

Herb: Flaxseed Oil

Scientific: *Linum Usitatissimum*
Family: Linaceae

Common Name¹⁻²: Flax Seed, Graine De Lin, Leinsamen, Lini Semen, Linseed, Lint Bells, Linum, Phytoestrogen, Winterlien, Linen Flax.

Active Ingredients: Linolenic acid, Linoleic acid, Alpha-linolenic acid and Oleic acid are all fatty acids². Galactose, Xylose, Arabinose, and Rhamnose are mucilage². Equol is a protein flavonoid².

MOA: Linolenic acid, linoleic acid, alpha-linolenic acid and oleic acid are considered fatty acids and are believed to lower cholesterol². Linoleic acid and alpha-linolenic acid are required for cell membranes for the structural integrity¹. Flaxseed oil may also have an effect on platelet aggregation that involves a decrease in platelet aggregation and may increase the risk of bleeding¹. Alpha-linolenic acid raises the body serum levels of omega-3 polyunsaturated fatty acids that include eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) that are converted by the body to anti-inflammatory prostaglandins and leukotrienes in the body¹. The increase of the EPA and DHA ratio is greater than the pro-inflammatory arachidonic acid, which produces an anti-inflammatory response¹. The alpha-linolenic acid has also been reported to suppress the production of interleukin-1, tumor necrosis factor, leukotriene B4, and oxygen free radicals by polymorphonuclear leukocytes and monocytes. The possible anti-tumor effects from the alpha-linolenic acid are thought to be through the possibilities of increasing peroxidation of fatty acids in tumor cell membranes or by altering the balance of prostaglandin production away from tumor promoting prostaglandins of the E2 series. The galactose, xylose, arabinose, and rhamnose are mucilage that is why flaxseed is used as a bulk laxative². Flaxseed increases the volume of the bowel content, which therefore it stimulates peristalsis³. Flax also has a use in colitis because it protects the mucous membrane when the bowel is inflamed³.

Indications/Efficacy: Laxative- there is limited data looking at flaxseed in constipation, but flaxseed is a rich source of soluble fiber mucilage. In a randomized crossover trial of flaxseed 40 patients with lupus nephritis were randomized to receive 30 grams of ground flaxseed daily or a control. Of the 15 patients who finished the two-year study, 2 of the patients had increase laxation.⁴

Rheumatoid Arthritis- flaxseed vs. safflower was evaluated in a double-blind, placebo-controlled randomized study that looked at 22 patients with rheumatoid arthritis. After 3 months of treatment the groups were followed up and showed that there was no improvement in the clinical subjective findings (pain, global assessment, functional status), or laboratory parameters (C-reactive protein, erythrocyte sedimentation rate). The authors' therefore concluded that flaxseed did not prove to be beneficial in patients with rheumatoid arthritis.⁵

Hypertriglyceridemia/cholesterolemia- in a controlled double blind parallel study the investigators compared the treatment of 40 g of either ground whole flaxseed or wheat-based comparative control regimen and the effects on the lipid profile of postmenopausal women for a period of 3 months⁶. The study included 58 postmenopausal women who were less than 65 years old who were not on hormone replacement therapy or any medication to treat or know to affect lipids or bone metabolism⁶. The flaxseed treatment group did have a significant decrease in total and non-HDL cholesterol of 6%, but there was not a significant decrease in LDL or triglycerides, although there was a decrease of 6.7% and 12.8% respectively.⁶ Another study looked at 25 menopausal patients and compared 40g/day of crushed flaxseed (given in the form of bread and grain) vs. 0.625mg of conjugated equine estrogens alone or combined with micronized progesterone⁷. It was a crossover trial with treatment with 2 months of each therapy⁷. The patients involved in the study had to be between 45 and 65 years old, had their last menstrual cycle at least a year ago, no bleeding with medroxyprogesterone acetate challenge and for the last 6 months, and have abnormal lipid profile (total cholesterol 240-300mg/dL, LDL >160mg/dL, cholesterol/HDL cholesterol ration greater than 4.5 and triglycerides <310mg/dL)⁷. Flaxseed did not cause a significant reduction of the lipid profile, but a significant decrease was found in the HRT group.⁷ The changes in LDL for the HRT group was a significant decrease of 15.9% and in the flaxseed group a non-significant decrease of 1.6%⁷. The change in cholesterol/HDL cholesterol for the HRT group was a significant decrease of 13.9% and non-significant decrease in the flaxseed group of 2.0%⁷. The change in triglycerides for the HRT group was a significant increase of 19.2% and for the flaxseed group there was non-significant decrease of 1.2%⁷.

