



# Flaxseed : Medicinal Importance

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**Abstract - Flax (*Linum usitatissimum* L.) is known to humans possibly for as long as 30 millennia and is used for at least 9 millennia. The use of flax for the production of linen goes back at least to ancient Egyptian times. It is a good source of plant Omega-3 fatty acids, fiber and other nutrients. Consumption of the oil or seed has been reported to have beneficial effects on cardiovascular health and in the treatment of certain cancers and inflammatory diseases. Flax seed is also used in animal feed to increase levels of alpha-linolenic acid in meat or eggs.**

**Keywords:** Flax, Omega-3, Oil, Fibers, Linen.

**Introduction** - Flax fibers are amongst the oldest fiber crops in the world. Dyed flax fibers found in a cave in Dzudzuana (prehistoric Georgia) have been dated to 30,000 years ago. The use of flax fiber in the manufacturing of cloth in northern Europe dates back to Neolithic times. In North America, flax was introduced by the Puritans<sup>3</sup>.

The flaxseeds are of medicinal and industrial importance; its varieties are cultivated in over 20 countries. It is a good source of plant Omega-3 fat, fiber and other nutrients<sup>2</sup>. The bast fibers obtained from the flax stem are made up of remarkably long cells and are rich in crystalline cellulose. They have a very high tensile strength and are source of linen textiles, and their use in composite materials is an area of active research.

The botanical name of flax is *Linum usitatissimum* of the family Linaceae. It is an erect annual plant growing to about 1.2 m tall, with slender stems. The leaves are green, slender lanceolate, 20–40 mm long and about 3 mm broad. Flax is a versatile, blue-flowered crop 15–25 mm in diameter, with five petals; they can also be bright red. The fruit is a round, dry capsule and 5–9 mm in diameter, containing several glossy brown seeds, about 4–7 mm long<sup>3</sup>. It is flat and oval with a pointed tip and little larger

than a sesame seed. Flax seeds range in color from a deep brown to a light yellow. Seed color is determined by the amount of pigment in the outer seed coat – the more pigment, the darker the seed. Seed color is easily modified through simple plant breeding techniques. The seeds are used as food and feed. The seeds have a crisp and chewy texture and a pleasant, nutty taste<sup>2</sup>.

The seed of flax produces oil that is rich in unsaturated fatty acids, especially a linolenic acid, polymers of which are used in linoleum, paints and other finishes. Health benefits are derived from both the alpha-linolenic acid and other components of the seed, including lignans such as secoisolariciresinoldiglucoside (SDG), which is an antioxidant and the precursor of several phytoestrogens<sup>1</sup>.



## Medicinal Importance

Flax is rich in fat, protein and dietary fiber. An analysis of brown Canadian flax averaged 41% fat, 20% protein, 28% total dietary fiber, 7.7% moisture and 3.4% ash, which is the mineral-rich residue left after samples are burnt. The composition of flax can vary with genetics, growing environment, seed processing and method of analysis<sup>2</sup>. In recent years it has attracted considerable interest as a result of studies which attribute potential health benefits



to its components, including the prevention of chronic non-communicable diseases. Among these compounds presenting biological activity, alpha-linolenic acid, lignans and soluble fiber are of special interest<sup>4</sup>.

Flaxseed oil contains both omega-3 and omega-6 fatty acids, which are needed for health. Flaxseed oil contains the essential fatty acid alpha-linolenic acid (ALA), which the body converts into eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), the omega-3 fatty acids found in fish oil. Some researchers think that flaxseed oil might have some of the same benefits as fish oil, but the body is not very efficient at converting ALA into EPA and DHA. And the benefits of ALA, EPA, and DHA are not necessarily the same. Omega-3 fatty acids, usually from fish oil, have been shown to reduce inflammation and help prevent certain chronic diseases, such as heart disease and arthritis<sup>5</sup>.

Getting a good balance of omega-3 and omega-6 fatty acids in the diet is important. These essential fats are both examples of polyunsaturated fatty acids, or PUFAs. Omega-3 fatty acids help reduce inflammation, while many omega-6 fatty acids tend to contribute to inflammation. A healthy diet should consist of roughly 2 - 4 times fewer omega-6 fatty acids than omega-3 fatty acids. The typical American diet, however, tends to contain 14 - 25 times more omega-6 fatty acids than omega-3 fatty acids. Many researchers believe this is a significant factor in the rising rate of inflammatory disorders in the United States<sup>5</sup>.

- **High cholesterol :**

People who follow a Mediterranean diet tend to have an increased HDL, or “good” cholesterol level. Taking flaxseed or flaxseed oil as a supplement can help lower cholesterol or not is up for debate. Some small studies show it has beneficial effects on cholesterol levels, but at least one double blind study found no evidence that it lowered cholesterol.

