delta eGFR-cysC < -3 \text{ mL/min/1.73 m}^2 \]

Unadjusted | Adjusted | Adjusted^a |
----------|---------|------------|
| 1.00 (ref) | 1.33 (1.02, 1.73) | 1.05 (0.91, 1.22) |
| Adjusted^a | 1.00 (ref) | 1.20 (0.91, 1.58) | 1.13 (0.97, 1.33) |

^a Adjusted for age, gender, race and smoking.

### Table 5. Association of alcohol consumption with rapid kidney function decline (dichotomous outcome eGFR MDRD >3)

<table>
<thead>
<tr>
<th>No. of drinks per week</th>
<th>None (%)</th>
<th>Former (%)</th>
<th>1–6</th>
<th>7–13</th>
<th>≥14</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>1720 (40%)</td>
<td>338 (8%)</td>
<td>863 (20%)</td>
<td>792 (18%)</td>
<td>266 (6%)</td>
</tr>
<tr>
<td>Baseline eGFR MDRD mean (SD)</td>
<td>79 (23)</td>
<td>80 (23)</td>
<td>79 (22)</td>
<td>79 (23)</td>
<td>80 (23)</td>
</tr>
<tr>
<td>( \Delta eGFR \text{ MDRD} &gt;3 \text{ n} ) (%)</td>
<td>294 (17%)</td>
<td>60 (18%)</td>
<td>146 (17%)</td>
<td>127 (16%)</td>
<td>28 (11%)</td>
</tr>
</tbody>
</table>

Unadjusted | Adjusted^a | Adjusted^b |
----------|---------|------------|
| 1.00 (ref) | 1.11 (0.81, 1.51) | 1.01 (0.81, 1.27) | 0.98 (0.78, 1.24) | 0.61 (0.40, 1.00) | 0.90 (0.65, 1.24) |
| Adjusted^a | 1.00 (ref) | 1.28 (0.93, 1.77) | 1.09 (0.87, 1.27) | 1.19 (0.94, 1.51) | 0.75 (0.49, 1.14) | 1.16 (0.84, 1.62) |
| Adjusted^b | 1.00 (ref) | 1.16 (0.84, 1.62) | 1.18 (0.94, 1.48) | 1.40 (1.09, 1.74) | 0.93 (0.60, 1.42) | 1.39 (0.98, 1.98) |

^a Adjusted for age, gender, race and smoking.

^b Adjusted for age, gender, race, smoking, diabetes, systolic blood pressure, diastolic blood pressure, anti-hypertensive medications, LDL cholesterol, HDL cholesterol, prevalent cardiovascular disease, prevalent heart failure, C-reactive protein and fibrinogen.

### Table 6. Association of alcohol consumption with rapid kidney function decline (dichotomous outcome eGFRcys >3) in participants with eGFRcys <60 mL/min/1.73 m² at baseline

<table>
<thead>
<tr>
<th>None (%)</th>
<th>Former (%)</th>
<th>Current (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>275</td>
<td>49</td>
<td>294</td>
</tr>
</tbody>
</table>

\[ eGFRcys >3 \text{ n} \] (%) | 54 (20%) | 7 (14%) | 57 (19%) |

Unadjusted | Adjusted^a | Adjusted^b |
----------|---------|------------|
| 1.00 (ref) | 0.62 (0.25, 1.55) | 0.94 (0.61, 1.43) |
| Adjusted^a | 1.00 (ref) | 0.52 (0.21, 1.31) | 0.86 (0.56, 1.34) |
| Adjusted^b | 1.00 (ref) | 0.38 (0.14, 1.01) | 0.73 (0.45, 1.19) |

^a Adjusted for age, gender, race and smoking.

^b Adjusted for age, gender, race, smoking, diabetes, systolic blood pressure, diastolic blood pressure, anti-hypertensive medications, LDL cholesterol, HDL cholesterol, prevalent cardiovascular disease, prevalent heart failure, C-reactive protein and fibrinogen.
1–6 drinks per week, had similar odds of rapid kidney function decline compared to non-drinkers. We interpret this as a false-positive test. There was no association between alcohol consumption categorized as none, former and current, and eGFRcreat decline (data not shown).

Secondary analysis
Six hundred eighteen participants had eGFR_cys <60 mL/min/1.73 m² at baseline of whom 19% had rapid kidney function decline. There was no association between alcohol consumption and kidney function decline in this subgroup (Table 6). The interaction term for alcohol consumption and kidney function decline across strata of baseline kidney function was not significant [P-value for interaction = 0.441 (unadjusted), 0.580 (adjusted)].

Discussion
CKD is a problem of growing magnitude worldwide [6], and CVD is the leading cause of morbidity and mortality in this patient population. Although moderate alcohol consumption appears to be protective for CVD, the association between alcohol and CKD is less clear. In this cohort of community-dwelling older adults, we observed no association between alcohol consumption and kidney function decline.

