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Barley and Cardiovascular Disease

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- Heart disease is the number-one killer worldwide.
- Cardiovascular disease risk can be modified through a healthy diet that includes high-fibre foods such as barley.
- Regular consumption of barley reduces serum total and LDL cholesterol.
- Health Canada and the United States Food and Drug Administration have permitted the use of blood-cholesterol-lowering and cardiovascular health claims for barley.
- Barley is a low-glycemic-index food that may provide cardioprotective benefits.



Cardiovascular Disease: Facts and Figures

Cardiovascular disease (CVD) has been the number-one killer worldwide during the past decade¹. An estimated 9 in 10 Canadians have at least one CVD risk factor, with over 40 per cent of individuals aged 20 to 79 having elevated levels of total cholesterol². In the U.S., CVD accounts for approximately one out of every three deaths, with more than 2,150 Americans dying each day³.



Barley Claims for Heart Health

In 2006, the United States Food and Drug Administration indicated that foods containing barley providing at least 0.75 grams of soluble fibre per serving are permitted to claim that they may help to reduce the risk of coronary heart disease⁴.

Health Canada followed in 2012 by permitting the claim that barley-containing foods are a source of fibre shown to help lower cholesterol⁵. An example of the permitted claim is: "125 ml of cooked pearled barley supplies 60 per cent of the daily amount of the fibre shown to help lower cholesterol⁵." The "daily amount" referred to in the claim is three grams of barley β -glucan⁵, and the food must contain at least one gram of β -glucan per serving size. Included in the claim are dehulled or hullless barley, pearl barley, barley flakes, grits, meal, flour, bran as well as β -glucan-enriched milling fractions, but does not include extracted barley β -glucan⁵. Health Canada permits the following statements in addition to the primary statement⁵:

- Barley fibre helps reduce/lower cholesterol.
- High cholesterol is a risk factor for heart disease.
- Barley fibre helps reduce/lower cholesterol, (which is) a risk factor for heart disease.

The literature review upon which the Canadian health claim is based demonstrated that barley β -glucan consumption was consistently associated with statistically significant reductions in both total and LDL cholesterol in 78 per cent of trials⁵.



Cardioprotective Benefits of Barley

The Institute of Medicine has set the Adequate Intake for fibre at 14 grams per 1,000 kilocalories (kcal), or about 25 grams per day for women and 38 grams per day for men⁶. It is estimated that 90 per cent of the U.S. population does not consume enough dietary fibre⁷, and in Canada the average intake is only about half the recommended amount⁸. Cereal fibre is strongly associated with reduced risk of myocardial infarction and stroke, as well as the incidence and rate of death from CVD⁷.

Increasing consumption of soluble fibres has clinically significant effects by reducing LDL cholesterol by an estimated five to 10 per cent⁹. Soluble fibre reduces postprandial lipemia, decreases lipid oxidation, inhibits lipogenic enzymes, and is inversely associated with C-reactive protein concentrations, a marker of inflammation and CVD risk factor¹⁰.

Barley is a low-fat, high-fibre, whole-grain food that fits with the nutrition guidelines for the prevention of CVD established by leading health-promotion organizations:

- The Heart and Stroke Foundation of Canada endorses Eating Well with Canada's Food Guide, which recommends consuming at least half of grains as whole grains, eating a variety of grains, and choosing grain products that are low in fat, sugar or salt¹¹.
- The American Heart Association recommends consuming a diet rich in whole grains, with at least half of grain intake as whole grains¹².
- The Academy of Nutrition and Dietetics, in its position statement on the health implications of dietary fibre, concluded that in regard to CVD, dietary fibre intake from whole foods may lower blood pressure, improve serum lipid levels, and reduce indicators of inflammation¹³.



Of the cereal grains, barley provides the highest level of heart-healthy β -glucan at three to 11 per cent on a dry weight basis¹⁴. β -glucans increase bile acid excretion by entrapping them in the viscous gastrointestinal contents or by directly binding to bile acids leading to fecal excretion¹⁵. Since cholesterol is a substrate for bile acid synthesis, increased excretion results in reduced circulating cholesterol levels¹⁵.

Soluble fibre may also lower cholesterol levels due to fermentation in the large intestine. Fermentation decreases pH and increases microbial populations, resulting in enhanced production of short-chain fatty acids that inhibit cholesterol synthesis⁷. Barley has the lowest glycemic index (GI) of the food grains¹⁶. Hyperglycemia is associated with the initiation of pro-inflammatory events and oxidative stress, which may adversely affect vascular structure and function by damaging the endothelium, the single layer of cells that line blood vessels and play a critical homeostatic role in the vascular system¹⁷. A systematic review concluded that a diet with a lower glycemic load can help to improve lipid profiles¹⁸. A meta-analysis of 14 prospective studies found that a high-glycemic-load diet was associated with a 23 per cent increased risk of CVD, while a high GI increased risk by 13 per cent¹⁹.

The low GI of barley is an attribute that, in addition to its β -glucan content, may help to promote cardiovascular health.





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