

Moderate drinking and health

Implications of recent evidence

Mary Jane Ashley, MD Roberta Ferrence, PHD Robin Room, PHD Susan Bondy, PHD
Jürgen Rehm, PHD Eric Single, PHD

ABSTRACT

OBJECTIVE To address three questions (Is moderate drinking good for health? Should people drink to prevent heart disease? What is moderate drinking?) and to examine and compare two recent Canadian guidelines on low-risk drinking in the context of counseling patients.

DATA SOURCES English-language data sources were searched, particularly peer-reviewed health and social science literature and recent expert reports.

STUDY SELECTION Studies and reports were selected for their scientific merit and direct relevance to the three questions addressed and to the formulation of guidelines on low-risk drinking.

SYNTHESIS While moderate drinking might protect some older people against coronary heart disease, it is associated with increased risk of hemorrhagic stroke, certain cancers, accidents and injuries, and a range of social problems. For most health outcomes, risk increases as consumption of alcohol increases.

CONCLUSIONS While the data have limitations, they provide a basis for formulating guidelines on low-risk drinking. The two Canadian guidelines, one developed from the perspective of health recovery, the other from the perspective of health promotion, complement each other in the context of counseling patients.

RÉSUMÉ

OBJECTIF Tenter de répondre à trois questions (La consommation modérée d'alcool est-elle bonne pour la santé ? Devrait-on consommer de l'alcool pour prévenir les cardiopathies ? Qu'entend-on par consommation modérée ?) et analyser et comparer deux guides canadiens récents sur la consommation à faible risque dans un contexte de counselling des patients.

SOURCES DES DONNÉES Recension des sources de données de langue anglaise, en insistant particulièrement sur les articles scientifiques révisés par les pairs dans les domaines de la santé et des sciences sociales ainsi que sur les rapports récents des experts.

SÉLECTION DES ÉTUDES Le choix des études et des rapports s'est fait en fonction de leur mérite scientifique et de leur pertinence directe aux trois questions posées afin de pouvoir formuler des lignes directrices sur la consommation à faible risque.

SYNTHÈSE Bien que la consommation modérée puisse protéger certaines personnes âgées contre la coronaropathie, on l'associe toutefois à un risque accru d'accident vasculaire cérébral hémorragique, de certains cancers, d'accidents et de blessures et d'une variété de problèmes sociaux. Pour la plupart de ces résultats, le risque augmente proportionnellement à la consommation d'alcool.

CONCLUSIONS Malgré les limitations de ces données, elles fournissent une base permettant d'élaborer des lignes directrices sur la consommation à faible risque. Les deux guides canadiens, l'un présenté dans une perspective de recouvrement de la santé, l'autre dans une perspective de promotion de la santé, sont complémentaires dans un contexte de counselling des patients.

Is moderate drinking good for your health? Should I drink alcohol to prevent heart disease? What is moderate drinking, anyway?

As many physicians realize, providing answers to these deceptively simple questions is by no means straightforward. Much controversy exists in the scientific and professional literature and in the media concerning the health benefits of moderate drinking, and debate continues over the implications of scientific evidence for clinical practice¹ and public health policy.^{2,3}

This paper has two objectives: to provide a synthesis of the evidence on moderate drinking and health, pointing out the limitations of this evidence; and to consider what constitutes "best advice" on alcohol use for individual drinkers. Based on this assessment, we examine two Canadian guidelines that should help physicians advise patients.

Health benefits

Alcohol has long been credited with medicinal and health-enhancing properties and is widely perceived to have psychological and social benefits as a mood modifier, relaxant, and social lubricant.^{4,5} However, evidence accumulated during the past 15 years on the protective role of alcohol in coronary heart disease (CHD), the leading cause of death in many developed countries, now demands that physical health benefits be taken into account in devising guidelines on drinking.

