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Review Article

KNOW MORE ABOUT PROPITIOUS SEED-FLAX

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ABSTRACT:

Linseed, *linum usitatissimum* is used in Ayurveda for many Vata, Pitta related disorders. The lipid content of the seed contains more than 55% of omega – 3 fatty acid responsible for hypolipidaemic, anticancer, anti inflammatory, anti burn, anti rheumatic, antithrombic and proven useful in atherosclerosis, arrhythmias, cardiac disorders, also in autoimmune diseases. Lignan content contains cyanogenic glucosides and phyto oestrogens. The whole seed is very useful and is known from the ancient times for its activities.

Recent years, again people has realized about the valuable therapeutic activities and immense research work already been started. The use of seed is recommended for its omega-3, omega-6 and omega-9, phytoestrogens and cyanogenic glucosides. All these ingredients with diverse pharmacotherapeutic activities make it a propitious seed.

Key words: Flax, linseed, anticancer, hypolipidaemic, anti-inflammatory, antiburn.

INTRODUCTION:

Flax (*Linum usitatissimum* Linn, family: Linaceae)¹ is the oldest cultivated plant in many countries for its immense phrarmacotherapeutic activities. It is in usage from the time immemorial in India and other countries for its therapeutic and beneficial effects. Usitatissimum means very useful and it stands

to its meaning. In Ayurveda and sidha, it is extensively used for its medicinal properties in Vata & Pitta related disorders.

In the recent years, it has gained the popularity for its anticancer and antihyperlipidaemic, anti inflammatory⁵, anti arrhythmic⁹ and antiburn activity. The anti cancer activity has been attributed to the lignans present in the seeds, however the lignans are absent in the oil of linseed which has polyunsaturated fatty acids responsible for antihyperliperlipidaemic, anti inflammatory activity⁴.

Flax is an ancient crop that was used as a food source as far back as 3000 B.C. It has been cultivated for more than 7,000 years in the Middle East as a source of linen fiber and for its oil. The ancient Egyptians, Hebrews, Greeks, and Romans used the seeds as food, the oil as medicine, and the fibers for clothing and ships' sails. The Romans used bread from made flax and were able to march long distances and then do battle. Today, Roman meal bread still uses flaxseed, while the linseed oil is used in the manufacture of varnish, paint, linoleum, and soap. In the 8th century in France, Charlemagne passed laws requiring the seeds to be consumed in order to keep his subjects healthy. A Portuguese recipe recommends linseed oil mixed with red wine to treat wounds. In Mexico, it is used to treat burns, abscesses, cough, urinary tract inflammations, boils, swelling, and gingivitis.

The seeds have long been used as a bulk laxative and soothing expectorant. However, they must be ground to gain any benefit as the whole seed will pass through the body undigested. In addition, since flax absorbs moisture in its efforts to alleviate constipation, it is well advised to drink plenty of water, otherwise, the stools will be hard and dry. Flowers and seeds are used for curing many disorders and fiber from the stem is used for weaving cloth. If a seed is placed in the corner of the eye, it will move around and gather foreign particles into its mucilage to be removed. Before the usage of mechanical cotton in the early 18th century, the choice of clothing was wool or linen. Linen fiber is obtained from the stems of flax.

Linseed oil has been used as finish on wood (varnish)¹. After the development of petroleum industry, the use of linseed oil for the above purpose has been reduced drastically.

Mountain flax is a potent laxative and can be a substitute for Senna. However, it was largely used for rheumatism and liver complaints, mainly because of its string laxative action rids the body of built-up toxins.

The oil is an important source of essential fatty acids, which help in preventing fatty deposits from clogging, shows antithrombotic effect⁸. Flaxseed meal and oil should be kept refrigerated as it soon goes rancid, causing more health problems. If it begins to smell like turpentine, it should be discarded.

The seeds are extensively used in ayurveda which is witnessed by its description in all ayurvedic niganthus.

