

Intake of Beer, Wine and Spirits and Risk of Heavy Drinking and Alcoholic Cirrhosis

MORTEN GRØNBÆK¹, MAJKEN K JENSEN¹, DITTE JOHANSEN¹, THORKILD I A SØRENSEN¹ and ULRİK BECKER²

¹Centre for Alcohol Research, National Institute of Public Health, Copenhagen, Denmark. ²Alcohol Unit and Gastro Unit, Division of Medical, Gastroenterology, Copenhagen University Hospital, Hvidovre, Denmark. Copenhagen Centre for Prospective Population Studies, Danish Epidemiology Science at the Institute of Preventive Medicine, Copenhagen University Hospital, Copenhagen, Denmark.

ABSTRACT

Studies have suggested that wine drinkers are at lower risk of death than beer or spirit drinkers. The aim of this study is to examine whether the risk of becoming a heavy drinker or developing alcoholic cirrhosis differs among individuals who prefer different types of alcoholic beverages.

In a longitudinal setting we found that both the risk of becoming a heavy or excessive drinker (above 14 and 21 drinks per week for women and above 21 and 35 drinks per week for men) and the risk of developing alcoholic cirrhosis depended on the individuals preference of wine, beer or spirits. We conclude that moderate wine drinkers appear to be at lower risk of becoming heavy and excessive drinkers and that this may add to the explanation of the reported beverage-specific differences in morbidity and mortality.

Key words: Alcohol, alcoholic cirrhosis, beer, beverage preference, excessive drinking, heavy drinking, spirit, wine.

INTRODUCTION

A light to moderate intake of alcohol has been suggested to reduce morbidity and mortality (1-4). Several recent studies have shown that wine drinkers compared to beer and spirits drinkers are at lower risk of death from all causes (5-8). This may be due to the fact that beer contains possibly carcinogenic nitrosamines (9), whereas wine may have additional cardioprotective and anticarcinogenic properties different from those of ethanol (7, 10-12). The differences in morbidity and mortality may to some extent be explained by confounding factors such as diet (13), subjective health (14), binge versus steady drinking (15), or other correlates of preferred type of alcoholic beverage. Another explanation for the differences may be that beer and spirit drinkers could be more inclined to increase

their level of alcohol consumption. Apart from that, it was also the aim of this investigation to study whether there were different effects of the different types of alcoholic beverages on the risk of alcoholic cirrhosis.

SUBJECTS AND METHODS

Population

These analyses were based on data from two comprehensive Danish population studies compiled in the Copenhagen Centre for Prospective Population Studies: the Copenhagen City Heart Study and the Glostrup Population Studies. Baseline characteristics are shown in Table I. Detailed descriptions of the studies have been published previously (16-18).

TABLE I

Odds ratios and 95 % confidence intervals for becoming a heavy and an excessive drinker* according to beverage preference.

WOMEN				
	Heavy drinking (>14 drinks per week)		Excessive drinking (>21 drinks per week)	
	Crude	Adjusted†	Crude	Adjusted†
Wine	1.0	1.0	1.0	1.0
Beer	1.25 (0.95-1.63)	1.14 (0.87-1.50)	1.70 (1.08-2.77)	1.50 (0.93-2.43)
Spirits	0.96 (0.65-1.42)	0.85 (0.58-1.27)	1.84 (1.00-3.38)	1.51 (0.81-2.82)
Mixed	0.91 (0.70-1.18)	0.83 (0.64-1.09)	1.02 (0.63-1.68)	0.91 (0.55-1.50)

MEN				
	Heavy drinking (>21 drinks per week)		Excessive drinking (>35 drinks per week)	
	Crude	Adjusted†	Crude	Adjusted†
Wine	1.0	1.0	1.0	1.0
Beer	1.46 (1.09-1.95)	1.16 (0.84-1.58)	2.37 (1.14-4.95)	1.81 (0.85-3.82)
Spirits	1.01 (0.68-1.77)	1.09 (0.66-1.81)	0.96 (0.25-3.69)	0.85 (0.22-3.32)
Mixed	1.03 (0.75-1.42)	0.87 (0.62-1.23)	1.54 (0.69-3.41)	1.26 (0.56-2.84)

* "Heavy drinking" and "excessive drinking" are separate, dichotomous comparisons, including all study subjects.

† Adjusted for age, study of origin, smoking, educational level and total alcohol consumption

Questionnaire and examination

Information on participants at both examinations included a health examination and a self-administered questionnaire concerning various lifestyle and health-related issues. The staff checked the responses to the questionnaires during the examination with regard to potential non-response or inconsistent responses. Participants were asked: "How many drinks of beer do you normally consume within a week?" The same was asked for wine and spirits. We assumed that the alcohol content per drink was roughly the same for the three types of drinks. A beverage preference was defined as the type of alcohol whose intake exceeded 50 % of the

total alcohol intake. Participants who did not have a preferred alcoholic beverage were defined as mixed drinkers.