Epidemiologic studies have found that drinking alcohol, from very small amounts (on average less than one drink daily) to large amounts (up to five or six drinks daily), is associated with significant reductions (20% to 60% compared with the experience of non-drinkers) in the risk of death from CHD.⁶⁻⁸ The relationship seems to be U-shaped: benefit, although still seen, seems to be less at higher levels of drinking.^{6,7,9,10} Some argue that the relationship is L-shaped, with a marked reduction in risk at low levels of consumption and a flattening of risk reduction

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Dr Ashley is a Professor in the Department of Preventive Medicine and Biostatistics at the University of Toronto.
Dr Ferrence is a Senior Scientist, **Dr Room** is Vice-President of Research, **Dr Bondy** is a Scientist, and **Dr Rehm** is Director of Social and Evaluation Research, all at the Addiction Research Foundation in Toronto.
Dr Single is Director of the Policy and Research Unit at the Canadian Centre on Substance Abuse at the University of Toronto.

at higher levels,¹¹ but this might be an artifact, arising from analyses of populations in which the effects of heavier drinking on CHD risk could not be adequately examined.¹⁰

While concerns remain about controlling for potential confounders, such as diet, physical activity, smoking, acetylsalicylic acid use,¹²⁻¹⁶ and social factors (particularly social integration^{17,18}), evidence from epidemiologic studies of a protective relationship for CHD mortality, as measured against well-accepted causal criteria, is now quite strong.^{2,7,9,19,20}

Epidemiologic studies of alcohol and CHD mortality are complemented by epidemiologic, clinical, and laboratory studies of several biologic mechanisms that could play a role in reducing CHD risk.¹⁹⁻²¹ Substantial evidence indicates that alcohol use is associated with a more favourable lipid profile, in that high-density lipoprotein cholesterol (HDL-C) levels rise with alcohol consumption.^{20,21} As well, growing evidence suggests that improved antithrombotic and fibrinolytic profiles derived from alcohol intake explain part of the cardioprotective effect independent of HDL-C.^{21,22}

Also, epidemiologic evidence suggests that modest alcohol use protects against ischemic stroke,^{6,7,20,23} another important contributor to morbidity and mortality, particularly among the elderly. Moreover, a recent study suggests moderate drinking has a protective effect with regard to peripheral vascular disease after controlling for confounding by smoking.²⁴ This evidence adds coherence to the evidence of a protective effect of moderate drinking for CHD.

It is critically important to note that most of the reduction in relative risk of CHD mortality occurs with very low levels of alcohol use (a drink every other day up to two drinks daily⁶). While small amounts of alcohol taken regularly might protect against CHD, sporadic heavy drinking does not.²⁵ Such drinking can result in acute cardiotoxic effects²⁶⁻²⁸ and an increased risk of cerebral infarction.^{28,29}

In absolute terms, any CHD benefit from alcohol will be directly proportional to the incidence of the disease. Consequently, the benefits of alcohol use appear to be largely confined to middle-aged and older men and postmenopausal women.^{6,7} Groups among whom the risk of CHD is low, such as younger people and the populations of some countries, have little to gain. Also, the protective effect might be limited to certain subgroups of the population, for example, those who are insulin resistant^{21,30} and those who are at high risk of adverse CHD outcomes.^{31,32}

Some evidence indicates that the type of alcoholic beverage influences the degree of CHD benefit.^{33,34} Red wine might provide additional protection due to its phenolic compounds.³⁵ However, some epidemiologic studies in which beverage type has been considered have not found differential benefits.^{7,36} Epidemiologic studies on the effects of beverage type are plagued with lack of control for confounding (eg, wine consumption with social class³³).

Although much less evidence exists than for CHD, some claim that moderate drinking is associated with other physical health benefits, including increased resistance to common colds at least among non-smokers³⁷ and to some gastrointestinal infections,³⁸ and possibly reductions in risk of diabetes,³⁹ endometrial cancer,⁴⁰ and cholelithiasis.⁴¹ As well, modest alcohol consumption might be associated with higher bone density levels in both men and women.^{42,43}

One recent study raises the possibility that moderate alcohol use mediates or buffers the effect of stress on depression.⁴⁴ For most of these postulated effects, much more evidence is needed, including a better understanding of underlying biologic mechanisms, before conclusions about cause and effect can be drawn. However, for cholelithiasis, evidence of a true protective effect is now substantial,⁴¹ although some argue that the apparent protective effect is an example of protopathic bias.⁴⁵

Health risks

It is well known that consumption of large amounts of alcohol contributes to the cause, course, and outcome of a range of acute and chronic physical, psychological, and social-behavioural health problems.^{6,46,47} But what are the relationships between modest drinking and specific health risks? Epidemiologic evidence, much of it recent, sheds light on the risk relationships that underlie adverse health effects.