- **Heart disease:**

Eating a diet rich in fruits, vegetables, whole grains, nuts or legumes, and ALA rich foods may substantially reduce the recurrence

of heart disease. One of the best ways to help prevent and treat heart disease is to eat a diet that is low in saturated and trans fat and rich in monounsaturated and polyunsaturated fats (including omega-3 fatty acids from flaxseed and fish). Evidence suggests that people having ALA rich diet are less likely to suffer a fatal heart attack. ALA may reduce heart disease risks through a variety of ways, including making platelets less “sticky,” reducing inflammation, promoting blood vessel health, and reducing risk of arrhythmia (irregular heart beat). Several human studies also suggest that diets rich in omega-3 fatty acids (including ALA) may lower blood pressure. However, it’s not clear whether taking flaxseed oil as a supplement would have the same effect on heart health.

- **Sjogren’s syndrome:**

Preliminary evidence that suggests taking 1 - 2 g of flaxseed per day can improve the symptoms of dry eye in people with Sjogren’s syndrome. Sjogren’s syndrome is an auto immune condition where the immune system attacks glands in the body that produce moisture, like salivary and tear glands.

- **Cancer :**

Studies suggest that flaxseed oil may help prevent the growth of breast tumors. In one Canadian Study, researchers discovered that flaxseed oil prevented breast tumor growth, likely through ALA content. Patients with breast cancer should not take any nutritional supplement without their doctor’s approval.

- **Dietary Sources:**

Flaxseed oil comes from the seed of the flax plant. It contains 50 - 60% omega-3 fatty acids in the form of alpha-linolenic acid (ALA) which is more than that in fish oil, but the body is not very efficient at converting ALA into the omega-3 fatty acids found in fish oils. So ALA from flaxseed may not have the same benefit as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) from fish oil<sup>5</sup>.

- **Controlled flax interventions for the improvement of menopausal symptoms and postmenopausal bone health:**

The use of phytoestrogen-rich plant food



supplements as an alternative to hormone therapy for the management of menopausal symptoms and chronic diseases is of considerable interest, although results to date have been mixed.

Flax is rich in phytoestrogen and a major dietary source of glycosides for the lignans-secoisolariciresinol and matairesinol, with the major form being-secoisolariciresinoldiglucoside (SDG; ranging from 11.9 to 25.9 mg/g flaxseed). After deglycosylation in vivo, gut bacteria can further metabolize secoisolariciresinol and matairesinol to form the mammalian lignans-enterodiol and enterolactone, respectively. Gut bacteria can further oxidize enterodiol to form additional enterolactone. These metabolites can be conjugated to glucuronide and sulfate forms by colonic epithelial cells and have been identified intact in human urine<sup>6</sup>.

#### ● Use of animals for Omega-3 fatty acids:

Recent research indicates that products, such as eggs and beef, from animals fed flax have increased levels of omega-3 fatty acids. Animal studies, on consuming flaxseed, suggest that flaxseed may decrease growth of both estrogen receptor-negative and estrogen receptor-positive breast cancers. In an animal study, flaxseed reduced tumor incidence, number and size when fed to carcinogen-treated rats at initiation, promotion or late stages of cancer development.

In a compared study, a control group of postmenopausal women were controlled with newly diagnosed breast cancer, and those who consumed 25 g ground flaxseed per day for approximately 32 days showed decreased tumor cell proliferation, decreased HER2 (c-erbB2) expression and increased apoptosis at the time of surgery. (HER2 leads to growth factor signaling pathways that play a role in cell proliferation, differentiation, apoptosis and metastasis.) Estrogen and progesterone levels and receptor activity did not change<sup>8</sup>.

More recently, diets with 5 percent or 10 percent flaxseed (comparable to 25 to 30 grams of flaxseed daily in humans) inhibited the growth of both estrogen receptor (ER) positive and ER-negative human breast cancer cells injected in mice. It also reduced metastasis of ER-negative

breast tumors. These studies maintained either high estrogen levels as a model for premenopausal breast cancer or low estrogen levels as a model of postmenopausal breast cancer. Decreased cell proliferation rates, decreased angiogenesis and increased apoptosis seem to account for the decreased tumor growth.

In a series of case-control studies, women with highest estimated lignan consumption showed 28 percent to 51 percent lower risk of breast cancer, though impact varied according to menopausal and estrogen receptor status, and was not seen in all such studies. A meta-analysis of seven case-control and four cohort studies found no significant association of total lignan intake and overall breast cancer risk. Separated analysis by menopausal status showed no significant link to premenopausal breast cancer, but a significant 15 percent lower risk of postmenopausal breast cancer in women with highest lignan consumption.

Another case-control study published since this meta-analysis showed highest estimated lignin consumption was associated with significantly lower postmenopausal breast cancer mortality, but showed no significant association with premenopausal breast cancer mortality<sup>8</sup>.

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