According to Charaka¹³:

“ atasyam madhuralayantu vipaki katukum thata |
Ushnaveeryam hitam vatee raktha pitha prakopanam ||”

Linseed oil has madhra, amla rasas, katu vipaka and ushna veerya useful in vata disorders and increases the rakta and pitta.

According to Susrutha¹⁴:

“ vataghnam madhura teshu kshoumam tailam balapahamii |
katupakamachukshushyam snighdoshnam guru pittalam ||”

ref: Susruta samhita sutrasthana 46th Chapter

It has madhura rasa, katu vipaka, ushma veerya and snigdha(oily) guna. It is useful in vata disorders and act as balya(tonic). Not good for eyes.

According to Rajanigantu¹¹:

“ madhuram tvataseetailam pichilam chanilapaham |
madhaghandhi kashyanchu kapakasapaharkamn ||”

Its taste is madhura and kashaya, sticky, its smell like liquor. It reduces kapha dosa and useful in cough.

Qualities:

“ Atasi picchila devi madagangha medolkata |
Uma kshuma himavati sunila neelapushpika ||
Atasi madagandha shyamadhura bhalakarika |
“Kaphavatakari cheshamtu pithahuntu kushtuvatanuthu ||

Its taste is madura smell like liquor. It is slightly pittahara and increases kaphavata. It gives strength.

Indications are in kusta (skin disorders) and vata disorders.

According to Dhanvantarinighantu¹⁰:

“Pratareekrutama proktha rudrapanti suvalkala |
Uma suneelapushpa vasutakta kshumapi cha |
Seta tailaaphala chou palika putipurak ||

Qualities (Guna karma):

“ Rudrapanti tu madhura snigdha cha balakarika
Kapavatakari cheshupitahantu krustavatagitu”

According to Bhavaprakashnigantu¹²:

“Atasi neelpushpi cha parvati shyadhuma chuma
Atasi madhura tikta snigdha pake kadhugruru”

Botanical classification¹:

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Malpighiales
Family: Linaceae
Genus: Linum
Species: Linum usitatissimum

Canada is the major producing country though it is regarded as indigenous to India. It is also produced in USA, USSR, Argentina, Italy, Algeria and Greece.

Top Ten Linseed Producers-2007		
Country	Production (Tonnes)	Footnote
Canada	633,500	
People's Republic of China	480,000	*
India	167,000	
United States	149,963	
Ethiopia	67,000	*
Bangladesh	50,000	F
Russia	47,490	
Ukraine	45,000	
France	41,000	F
Argentina	34,000	
World	4875,018	A

No symbol= official figure, F = FAO estimate, * = Unofficial/Semi official/mirror data,
C = Calculated figure A = Aggregate (may include official, semi official or estimates);
Source: Food And Agricultural Organization of United Nations: Economic And Social
Department: The Statistical Division.

In India, many varieties of flax is grown and it is cultivated in Utter Pradesh, Madhya Pradesh on commercial scale. It is cultivated as rab crop (seeds sown in October and harvesting in the month of February /March). There are the many varcities in India but 5 prominent varieties are 1) Sarda, 2)Parvati, 3) Neelum, 4) Padmini and 5)T-397 as provided by Linseed project co-ordinator, Kanpur, Uttar Pradesh, India.

The classification of plant mainly based on the purpose its cultivation. These plants are grown for (i) the seed (ii) for the fiber (iii) for seed and the fiber iii) for seed and the fiber.

It is an erect annual herb branches corymbosely above the main stem. Leaves are simple, sessile, linear- lanceolate with entire margin and borne on stems and branches.

The inflorescence is a loose terminal raceme or cyme. Flowers are borne on long erect pedicels are hermaphrodite, hypogynous and are composed of five sepals and five petals (the petals are blue coloured) five statements and a compound pistil of five carpels and may contain up to 10 seeds. The seed is oval, lenticular, 4-6 mm long with a smooth, shiny surface, brown in colour.