Definition of covariates

Age was divided into quartiles (less than or equal to 44 years, 45-52 years, 53-60 years and 60 years or more). Subjects reported if they were never-smokers, former smokers, or current smokers. Current smokers were grouped as 1-14 grams of tobacco per day, 15-24 grams per day, or more than 24 grams per day (one cigarette was equivalent to 1 g, a cheroot to 3 g and a cigar to 5 g of tobacco). Participants reported their level of education as less than or equal to 7 years of school, 8-11 years, or 12 or more years of

school education. Subjects were asked if they were physically active during leisure time. Categories were sedentary, less than 4 hours per week, or more than or equal to 4 hours per week. Height and weight in light clothes without shoes were measured, and body mass index was calculated as weight (kg) divided by squared height (m²). This was included in the analysis as a continuous measure. Subjects reported whether they lived with a partner or not (grouping married and unmarried couples). Chronic diseases among the participants were assessed by use of the Danish National Hospital Admission Register according to diagnoses based on the WHO International Classification of Diseases, Eighth Revision (ICD-8 codes; 40-46, 79, 83, 93-95, 140-209, 240-289, 340-358, 393-458, 490-493, 530-537, 560-569, 571-573, 577, 580-584, 710-739). A single covariate was used to designate those persons with any of the eligible chronic diseases.

Outcome

The outcome measures were heavy drinking, excessive drinking and alcoholic cirrhosis. Women were considered *heavy drinkers* at the second examination if they had a total weekly intake above 14, and men, if they had above 21 drinks per week. *Excessive drinking* was defined as more than 21 drinks per week for women and 35 drinks per week for men. *Alcoholic cirrhosis* was death or discharge with alcoholic cirrhosis defined according to the International Classification of Diseases (ICD-8) (ICD-8 code 571.09).

RESULTS

Heavy and excessive drinking

Using wine drinkers (the largest category) as the reference group, women who preferred beer had crude odds ratios of 1.25 (95 % CI: 0.95-1.63) and 1.73 (95 % CI: 1.08-2.77) for heavy and excessive drinking. For men the odds ratios were 1.46 (1.09-1.95) and 2.37 (1.14-4.95) (Table I). Adjustment for total alcohol consumption

weakened the association, and the fully adjusted analysis shows a modest tendency of men and women who prefer beer to become excessive drinkers. Stratified analysis showed that especially younger men drinking beer were at high risk of developing a heavy drinking pattern (Table II). Compared to wine drinkers as referent, the adjusted odds ratios among men who preferred beer were 1.16 (95 % CI: 0.84-1.58) for becoming a heavy drinker and 1.81 (95 % CI: 0.85-3.82) for becoming an excessive drinker. Women who preferred beer had adjusted odds ratios of 1.14 (95 % CI: 0.87-1.50) and 1.50 (95 % CI: 0.93-2.43) for heavy and excessive drinking, respectively. Also, women who preferred spirits had increased risks of excessive drinking as compared to wine-drinking women (odds ratio: 1.51, 96 % CI: 0.81-2.82). As a sensitivity analysis, other categories of alcohol consumption were applied. These analyses were all adjusted for age, study of origin, smoking and total alcohol consumption.

Alcoholic cirrhosis

A total of 292 individuals (80 women and 212 men) developed alcoholic cirrhosis during the observation period. When analyzing the separate effects of wine intake (drinks per week) adjusting for beer and spirits intake as well as adjusting for the other covariates, we found a relative risk for developing cirrhosis of 0.5 (95 % confidence limits 0.4-0.7) in the group drinking 1 to 7 drinks of wine per week and a relative risk of 0.6 (95 % confidence limits 0.3-1.0) and 2.5 (95 % confidence limits 1.1-5.7) respectively for the two groups drinking 8 to 21 drinks and more than 21 drinks of wine per week. The group drinking less than one drink of wine per week was used as reference (relative risk set at 1.0). The results of the final model including total alcohol intake (drinks per week) and wine percent are shown in Figure 1. An increase in risk of cirrhosis with increasing total alcohol intake was observed in all categories of wine percent. However, the risk of alcoholic cirrhosis was lower for wine drinkers compared to those

TABLE II

Age-related odds ratios for becoming an excessive drinker according to beverage preference

Beverage Preference	YOUNGER MEN (N=2,704)	OLDER MEN (N=2,299)
Wine	1.00	1.00
Beer	3.71 (1.13-12.14)	0.75 (0.27-2.05)
Spirits	2.08 (0.21-21.21)	0.38 (0.07-2.04)
Mixed	2.20 (0.62-7.80)	0.67 (0.23-1.98)

	YOUNGER WOMEN (N=2,931)	OLDER WOMEN (N=2,396)
Wine	1.00	1.00
Beer	1.54 (0.82-2.88)	1.53 (0.72-3.25)
Spirits	1.10 (0.36-3.33)	1.51 (0.69-3.32)
Mixed	1.51 (0.84-2.72)	0.20 (0.60-0.72)

Note: Estimates are controlled for study of origin, educational level, smoking and total alcohol intake. Median age (52 years) used as cutpoint

