

Clinical Perspective

Alcohol and coronary heart disease reduction among British doctors: confounding or causality?

In the absence of experimental evidence, the interpretation of observed associations may be difficult unless they are exceptionally strong. There is no simple rule for distinguishing between associations of moderate strength that are partly or wholly causal and those that are entirely due to confounding between the factor under study and some other factor that is actually a cause of the disease. All importantly relevant evidence has to be taken into account, including the biological plausibility of causality.

Several epidemiological studies have found an inverse association between the consumption of alcohol and coronary heart disease, and many authors have concluded that the most plausible explanation is that alcohol can be somewhat protective. Some, however, remain unconvinced. Shaper^[1], for example, believes that the inverse association may well arise just because the non-drinking group is 'particularly predisposed to ill-health in all forms, and for several reasons, most particularly predisposed to coronary heart disease'.

One widely discussed possibility is that the non-drinking group includes a substantial proportion of ex-drinkers who have given up alcohol because they already had heart disease, but the inverse relationship holds even after ex-drinkers have been excluded^[2–4] and it also holds among men and women with no self-reported history of coronary heart disease in the past^[3,5–8].

The other possible non-causal explanation for the observed inverse association involves confounding, lifelong abstainers being at relatively high risk because of some personal characteristics that affect the risk of the disease (other than the effects of their abstinence, or their past history of coronary disease). In our 1978–91 prospective study of mortality in relation to the consumption of alcohol in British doctors^[6] we, like many others, found that moderate alcohol consumption was associated with a reduction in mortality from vascular disease (Fig. 1) and concluded that the apparently protective effect was likely to be partly or wholly real. Shaper^[9], however, has

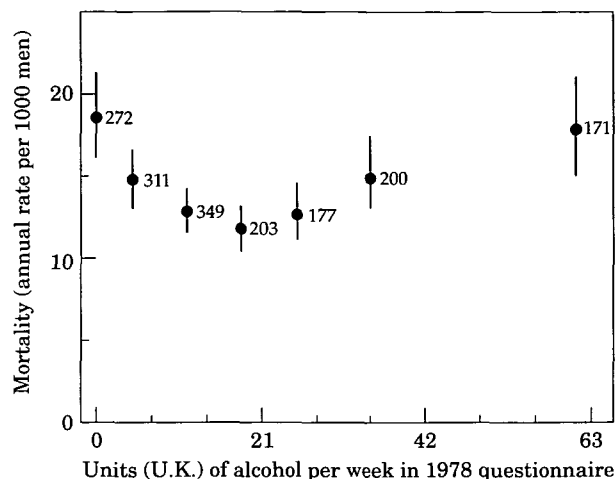


Figure 1 Trend in mortality from vascular disease (ischaemic heart disease and stroke and residual vascular; ICD 9th revision 401–459) with consumption of alcohol (U.K. units per week) in British doctors 1978–1991. Floating absolute risk and 95% confidence interval, standardized for exact age and smoking.

proposed that the lower mortality in the light and moderate drinkers in our study might have been due to such advantageous characteristics as a lower proportion of current cigarette smokers, lower mean blood pressure and body mass index, and a higher level of physical activity in leisure time.

The relevance of most of these factors and some others can, in fact, be assessed directly, as at the time in 1978, when we sought information about the consumption of alcohol, we also obtained much personal information about past and current health, physical measurements, and relevant dietary habits^[10]. Moderate drinkers actually had a higher proportion of cigarette smokers than non-drinkers did, but this was of little relevance as it had been allowed for in the analysis. The crude data for some of the other possibly relevant characteristics for the doctors who in 1978 reported themselves to be non-drinkers, or to be drinking 1–14 or 15–28 units of alcohol a week, are summarized in Tables 1 and 2, and no large differences are apparent. Non-drinkers were slightly older than drinkers, but the effects of this on subsequent death rates were automatically

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Table 1 Mean values in 1978 of different measurements (and their standard errors) in 13 000 male British doctors who reported drinking different amounts of alcohol

Characteristic	Units of alcohol reported to be consumed per week					
	0		1-14		15-28	
Age (years)	65.0	(0.23)	61.9	(0.11)	62.5	(0.13)
Weight (kg)	73.7	(0.26)	74.7	(0.13)	76.0	(0.20)
Height (m)	1.75	(0.002)	1.76	(0.001)	1.77	(0.001)
Body mass index (kg . m ⁻²)	24.1	(0.08)	24.1	(0.04)	24.3	(0.05)
Systolic blood pressure	138.1	(0.67)	135.1	(0.30)	136.8	(0.38)
Diastolic blood pressure	83.5	(0.33)	82.6	(0.16)	83.1	(0.23)

Table 2 Percent of men who had modified their diet in different ways

Dietary change	Units of alcohol consumed per week		
	0	1-14	15-28
Reduced sugar	39	41	41
Reduced saturated fat	42	39	35
Reduced calories	35	35	39
Increased polyunsaturated fat	36	37	33
Increased fibre	38	39	34

taken into account in the analyses of mortality. Men drinking 1-14 or 15-28 units a week actually weighed slightly more than non-drinkers of the same age ($P < 0.001$ for trend). But, this was probably not entirely due to their alcohol consumption for they were also slightly taller ($P < 0.001$), and there was no significant difference between drinkers and the non-drinkers in body mass index (Table 1). There was a small but significant difference in blood pressure, but this would not suffice to account for the large differences that were subsequently seen in heart disease mortality^[11].

Logistic regression allowing for age and body mass index showed only three significant differences in dietary habits: non-drinkers were more likely to report having reduced their intake of saturated fat, having increased their intake of polyunsaturated fat, and having increased their intake of fibre. In so far as any of these factors contributed to differences in mortality from vascular disease, allowance for them would have slightly increased the excess mortality in non-drinkers rather than the reverse, but the increase would have been only small. Another widely discussed factor, socio-economic status, could not have substantially confounded the association between alcohol and disease in this population as all were doctors, so they were socially fairly homogeneous. There is no reason to suppose that exercise differed materially between drinkers and abstainers, especially

since most were already over 60 years of age in 1978 (indeed, those who died over the next 13 years were, on average, 75 years of age when they died), but even if it had it could not have accounted for the large differences in mortality.

These observations are reinforced by other studies, in which drinkers are consistently found to be heavier smokers than abstainers^[12,13], while dietary differences have been small but inconsistent. Male drinkers have been found to eat more fat and less fibre than abstainers^[8], while female drinkers have been found to eat less fibre, but also less fat, and to be substantially less obese than abstainers, as measured by Quetelet's index^[12]. Adjustment for 13 potential risk factors in a study of women (parental history of infarction under 60 years of age, menopausal status and contraceptive use, smoking status, hypertension, diabetes, high cholesterol, age, obesity, exercise, cholesterol intake, saturated fat intake, polyunsaturated fat intake, and period) left the relative risks for different levels of alcohol consumption compared to abstainers almost unchanged, at (on average) 0.6^[12]. Thus, both in our study and in other studies that involved the observation of large numbers of deaths, confounding, in so far as it has been possible to test for it, does not seem to be responsible for the relatively higher vascular mortality in non-drinkers than in moderate drinkers. Hence we concur with the expert advisors to the European Office of the World Health Organization^[14] that 'drinking modest amounts of alcoholic beverages is likely to reduce the risk of CHD [coronary heart disease] for some populations'.

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