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Flaxseed: A Nutritional Review

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Flaxseed is rich in nutrients that support a healthy lifestyle: omega-3 fatty acids, soluble fibre, and lignans.

Flaxseed consumption helps to reduce cholesterol levels and lower blood pressure to protect against cardiovascular disease.

Blood glucose control may be enhanced when flaxseed is incorporated into a healthy diet.

Cancer-fighting components in flaxseed may help in reducing the risk of cancer.

Nutritional Profile of Flaxseed

Flaxseed (*Linum usitatissimum*) is a rich source of protein, fat, and dietary fibre to support a healthy lifestyle. On average, Canadian flaxseed contains 41% fat, 20% protein, and 28% total dietary fibre. This modest seed is a wealth of nutrition due to its content of three health-promoting components: the omega-3 polyunsaturated fatty acid alpha-linolenic acid (ALA, 20% of dry weight); the plant lignan secoisolariciresinol diglucoside (SDG, 1% of dry weight); and soluble fibre (6% of dry weight).¹

Flaxseed has a unique mix of fatty acids being low in saturates (less than 9% of total fatty acids) and containing the essential polyunsaturated fatty acids, omega-3 ALA and omega-6 linoleic acid (LA). Approximately 57% of the fatty acids are ALA, making flaxseed the richest plant source of this important omega-3.

Chronic inflammation and oxidative stress are linked with age-related diseases such as cardiovascular disease (CVD), obesity, diabetes, and cancer. A unifying mechanism by which flaxseed may lower the risk of these diseases risk is via its role in reducing inflammation. ALA may decrease inflammation via its influence on eicosanoids - hormone-like substances that play a role in controlling inflammation. When omega-3 ALA intake is low and omega-6 LA intake is high, pro-inflammatory eicosanoid production from LA is favoured. The opposite occurs when diets are both higher in ALA and lower in LA. A pro-inflammatory environment is associated with chronic disease risk and thus, increased ALA intake may offer protection.

The Institute of Medicine recommends an omega-6 to omega-3 ratio of 5:1 to 10:1.² Dietary flaxseed can help to significantly improve this ratio since it contains more than three times as much omega-3 as omega-6 fatty acids. The minimum recommended DV for ALA Omega 3 is 1,600-mg per day.²

Flaxseed Nutritional Analysis

Nutrients as per 2 Tbsp. (16 g)

Calories	91.2 kcal
Total Fat	7.1 g
Saturated Fat	0.6 g
Polyunsaturated Fat	5.0 g
Linoleic	1.1 g
Alpha-Linolenic	4.0 g
Monounsaturated Fat	1.3 g
Trans Fat	0.0 g
Total Carbohydrate	4.9 g
Total Dietary Fibre	4.8 g
Protein	3.4 g
Minerals	
Calcium	56.8 mg
Iron	0.8 mg
Magnesium	62.4 mg
Phosphorus	109.6 mg
Potassium	141.6 mg
Sodium	4.8 mg
Zinc	0.7 mg
Copper	0.3 mg
Manganese	1.3 mg
Selenium	4.3 µg
Vitamins	
Folate	14.8 µg
Niacin	0.5 mg
Pantothenic Acid	0.2 mg
Thiamin	0.3 mg
Vitamin C	0.1 mg
Vitamin K	0.7 µg

Lignans are phytoestrogens – compounds in plants that possess estrogen-like properties. Flaxseed has as much as 800 times greater amounts of active lignans compared to vegetables, fruits, legumes, cereals, or seeds. SDG is the major lignan found in flaxseed. Depending on the cultivar, growing region, and method of analysis, flaxseed typically contains between 0.7% and 1.9% SDG (1 to 26 mg/g of seed).³ SDG and its metabolites possess potent antioxidant properties, thereby reducing oxidative stress and protecting against chronic disease.¹

In addition, flaxseed is a rich source of total dietary fibre and contains 4 g of fibre per 2 tablespoon serving, or 16% of the Daily Value. Flaxseed contains mucilage gums, a type of soluble dietary fibre that forms a viscous solution when mixed with water. Soluble fibre helps to lower serum cholesterol, blood pressure, and inflammation, thereby reducing the risk of chronic disease.⁴ The Institute of Medicine has set the Adequate Intake for fibre at 14 g per 1000 kcal, or about 25 g/day for women and 38 g/day for men.² Flaxseed provides 4 g, or 16% of the Daily Value for fibre, per 2 tablespoon serving, so it is an excellent option for boosting dietary fibre intake.

Health Benefits of Flax

Increasing flaxseed intake may help in reducing the risk of chronic diseases that contribute to significant global morbidity and mortality.