With regard to cardiovascular effects, the risk of hemorrhagic stroke increases directly with alcohol consumption; moderate consumption is associated with higher risks of both intracerebral and subarachnoid hemorrhages than abstinence.^{7,23,28} For alcohol-related cancers (of mouth, pharynx, larynx, esophagus, and liver), risk appears to increase directly with alcohol consumption, although risk might increase more rapidly at higher drinking levels.⁶ While controversy continues about whether alcohol plays a causative role in breast cancer, a meta-analysis of 38 studies⁴⁸ indicates a steady but modest increase with increasing daily alcohol consumption. Several

recent studies have added to this evidence,⁴⁹⁻⁵¹ including one⁵¹ suggesting that the association of alcohol consumption with postmenopausal breast cancer risk might be mediated through increases in estrogen levels.

The risk relationships between alcohol consumption and accidents and injuries also seem to be linear; the more alcohol consumed, the higher the risks. Even moderate drinkers have considerably elevated mortality risks due to traffic accidents compared with abstainers.^{52,53} Moreover, blood alcohol concentration is linearly related to fatal crashes, even for concentrations below 0.08%,^{54,55} the legal limit in Canada.

Similar risk patterns have been demonstrated for a range of social consequences.^{6,53,56} Data from a recent national survey in Canada show that for six different consequences (friendships; health; happiness; home life; work, studies, employment opportunities; and finances), the proportion reporting harm in the last 12 months increases fairly steadily with increasing drinks per day.⁵⁶ Also, there does not appear to be a threshold below which drinkers do not experience harm.⁵⁶

Compared with the data available on alcohol and health problems, comprehensive data on the social harms associated with alcohol use, including economic costs and harm to others through casualties, violence, neglect of family or work, and so forth, are scanty. This is not because such harms do not occur, but because they have not been as intentionally or systematically measured.⁵⁷ Furthermore, data that are available on social harms are not usually taken into account in risk assessments.

For other outcomes, such as cirrhosis of the liver, the risk is curvilinear, increasing with increasing alcohol consumption, disproportionately so at higher levels.^{6,58,59} For still others, such as hypertension, there could be a "threshold effect," with little increase in risk up to about 20 to 30 mL of alcohol daily (one to two standard drinks), beyond which blood pressure increases markedly.^{60,61}

Balancing risks and benefits

It is clear that heavy drinking is associated with high risk of adverse outcomes in terms of physical diseases and conditions, traumatic events, and social consequences.^{6,46} It is also clear that no level of alcohol use is safe for all people under all circumstances. For most health outcomes, "less is better."⁶ An important exception is CHD, for which a substantial reduction in risk is found in association with alcohol use, at least in some populations. Benefits extend over a

Table 1. Four alcohol risk categories

NO RISK

No drinks. Any drinking carries some risk; abstainers have no risk of alcohol problems.

LOW RISK

One to two drinks in any day, with at least one alcohol-free day per week. People of average build, in good health, and with no history of alcohol-related problems are at low risk if their drinking does not exceed this range. People of small build should drink at the low end of the range.

INCREASED RISK

Three to four drinks in any day, up to 12 drinks per week, with at least one alcohol-free day per week. Drinking in this range should be limited to one drink per hour. Otherwise the level of alcohol in the blood rises, skills needed to drive or operate machinery become impaired, and judgment is affected. Drinking in this range also increases the risk of some health problems. If you drink three or four drinks daily, it is important to have a couple of alcohol-free days every week. People with a small build should drink less.