Flax seed	
Nutritional value per 100g (3.5 oz)	
Energy 530 kcal 2230kj	
Carbohydrates	28.88g
Sugars	1.55g
Dietary fiber	27.3g
Fat	42.16g
Prrotein	18.29g
Thiamine (Vit.B1) 1.644 mg	126%
Riboflavin (Vit. B2) 0.161 mg	11%
Niacin (Vit.B3) 3.08mg	21%
Pantothenic acid (B5) 0.985 mg	20%
Vitamin B6 0.473 mg	36%
<u>Folate</u> (Vit. B9) 0 µg	0%
Vitamin C 0.6 mg	1%
Calcium 255 mg	26%
Iron 5.73 mg	46%
Magnesium 392 mg	106%
Phosphorus 642 mg	92%
Potassium 813 mg	17%
Zinc 4.34 mg	43%

Chemical Constituents and their Pharmacological activities:

It contain lipids about 35-40%, proteins 20%, mucilage 2-7%, lignans – phyto oestrogens, cyanogenic glucosides, phenolic acids, glycosylated phenolic acids, flavonoids and tocopherols. It also contains enzymes linase and hydroperoxide isomerase, soluble dietary fiber, low level of digestible carbohydrate with low glycemic index.

Flax seed oil:

Flax seed oil, also known as “linseed oil” is a clear to yellowish oil obtained from the dried ripe seeds of the flax plant.

It is the most abundant source of omega-3 fatty acid i.e α -linolenic acid. It also contains triglycerides of the following fatty acids:

The saturated acids – palmitic (7%) and stearic acid (3.4-4.6%), monounsaturated oleic acid (18.5-22.6%), doubly unsaturated linoleic acid (14.2-17%), triply unsaturated omega-3 fatty acid, alpha linolenic acid (51.9-55.2%). Indian variety do not contain arachidic acid².

There is a change in percentage of these triglycerides based on the source of the seed. Include fatty acids provide energy, are an integral part of the cell membranes and are precursors of prostaglandins, thromboxanes , and leucotrienes collectively known as eicosanoids., they participate in development and synthesis of immunological and inflammatory responses⁵. The essential fatty acids in the flax are damaged by exposure to light, heat and oxygen and become rancid.

Ingestion of flax seed oil may alters the generation of eicosanoids, procoagulant activity and other membrane dependant responses and exert anti allergic, anti arthymic effects and used in treatment of cardiovascular diseases.

ALA is metabolized to eicosapentanoic acid, which may replace arachidonic acid in membrane phospholipids and is eventually converted to eicosapentanoic acid and docosahexenoic acid in some

species. EPA, and DHA are of significant benefit in the management of chronic inflammatory and immune disorders. When acted upon by cycloogenasae, they give rise to three series prostaglandins, which are notable to their anti inflammatory activity.

Per 1 Tbsp (14 g)*

Calories: 124

Total fat: 14g

Omega-3: 8g

Omega-6: 2g

Omega-9: 3g

*Nutrition information from the Flax Council of Canada.

Eating fish and flaxseed, and taking fish oil and flaxseed oil dietary supplements can help support heart health. The FDA recently granted GRAS (Generally Recognized As Safe) status for high alpha linolenic flaxseed oil.

Although flax seeds themselves contain lignans, a class of phytoestrogens considered to have antioxidant and cancer preventing properties⁶, the extracted linseed oil does not contain the lignans found in flax seed, and therefore does not have the same antioxidant properties. In fact, flax seed oil is easily oxidized, and rapidly becomes rancid with an unpleasant odor unless refrigerated. Even when kept under cool conditions it has a shelf life of only a few weeks. Oil with an unpleasant or rancid odour should be discarded. Rancid oils contribute to the formation of free radicals and may be carcinogenic. Oxidation of flax seed oil is major commercial concern, and antioxidants may be added to prevent rancidification.