1 Cardiovascular Disease

Cardiovascular disease has been the leading cause of mortality during the past decade.⁵ Many of the risk factors for CVD are modifiable and diet plays a key role in the prevention and treatment of CVD. Flaxseed lignans, omega-3 ALA, and soluble fibre may all contribute to the cardioprotective effects reported. A meta-analysis indicated that every 1 g/d increment of ALA intake was associated with a 10% lower risk of death from heart disease.⁶ Individuals with low ALA intakes (less than 1 g/day) may experience the greatest cardiovascular benefits from increasing intakes.⁶

On the basis of a review of numerous studies which focused on ALA, Fleming and Kris-Etherton conclude that there is evidence demonstrating a beneficial role of ALA for the primary and secondary prevention of CVD. Further, it was recommended that ALA intake be increased to 2 to 3 g/day to reduce risk of CVD.⁷

Flaxseed SDG has been found to reduce the progression of atherosclerosis in animal models and to lower serum total and low density lipoprotein (LDL) cholesterol in both humans and animals.¹ Compared with placebo, supplementation with a flax lignan complex decreased metabolic syndrome composite score in males and reduced diastolic blood pressure among all males as well as males and females with metabolic syndrome.⁸

Dietary fibre intake is inversely associated with risk of CVD, including coronary heart disease, stroke, hypertension, obesity and metabolic syndrome.⁹ Soluble fibre helps to reduce serum cholesterol by increasing excretion of cholesterol-containing bile acids.¹⁰

A double blind randomized controlled trial found that in participants who received ground flaxseed, systolic blood pressure decreased by 10 mm Hg and diastolic blood pressure decreased by 7 mm Hg compared to placebo.¹¹ This is one of the most potent antihypertensive effects observed as the result of a dietary intervention and is even more significant than some common drugs used to treat the disease.¹¹



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Health Claim for Flax

In 2014, Health Canada approved a health claim for flax based on evidence that linked ground (milled) whole flaxseed with reductions in blood cholesterol.¹² The research supporting the claim demonstrated that flaxseed decreased total cholesterol and LDL cholesterol levels by 0.21 mmol/L and 0.22 mmol/L, respectively.¹² This has clinically relevant implications since every 0.0259 mmol/L reduction in LDL-C is estimated to reduce total mortality by 1%.¹³

The “daily amount” referred to in the claim is 40 g (5 tablespoons) of ground whole flaxseed to be consumed over three eating occasions in the day.

An example of the permitted claim for ground flaxseed is: “16 g (2 tablespoons) of ground flaxseed supplies 40% of the daily amount shown to help lower cholesterol”. The “daily amount” referred to in the claim is 40 g (5 tablespoons) of ground whole flaxseed. In addition to the primary claim statement, the following statements may be used:

- Ground (whole) flaxseed helps reduce/lower cholesterol
- High cholesterol is a risk factor for heart disease
- Ground (whole) flaxseed helps reduce/lower cholesterol, (which is) a risk factor for heart disease

2 Diabetes and the Metabolic Syndrome

The number of adults with diabetes worldwide has more than doubled over three decades and is now estimated to be 8.3%, or 371 million people.¹⁴ The soluble fibre, protein, SDG, and ALA in flaxseed may moderate insulin secretion and activity to help maintain plasma glucose homeostasis. Flaxseed SDG has been associated with improvements in glycated hemoglobin levels and the metabolic syndrome.¹ A high fibre diet (25-50 g/day; 15-25 g/1000 kcal) is likely the most effective for diabetes due to the effect of fibre in reducing glycemia, insulinemia and lipemia.¹⁵ Foods that incorporate milled flaxseed may help to lower postprandial glycemic response.¹⁶ Flaxseed may also suppress appetite and energy intake, which may assist with weight control and diabetes management.¹⁷

3 Cancer

An estimated two out of five Canadians (46% of men and 41% of women) are expected to be diagnosed with cancer during their lifetime and one in four people are predicted to die from the disease.¹⁸ In the United States, over 1.6 million new cancer cases are expected to be diagnosed in 2014.¹⁹ The anticancer effects of flaxseed appear to be due to both hormone and non-hormone-related actions. Flaxseed lignans, in particular SDG, exert hormone-related actions by competing with estrogen and testosterone for binding to their respective receptors, and by inhibiting the enzyme aromatase, which converts androgens into estrogen.²⁰ Non-hormone-related actions may include decreasing nuclear aberrations and genetic damage, cell proliferation and metastasis, and production of growth factors that promote angiogenesis and tumour growth.¹

Since breast cancer is a hormone-sensitive cancer, the anti-estrogenic effects of flaxseed are of interest in mitigation of the disease. A case-control study found that consumption of flaxseed and flaxseed bread significantly reduced the risk of breast cancer by 20-30%.²¹ These results are supported by findings of two meta-analyses that reported an association between high dietary lignan intake and a reduction in post-menopausal breast cancer risk.²¹ Flaxseed lignans have also been shown to inhibit cancer cell growth in patients with prostate cancer.

ALA, SDG, antioxidants and soluble fibre - flaxseed provides amazing disease-fighting nutrition in a tiny seed. Further evidence that good things really do come in small packages!

YELLOW FLAXSEED



BROWN FLAXSEED



YELLOW GROUND FLAXSEED



BROWN GROUND FLAXSEED



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