HAZARDOUS DRINKING

Five or more drinks in any day, or three or more drinks on more than half the days of the week. Likelihood of automobile accidents increases with every added drink. Anyone drinking five or more drinks could be intoxicated. Drinking frequently in this range carries risks of severe health problems, such as cirrhosis of the liver, head and neck cancers, and possibly breast cancer for women. People who drink heavily frequently experience health problems, such as gastritis, that can be painful and disabling.

Adapted from Addiction Research Foundation.⁷⁷

range of consumption, from one to four drinks weekly to five or six drinks daily. Small amounts probably confer most of the protective effect, and, as recent overviews make clear, are advisable in light of the adverse risk relationships of moderate drinking to other kinds of alcohol-related mortality and morbidity.^{6,9,11,62,63} Research into the underlying mechanism(s) for CHD benefit and the populations that stand to benefit most is important because it might enable a targeted dietary or pharmacologic intervention that would confer the benefits of alcohol use without the accompanying risks.^{33,64}

The balance of risks and benefits is partially captured by global measures of morbidity and mortality. Largely because of the CHD benefit, a J-shaped relationship appears to prevail between alcohol use and overall mortality,^{6,65,66} at least in middle-aged and

older people. In most studies, modest amounts of alcohol use are associated with modest reductions in mortality from all causes, but risk increases sharply as alcohol consumption rises above two to three drinks daily.^{65,66} Although fewer studies have addressed the relationship of alcohol use to overall measures of morbidity, available evidence also supports a J-shaped relationship.^{6,67} Again, it is important to stress that global measures of mortality and morbidity fail to capture social risks and benefits.

In younger populations, risk of death increases with increasing consumption, even at low levels.⁶⁸ Other causes of mortality, such as violence, more than counteract any CHD benefit.^{6,58,62,68} One recent study even suggests that the risk relationship of alcohol with overall mortality is linear up to the age of 60 for both men and women.⁶⁹ The exact age at which benefit can be demonstrated depends on the distribution of causes of death. In many industrialized countries, such as Canada⁷⁰ and the United States,⁷¹ CHD death rates begin to accelerate around age 40 to 44 in men and 45 to 49 in women. The beneficial effect of moderate drinking can usually be demonstrated in cohorts older than these ages. At present, it is not clear whether the effect is both short-term and long-term. Since case-control studies, in which consumption is measured close to outcome, show higher beneficial effects on average than do cohort studies, in which consumption is usually measured years before outcome, a short-term effect seems plausible.⁷²

Limitations

It is important to recognize the limitations in the epidemiologic studies from which assessments of risk are obtained.^{6,13} No one measure can adequately capture the variations in the drinking patterns of individuals over time and place. Direct measurement of drinking patterns over the long term is extremely difficult, and the drinking level measured at a particular time might not be a good estimate of cumulative drinking.

Most epidemiologic studies of physical disease outcomes summarize alcohol use as average intake over time, such as drinks per day or drinks per week. While average alcohol consumption over time might be important for some long-term chronic disease outcomes, such as cirrhosis of the liver, it fails to capture risks of social or casualty outcomes associated with alcohol intake during particular occasions or in connection with various activities.⁷³⁻⁷⁶ As well, average measures do not adequately describe real drinking in

populations. For example, most drinkers who average one drink daily, drink less often than daily but more drinks per occasion, a pattern associated with social and casualty harms. With regard to drinking pattern, a recent Canadian study showed that the probability of being assaulted by another person who had been drinking was considerably higher among drinkers who reported consuming five or more drinks on an occasion at least monthly compared with consumers of the same average amount who did no heavy drinking.⁵⁶ Another recent Canadian study underscores the importance of heavy drinking occasions as an independent determinant of alcohol-related harms and benefits.⁵

Subject selection procedures also can produce bias in estimates obtained and limit their generalizability.^{6,13} Other coexisting factors, such as cigarette smoking,¹² that might account for the relationship, sometimes are not appropriately considered.^{6,13,16} It should be noted that the epidemiologic findings on moderate drinking and health are based on the behaviours of natural populations, not on the results of randomized trials. Also, most studies have been conducted in developed countries, raising concerns about their generalizability to other settings.^{6,7} Finally, the interpretation of aggregate level risk-to-benefit curves is not necessarily straightforward, including causal attribution at the level of particular individuals.⁶