Boiled linseed oil is used as a paint binder or as a wood finish on its own. Heating oil causes it to polymerize and oxidize, effectively making it thicker and shortening its drying time. Today most

products labeled as “boiled linseed oil” are a combination of raw linseed oil, petroleum-based solvent and metallic dryers. The use of metallic dryers makes boiled linseed oil inedible. Heat treated linseed oil is thicker and dries very slowly. This grade of linseed oil is usually labeled as “polymerized” or “stand” oil, though some types may be labeled as “boiled”.

EFAs are needed to provide the body with energy (especially the heart), and serve as integral of nerve cells, cell membranes, and hormone-like substances called prostaglandins. To keep the body healthy, EFAs and prostaglandins have many widespread roles in maintaining the homeostasis of the body.

Essential Fatty Acids are the “good fats”, a very hot research topic. Good fats raise HDL or “good cholesterol”. One of the jobs of this High Density Lipoprotein (HDL) or “good cholesterol” is to grab your bad cholesterol, LDL (Low Density Lipoprotein), and escort it to the liver where it is broken down and excreted. In other words, these good fats attack some of the damage already done by the bad fats and also in struggling to get cholesterol down, and fight heart disease and obesity. Essential Fatty Acids (EFAs) are necessary fats that humans cannot synthesize, and must be obtained through diet. EFAs are long-chain polyunsaturated fatty acids derived from linolenic, linoleic, and oleic acids.

EFAs support the cardiovascular, reproductive, immune, and nervous systems. The human body needs EFAs to manufacture and repair cell membranes, enabling the cells to obtain optimum nutrition and expel harmful waste products. A primary function of EFAs is the production of prostaglandins, which regulate body functions such as heart rate, blood pressure, blood clotting, fertility, conception, and play a role in immune function by regulating inflammation and encouraging the body to fight infection. Essential Fatty Acids are also needed for proper growth in children, particularly for neural development and maturation of sensory systems, with male children having higher needs than females. Fetuses and breast- fed infants also require an adequate supply of EFAs through the mother’s dietary intake.

The minimum healthy intake for both linoleic (Omega-3) and linoleic (Omega-6) acid via diet, per adult per day, is 1.5 grams. One tablespoon of flaxseed oil can provide this amount or larger amounts of other linolenic-rich foods. Because high heat destroys linolenic acid, cooking in linolenic-rich oils or eating cooked linolenic –rich fish is unlikely to provide a sufficient amount.

EFA deficiency, omega-6 and omega-3 imbalance is linked with serious health conditions, such as heart attacks, cancer, insulin resistance, asthma, lupus, schizophrenia, depression, postpartum depression, accelerated aging, stroke, obesity, diabetes, arthritis, ADHD, and Alzheimer's Disease, among others.

Flax seed contains both soluble and insoluble fiber. About one-third of the fiber in flax seed is soluble. Soluble fiber can aid in lowering cholesterol and regulating blood sugar levels. Two-thirds of the fiber in flax seed is insoluble. Insoluble fiber aids digestion by increasing bulk and preventing constipation. These characteristics seem to have a role in reducing incidents of colon cancer⁷.

Ground Flax Seed is rich in protein, B Vitamins, Vitamin E, beta-carotene, calcium, potassium, magnesium, manganese and zinc. Lignans benefit the heart, possess anti-cancer properties and studies performed on mice found reduced growth in specific types of tumors'. Initial studies suggest that flaxseed taken in the diet may benefit individuals with certain types of breast and prostate cancers. Flax may also lessen the severity of diabetes by stabilizing blood-sugar levels. There is some support for the use of flax seed as a laxative due to its dietary fiber contents and also possesses anti-inflammatory and anti burn activity. It has hypolipidaemic activity useful in cardiac diseases and also recommended in arthritis.

Conclusion:

Both oil content and lignan content of the seed have many therapeutic activities like anti cancer, hypolipidaemic, anti inflammatory, anti arthritic, antiarrhythmic, anti burn also useful cardiac diseases,

autoimmune diseases and atherosclerosis etc., makes the seed a propitious seed and the name is apt for flax seed.

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