Cancer- a pilot study looked at dietary fat restriction and flaxseed supplementation in men with prostate cancer who were about to undergo radical prostatectomy⁸. There were 25 patients in the study who had prostate cancer and were waiting to undergo a

prostatectomy⁸. The patients were to take 30g/day of ground flaxseed and to have a low fat diet of 20% of total kilocalories or less⁸. The study lasted an average of 34 days and there was a significant decrease in total testosterone (422 ± 122 ng/dL to 360 ± 128 ng/dL), total cholesterol (201 ± 39 mg/dL to 174 ± 42 mg/dL) and free androgen index ($36.3\% \pm 18.9\%$ to $29.3\% \pm 16.8\%$) (all $p < 0.05$), a decrease in the mean proliferation rate (7.4 ± 7.8 historic controls vs. 5.0 ± 4.9 for treated patients, $p = 0.05$), the distribution of the apoptotic indexes differed significantly ($p = 0.01$) and the proliferation rate and apoptosis were significantly associated with the number of days on the diet ($p = 0.049$ and $p = 0.017$)⁸. In another study the investigators looked at the use of flaxseed in blind mice with human breast cancer xenografts⁹. The mice were given two diets one containing 20% corn oil and the other containing 10% flaxseed⁹. The study looked at the estrogen receptor-negative MDA-MB-435 human breast cancer cell line in 20 female nude mice⁹. In this study it showed that there was a decrease in tumor growth rate (10.2 ± 2.4 flaxseed diet vs. 16.6 ± 1.7 mm²/week in the corn oil group, $p < 0.05$) and decrease in metastasis (1/10 in flaxseed group vs. 7/10 in the corn oil group, $p < 0.05$), a decrease in vascular endothelial growth factor in large tumors (5 ± 5 in the flaxseed group vs. 60 ± 10 pg/ml in the corn oil group, $p < 0.05$) in the flaxseed supplement group⁹.

Supplemental source of dietary alpha-linolenic acid- in a randomized double-blind crossover study were ground flaxseed 1.3g/100g and flaxseed oil 5g/100g were added to test food and it was compared to wheat fiber that was added to the test food¹⁰. The study included 80 volunteers who were all employees of a food company¹⁰. In the flaxseed group it significantly increased the proportions of alpha-linolenic acid in serum lipids (1749 ± 1001 baseline to 4638 ± 1721 , $p = 0.001$)¹⁰.

Lupus erythematosus- in a two year non-placebo controlled crossover study that had 23 patients who had lupus nephritis were randomized to receive 30g of ground flaxseed or a control⁴. The patients had to have a diagnosis of SLE with a history of documented hematuria and proteinuria and \pm renal biopsy⁴. There was a decrease in serum creatine with a trend towards significance ($0.97 \pm .30$ mg/dL to 0.94 ± 0.28 mg/dL, $p < 0.08$) in the flaxseed group, there was also a significant lower serum creatine in the flaxseed group who were compliant in taking the flaxseed vs. those who were not at the end of the two year study ($p < 0.05$).⁴

Other listed uses included anxiety, benign prostatic hyperplasia, vaginitis, weight loss, prevention of heart attacks, psoriasis,

eczema, multiple sclerosis, attention deficit disorder, hypertension and agoraphobia, but there is limited data available on these indications¹⁻².

Contraindications/: Pregnancy/lactation and children due to lack of information
Allergies² Bowl obstruction, dehydration and a hypersensitivity to flaxseed
Flax poultice should not be used on open wounds
Immature seeds are toxic

Dosage Forms: Capsules, oil, powder, softgel capsules, flax flour made into a paste

Recommended doses/

Duration: A typical dose is 15-30ml of the oil per day orally, with the product being standardized to 58% alpha-linolenic acid². The powder (crushed/ground flaxseed) in the studies used doses of 15 to 30g/day^{4,6-8}. The duration of most studies looking at the use of flaxseed in a variety of disease states have shown that it is safe to use for 3 months in dislipidemia, and as a supplement^{1,3,4,6}. One study did use flaxseed for one year, but only a few patients were able to tolerate it for that duration⁴. There is not a standard dose for the topical form, but 30-40 grams of flax flour may be used to form the paste².

Drug Interactions¹⁻²: The absorption of medications may be decreased when given at the same time as flaxseed oil. Flax may increase the effectiveness of laxatives and result in diarrhea. Flax should be avoid in patients who are currently taking anticoagulants or antiplatelets do to flax's inhibition of platelet aggregation, which increases the patient's chance of bleeding (aspirin, clopidogrel, dalteparin, enoxaparin, heparin, ticlopidine, warfarin, and others).

Herb/Herb or

Herb/Food interactions:

None reported

Herb-Disease Interaction:

Patients with bleeding disorders should use caution when using flax due to the increase chance of bleeding complications¹. May cause a thyroid problem¹¹

Other Safety Issues: Lab tests interactions include prothrombin time due to risk of increased bleeding, and triglycerides may decrease and the test results in some patients may show hyperlipoproteinemia¹. The main side effects are GI (upset stomach, diarrhea), and it can cause

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an anaphylactic reaction that involves IgE antibodies and histamine release¹².

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