Implications of the risk curves for individuals

For health promotion purposes, people should drink alcohol in such a way that the health and other benefits are enjoyed and the risks of adverse effects are minimized. Considering known patterns for social and health harms and that most of the CHD benefit can be attained at modest levels, drinking one to four drinks weekly, up to and not exceeding one or two drinks in any day, is likely to be the pattern associated with the lowest net risk of harm.⁶ A recent population-based survey of alcohol consumers in Ontario showed that a pattern characterized by low levels of average consumption (less than two drinks daily) and infrequent heavy drinking was associated with few social and health problems and most of the perceived benefits of alcohol use.⁵ Recently, the Addiction Research Foundation of Ontario (ARF) published a four-level risk categorization that takes into account a range of alcohol-related problems (**Table 1**⁷⁷).

Best advice for individual drinkers

Guidelines have been developed in Canada and other countries^{78,79} to assist physicians in providing "best

Table 2. Guidelines on low-risk drinking for individuals

As a general guideline, people should not drink more than two standard drinks in any day.*

Lower limits are appropriate for certain groups, such as those with lower body weight.†

Those who currently abstain from alcohol should not begin drinking in order to reduce their risk of health problems.

Those who drink less frequently than every day should not increase their consumption to reduce their risk of health problems.

All those whose drinking exceeds two drinks in any day should reduce their consumption of alcohol.

To minimize any risk of dependence, there should be at least 1 day per week when no alcohol is consumed.

All people who consume alcohol should avoid drinking to intoxication.

Pregnant women should be advised to abstain from alcohol.

In certain circumstances and for certain individuals, the use of alcoholic beverages is contraindicated. Those with certain psychological and physical illnesses and conditions, those taking certain medications and psychoactive drugs, those operating vehicles or machinery, those responsible for public order or safety, those who have shown a persistent inability to control their drinking, and those who are legally prohibited from drinking, such as underage people, should not drink at all.

People considering increasing their drinking for any health reason should consult their physicians before doing so.

*One standard drink contains 13.6 g of alcohol.

†Epidemiologic and other evidence suggests that women might incur more negative health consequences related to drinking two drinks a day than men and should limit their drinking to smaller amounts.^{48,77,78}

Adapted from Ashley et al.⁶⁴

advice" to individual drinkers. One Canadian guideline, developed several years ago by ARF researchers, provided the underpinnings of the College of Family Physicians of Canada's Alcohol Risk Assessment and Intervention (ARAI) program.^{80,81} The guideline advises women to drink no more than three, and men four, drinks in any day, and no more than 12 drinks a week. Sometimes no drinks is advisable. A more recent guideline, summarized in **Table 2**,^{48,64,77,78} was endorsed by the ARF and the Canadian Centre on Substance Abuse (CCSA).⁶⁴ In an analysis of Canadian survey data,

this more restrictive guideline was associated with substantially fewer reports of drinking-related harm.⁵⁶

While the existence of two different guidelines might seem confusing, if not contradictory, it is important to realize that these guidelines were developed from quite different, but valid, perspectives. The earlier guideline was developed from clinical studies of adult problem drinkers.⁸²⁻⁸⁵ Its primary aim was health recovery by encouraging less risky drinking patterns in patients who are drinking hazardously. The more recent ARF-CCSA guideline was developed for health promotion in the general population, most of which is already at no risk or low-risk of developing alcohol problems. Its primary intent was to reinforce low-risk drinking patterns. In counseling patients, physicians might find both guidelines useful, depending on the alcohol risk category of each patient. ❀

Correspondence to: Dr M.J. Ashley, Department of Preventive Medicine and Biostatistics, Faculty of Medicine, University of Toronto, Toronto, ON M5S 1A8; telephone (416) 978-2751; fax (416) 978-8299; e-mail ashley@pmb.med.utoronto.ca

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