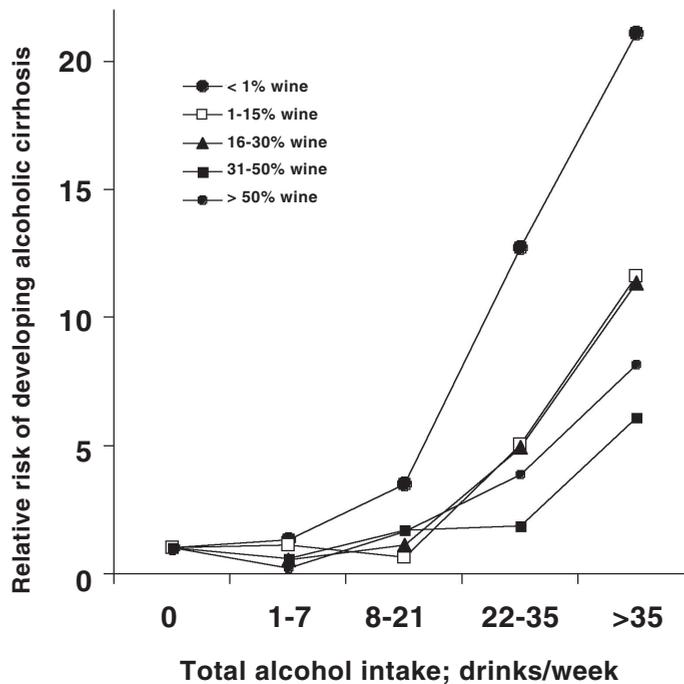


Figure 1. Relative risks for developing alcoholic cirrhosis. Relative risks were adjusted for sex, age, smoking habits, BMI, educational level, and total alcohol intake. Individuals drinking < 1 % wine of total alcohol intake in both genders combined were used as reference group (relative risk = 1.00). Vertical bars are estimated 95 % confidence limits.

drinking no or little wine - even for heavy drinkers (total alcohol intake more than 35 drinks per week). For heavy drinkers who drank more than 50 % of their alcohol intake as wine, the relative risk was 8.2 (95 % confidence limits 1.8 – 20.8) for developing cirrhosis compared to individuals drinking less than 1 drink per week (reference group; relative risk set at 1.0). In contrast, heavy drinkers who drank no wine had a relative risk for developing alcoholic cirrhosis of 21.1 (95 % confidence limits 12.4 – 36.1).

CONCLUSION

The present study suggests that a person who prefers beer is more likely to become a heavy or an excessive drinker than a person who prefers wine. Among men, moderate drinkers who included wine in their weekly alcohol intake had significantly lower risks of becoming heavy or excessive drinkers as compared to those who did not drink any wine. Women who included beer in their alcohol intake showed increased risk of heavy and excessive drinking compared to non-beer drinking women. Further we found that the risk of developing cirrhosis in wine drinkers (more than 30 % wine of total alcohol intake) was less than 50 % of the risk in non-wine drinkers for any given level of total alcohol intake, while beer and spirits drinking did not modify the relation between total alcohol intake and risk of developing cirrhosis.

Other studies have reported relations between beer drinking and high-risk behaviors such as frequent heavy drinking and other alcohol-related problems, while wine drinking seems to be considered 'the beverage of moderation' (19-21). However, these studies were all cross-sectional and therefore inadequate for causal inferences. Our study was based on a large random sample of the population which was followed prospectively, thus reducing selection and recall bias.

Free radical formation after alcohol intake and a reduced level of antioxidants

have been implicated in the pathogenesis of alcoholic liver disease (22-23). Non-alcoholic constituents of wine have antioxidant properties (24-25) and intake of red wine has been demonstrated to increase antioxidant activity in serum. Quercetin, a flavonoid, has been demonstrated to reduce oxidative damage to the liver in rats and resveratrol, as well as quercetin, can inhibit activation of rat hepatic stellate cells (26-27). However, antioxidants are also abundant in diets with high contents of vegetables and fruits (28-29), and a causal relation between ingestion of these substances and a reduced risk of cirrhosis remains to be demonstrated.

The observed effect of wine drinking may merely reflect a lower risk of later excessive drinking or a lower risk of being exposed to the unknown additional risk factors that initiate liver damage in subjects conditioned by heavy drinking. The association between wine intake and other life style factors including current alcohol intake should also be studied in detail. The public health implications of these results remain to be determined as a causal relationship between wine drinking and beneficial health effects have not yet been established.

In conclusion, the finding that moderate wine drinkers appear to be at lower risk of becoming heavy and excessive drinkers as well as developing alcoholic cirrhosis may add to the explanation of the reported beverage-specific differences in morbidity and mortality.

These results have previously been reported in:

JENSEN MK, ANDERSEN AT, SØRENSEN TI, BECKER U, THORSEN T, GRØNBÆK M. Alcoholic beverage preference and risk of becoming a heavy drinker. *Epidemiology* 2002; 13(2):127-32, and

BECKER U, GRONBÆK M, JOHANSEN D, SØRENSEN TI. Lower risk for alcohol-induced cirrhosis in wine drinkers. *Hepatology*. 2002 Apr; 35(4):868-75.

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