The strengths of our study include a unique sample of elderly subjects, longitudinal study design with over 7 years of follow-up, the use of cystatin C as a marker of kidney function, a large sample size and a multitude of events (>1000 outcomes) giving us excellent statistical power to adjust for a variety of relevant risk factors. We believe our findings are robust given these strengths and the fact that this same cohort has found other positive associations of alcohol consumption with carotid atherosclerosis, coronary heart disease and stroke [16,20,21]. However, we have to interpret these findings in the context of existing literature which is contradictory and inconclusive.

In a population-based case control study of 716 cases with kidney failure and 361 age matched controls, the adjusted odds of kidney failure were 4-fold among participants who consumed >2 drinks per day [7]. The estimated population attributable risk in this study was 9%. A population-based study from Wisconsin found that heavy drinking (defined as >4 servings per day) was associated with a 1.6-fold increase in the adjusted odds of prevalent CKD (defined as estimated GFR <60 mL/min/1.73 m²) [8]. In longitudinal analysis, current heavy drinking increased the risk of incident CKD; however, covariate adjustment attenuated this association.

In contrast, other studies found no association [9–11] or suggest a protective relationship between alcohol consumption and risk for development of progression of CKD [12,13]. A prospective analysis of 1658 women in the Nurses Health Study did not find an association between moderate alcohol consumption (daily alcohol intake classified as none, 0.1–4.9, 5–14.9 and 15–59.9 g/day) and rate of progression of kidney disease [defined as >25% decline in estimated GFR; number of events = 287 (17%)] over a follow-up period of 11 years [11]. Conversely, in the Physicians Health Study, there was an inverse relationship between moderate alcohol consumption and the subsequent risk of developing kidney disease during a follow-up of 14 years [12]. After covariate adjustment, men who consumed at least 7 drinks per week had an ~30% lower risk of incident CKD (defined as serum creatinine level >1.5 mg/dL; number of events = 473) than men who consumed 1 or fewer drinks. This inverse relationship was also observed when incident CKD was defined as an estimated Cockcroft–Gault GFR <55 mL/min (number of events = 1296).

More recently, a prospective study of 65 000 Chinese men assessed the relationship between alcohol consumption and a composite outcome of death or kidney failure (dialysis or transplantation) during an 8-year follow-up period [22]. Men consuming 21 or more drinks per week at baseline were 48% less likely to reach the composite outcome compared to non-drinkers.

Prior analyses have examined the association between alcohol and CVD in the CHS cohort. Moderate alcohol consumption was protective against coronary heart disease [23] and heart failure [23], but there was a U-shaped relationship for stroke [16]. While moderate drinking was associated with lower carotid intima media thickness, consumption of >14 drinks per week was associated with higher intima media thickness [24].

In this analysis, we did not find an association between light to moderate alcohol consumption and kidney function decline in older adults from the CHS cohort. There are several potential explanations for our findings. Firstly, variation in population characteristics as we studied older adults and study design may explain differences between our study and those that demonstrated an association between alcohol consumption and kidney disease. For instance in the study by Schaefer et al., the inverse association between alcohol consumption and kidney disease was observed in participants consuming ≥7 drinks per week and was not significant in participants consuming <7 drinks per week. Twenty five percent of participants in the Physicians Health Study reported consuming ≥7 drinks per week compared to 14% in the CHS cohort included in this analysis. Thus, it is possible that we may have missed a protective effect of consuming ≥7 drinks per week on kidney disease given the fact that there were relatively few heavy drinkers and many non-drinkers in this study cohort. Similarly, in the study by Reynolds et al., 62% were non-drinkers, 22% reported consuming <21 drinks per week and 16% of the cohort consumed ≥21 drinks per week. In addition, the investigators did not assess baseline kidney function. Thus, differences between this study and ours may be due to differences in level of alcohol consumption and differences in baseline level of kidney function. Another possibility is that alcohol might have different effects on kidney function decline in healthy individuals than in those with preexisting kidney disease.

Secondly, prior studies have not uniformly separated out non-drinkers and former drinkers (when looking at amount of alcohol consumed) from the reference group. Since the non-drinkers and former drinkers differ, the choice of the
reference group used in prior studies may have influenced their findings. Thirdly, alcohol was assessed late in life in CHS. While this likely is correlated to intake in mid-life, our findings relate to older adults. It is possible that differences in the timing of the assessment of alcohol and decline in kidney function may account for the discrepancy between our findings and those of other studies.

Finally, the individuals included in this analysis were selected for having survived to have at least two measures of kidney function. These participants were healthier and had better kidney function on average than the entire CHS cohort and therefore were more likely to have smaller declines in kidney function. This may have reduced our ability to detect the relationships of interest.

