

FLAXSEEDS

A REVIEW OF THE HEALTH BENEFITS OF FLAXSEEDS

Flax (*Linum usitatissimum*) is one of the earliest agricultural crops grown by man (1). Flax has a blue flower that produces small, flat seeds ranging in color from golden yellow to reddish brown. Today flax is produced both for its stem and the seed. The stem is used for fiber to make linen cloth, and the seed yields oil which is used for human consumption and industry. Cold pressing of flax seeds yields oil which is edible and has omega-3 fatty acids and lignans, components that have health benefits. When flaxseed oil is processed with chemicals it is known as linseed oil and is unfit for human consumption. Linseed oil is used for finishing wood products, paint and coatings. Ground

flaxseeds are used for bakery products and also in animal feed (2).

In the last decade, flaxseed meal has garnered attention due to its reported health benefits, and its use in the U.S. has increased significantly (1). Flaxseed meal is used in many products such as snack bars, baking mixes, and ready made breakfast items such as waffles, muffins, bagels, rolls, bread, and cereals.



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SPECIAL POINTS OF INTEREST

- Flaxseed meal is used in many products such as snack bars, baking mixes, and ready made breakfast items such as waffles, muffins, bagels, rolls, bread, and cereals.
- Ground flaxseeds are high in protein.
- Improved glucose and insulin levels can result in improved satiety due to the high fiber content of flaxseeds and reduction in abdominal fat.

COMPOSITION OF FLAXSEED BASED ON SERVING SIZE OF ONE TABLESPOON

Form of Flaxseed	Weight (g)	Energy (kcal)	ALA (g)	Total Dietary Fiber (g)	Soluble Fiber	Lignan Content (mg)
Whole Seed	11	50	2.5	3.0	0.75	11-286
Ground Seed	8	36	1.8	2.2	0.55	8-208
Flaxseed Oil	14	124	8.0	0.0	0.0	0.0

A REVIEW OF THE HEALTH BENEFITS OF FLAXSEEDS (CONT'D)

Most of the benefits of flaxseed are believed to be due to alpha-linolenic acid (ALA), lignans (3) phenolic acids and fiber (4). The oil composition in flax is very unique with 57 percent of the fatty acids being unsaturated alpha-linolenic acids. It is the richest known source of the omega-3 fatty acid. In fact, the percentage of fat (as ALA) in flaxseed oil is 5.5 times higher than the next highest sources, walnuts and canola oil. ALA is

an essential fatty acid required for growth and maintenance of cells. Lignans are an important source of biological activity that can impact cardiovascular disease (5), diabetes (6), menopausal symptoms (7) and cancer (8). The fiber content of flax is quite high and for that reason it has been used as a laxative. Ground flaxseeds are also high in protein.

FLAXSEED OIL

Flaxseed oil is used for various health conditions due to its alpha linolenic acid content. The oil has a high concentration of unsaturated fats with 73% fatty acids being polyunsaturated fatty acids (PUFA), 18% monounsaturated fatty acids (MUFA) and 9% saturated fatty acids (SFA).

Since many chronic diseases are thought to be caused by chronic oxidative stress and inflammation, there has been much interest in the effect of ALA on reducing inflammation. Dietary supplementation with ALA significantly decreased inflammatory markers in a study in middle aged men (9).



Flaxseed Oil

RESEARCH FINDINGS ON FLAXSEEDS

FLAXSEED LIGNANS AND CANCER

Lignans are large molecules found in many plants such as grains, legumes, vegetables, fruits, berries and tea. They are in the seed coat and stalk of plants and other cell membranes. The lignan content of flaxseeds is about 335 mg/100grams of seeds, much higher than most grains and seeds other than sesame seeds. Flaxseed is the richest source of the mammalian lignan precursor secoisolariciresinol diglycoside (SDG) (4). SDG is converted to the lignans enterolactone and

enterodiol in the colon by intestinal bacteria. Enterolactone and enterodiol provide healthful biological activity in the body (10). They may regulate hormones; act as weak estrogenic compounds; support the immune system; reduce cholesterol insulin and glucose; and protect against several kinds of cancers. Lignans are considered to be phytoestrogens that provide a weak estrogenic effect in humans. Lignans have a very similar chemical structure to some of the therapies

RESEARCH FINDINGS ON FLAXSEEDS (CONT'D)

available for breast cancer, and recent research has focused on using lignans for cancer treatment and prevention (3). The incorporation of two tablespoons of flaxseed per day in the diet of women newly diagnosed with breast cancer reduced tumor cell proliferation and increased cancer cell death (8).

In laboratory animals, flaxseed supplementation has been shown to have beneficial effects on breast cancer (3). A flax seed supplementation reduced tumor growth rate and metastasis by 45% in mice. In another study, mice receiving 10% flax seed diet protected their offspring from mammary gland tumors, compared to those that did not receive flax seed supplementation (4).

Flaxseed supplementation as ground flaxseed has been shown to hinder prostate cancer cell growth and reduce tumor size (11) in both animal and human studies (3).



Grounded Flaxseed

FLAXSEED FIBER AND DIABETES

Because of its fiber content, ground flaxseeds have most commonly been used as a laxative. One tablespoon offers three grams of fiber or about the same amount as a bowl of oatmeal. Some studies have suggested that flaxseed may improve blood glucose levels (6). In studies on healthy volunteers and post-menopausal women, participants who ate bread made with flaxseed had a 28 percent reduction in blood glucose levels compared to those who ate bread made with wheat flour alone. The favorable effects on glucose

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metabolism observed from flax consumption were believed to be due to improvement in insulin sensitivity. This is likely due to the soluble fiber content of flax, which may delay glucose absorption in the gut after a meal. The soluble fiber forms a gel in the intestinal track slowing down glucose absorption, and thereby reduces insulin production. The improved glucose and insulin levels can result in improved satiety due to the high fiber content of flaxseeds and a reduction in abdominal fat.

FLAXSEED MEAL AND HEART DISEASE

High cholesterol levels are a risk factor for heart disease, as are abdominal obesity and high blood pressure. Flax has been suggested to protect against cardiovascular disease (CVD) due to its effect on these risk factors. The active components in flax that have been shown to mitigate the risk factors are the fatty acids ALA, lignans, phenolic acids and fiber (11). A number of mechanisms have been proposed by which flax may exert beneficial effects on the cardiovascular system.

It could be by reducing:

- serum cholesterol and protecting LDL from oxidation
- platelet aggregation
- inflammatory markers
- abdominal fat by helping to stabilize glucose and insulin levels
- blood pressure

RESEARCH FINDINGS ON FLAXSEEDS (CON'T)

The ability of flaxseed meal to reduce cholesterol in humans is supported by several studies (5, 12, 13, 14). In previous studies, flax seed meal modified risk factors for cardiovascular disease such as the thickness of artery walls (15) and reduced inflammatory markers such as C-reactive protein (9). There was a significant improvement in total cholesterol and LDL levels but no significant change in HDL levels in many of the studies.

Flaxseed meal has many beneficial components such as ALA, lignans, phenolic acids and both insoluble and soluble fiber. The various healthful components in flax produced measurable changes in research studies on cardiovascular disease, diabetes, menopausal symptoms and cancer. Further research will elaborate the specific sites and compounds that can be influenced by the components in flax producing the positive measurable changes. According to studies, incorporating up to two tablespoons of flax in the daily diet can produce measurable physiological changes that can be detected in the laboratory.

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