Other limitations include the lack of information regarding proteinuria and microalbuminuria and the possibility that under reporting of alcohol consumption may have biased the observed results. However, the methods used in CHS are well accepted and validated to ascertain self-reported alcohol consumption. In addition, a previous study has showed that the age-, sex- and race-adjusted Spearman correlation of HDL and alcohol intake in 5802 CHS participants with data at baseline is 0.23 (correlation of HDL and alcohol intake in 5802 CHS participants has showed that the age-, sex- and race-adjusted Spearman correlation of HDL and alcohol intake in 5802 CHS participants with data at baseline is 0.23 (P ≤ 0.0001) [21], and this is similar to what has been seen in other studies and consistent with the known direct effect of alcohol on this biomarker [25]. Finally, results from the Substance Abuse and Mental Health Services Administration’s National Survey on Drug Use and Health [26] are concordant with the CHS data in that 40% of Americans over 65 report any alcohol use in the last month. However, it should be noted that the SAMHSA survey refers to alcohol use in the past month versus CHS data which denote alcohol use over the person’s lifetime.

In secondary analyses examining relationships of interest in the subgroup of participants with CKD at baseline, we did not find a statistically significant association between alcohol consumption and rapid kidney function decline although the odds ratios were lower than in the whole cohort including those without CKD. These subgroup analyses, however, should be interpreted with caution due to the wide confidence intervals which may indicate a lack of statistical power to test these associations; furthermore, the numbers in the former subgroup are quite small, and the former group is select in that participants may have stopped drinking alcohol due to illness.

**Conclusion**

In summary, we did not find an association between light to moderate alcohol consumption and kidney function decline in older adults. These results suggest that light to moderate alcohol consumption may not have adverse or beneficial effect on kidney function. There are a multitude of clinical harms related to heavy drinking, and clinicians will need to carefully consider all potential deleterious effects associated with alcohol consumption when giving advice to patients regarding alcohol use; however, based on our findings, there does not appear to be a basis for recommending that older adults discontinue or initiate light to moderate alcohol consumption to protect against kidney disease in particular.

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**Conflict of interest statement.** None declared.

**References**

Prospective study of TNFα blockade with adalimumab in ANCA-associated systemic vasculitis with renal involvement

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Abstract

Background. Tumour necrosis factor alpha (TNFα) is implicated in the pathogenesis of ANCA-associated systemic vasculitis (AASV). There is a need for more effective and safer induction therapies for AASV. Uncontrolled studies have pointed to the efficacy of TNFα blockade with infliximab in the induction of remission in systemic vasculitides. We have hypothesized that adjunctive treatment with the humanized anti-TNFα monoclonal antibody, adalimumab, will permit more rapid remission and reduced prednisolone exposure in AASV.

Methods. This Phase II, open-label, prospective study enrolled 14 patients with acute flares of AASV either as first manifestation of disease or relapse. The Birmingham Vasculitis Activity Score (BVAS) was used to assess the activity of the disease and the response to treatment. Adalimumab (40 mg s.c.) was given every 2 weeks for 3 months, in combination with intravenous cyclophosphamide and a reducing course of prednisolone. Primary endpoints were: (i) induction of remission within the first 14 weeks (BVAS = 0); (ii) time taken to achieve remission; (iii) safety and tolerability.

Results. Mean age was 58 years and eight patients were male; all had kidney involvement. Eleven (78.5%) achieved remission within 14 weeks (mean, 12 weeks). BVAS decreased from 11.9 (mean; 95% CI, 9.3–14.4) at baseline to 2.0 (mean; 95% CI, 0–4.4) at Week 14 (P < 0.01). Prednisolone dose (in milligrammes per day) decreased from 37.1 (mean; 95% CI, 28.8–45.3) at entry to 8.1 (mean; 95% CI, 5.1–11.1) at Week 14 (P < 0.01). Estimated glomerular filtration rate (in millilitres per minute per 1.73 m²) increased from 17.1 (mean; 95% CI, 8.9–25.2) at entry to 30.1 (mean; 95% CI, 18–42.2) at 12 weeks (P < 0.01). One patient died and three infections occurred.

Conclusions. The addition of adalimumab to prednisolone and cyclophosphamide for the treatment of severe AASV was associated with response rates and adverse events similar to standard therapy alone but with a reduced prednisolone exposure. Further study is required to demonstrate whether the addition of adalimumab improves the speed of remission, the degree of renal recovery and safety.

Keywords: ANCA-associated systemic vasculitis; Birmingham Vasculitis Activity Score (BVAS); induction of remission; safety; steroid-sparing effect

Introduction

ANCA-associated systemic vasculitis (AASV) is the most common group of systemic necrotizing vasculitides, with...