



# A REVIEW ON ATASI (*Linum usitatissimum* Linn) AS A NUTRACEUTICAL

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## ABSTRACT

Atasi/Flax (*Linum usitatissimum* Linn.) is belongs to the family Linaceae. The genus *linum* has 230 species approx., but flax is the only species of economic importance. A nutraceutical is defined as any substance that is a food or part of a food and provides medical and health benefits, including the prevention and treatment of disease. Nutraceutical may be used to improve health, delay the ageing process, prevent chronic diseases, increase life expectancy, support the structure or function of the body. Flax seed has been classified as functional food because it provides numerous health benefits in addition to serving as a source of nutrients. The plant has shown diverse biological and Pharmacological activities. It has been used in Ayurveda from ancient period. In *Bavaprakasha nighantu* and *Kaiyyadeva nighantu* it is described under *Dhanya varga* while in *Dhanwanthari nighantu* it is comes under *Suvarnadi Varga*. Atasi is used in the treatment of *Vataraktha* (Gout), *Sotha* (Swelling), *Vruna* (Ulcer) and *Prameha* (Diabetes) by *Brihatrayis*. *Acharya charaka* included Atasi in *Rakshogna Gana* and *Pakwasothaprabedana gana*. *Atasyadi lepam*, *Dasamooladi anuvasana tailam*, *Atasi upanaham*, *punarnavasavam* are some Ayurvedic formulations that contains Atasi as ingredient. The recent studies show that it has Antioxidant, Antipyretic, Hepato-protective, Antibacterial, Nephro-protective properties. It is used to improve the strength of hair and bone. Flaxseed is used in the treatment of Breast cancer, PCOS, Prostate cancer etc. This review provides the information about Ayurvedic aspects and Pharmacological activities of Atasi/flaxseed.

**KEY WORDS** -Atasi, *Linum usitatissimum*, Nutraceutical

## INTRODUCTION

Nutraceutical is defined as any substance that is a food or part of a food and provides medical and health benefits, including the prevention and treatment of disease. The term "Nutraceutical" combines the two words of 'nutrient

' which is a nourishing food component, and 'Pharmaceutical' which is a medical drug. Atasi (*Linum usitatissimum* Linn) is one of the most important medicinal plants traditionally used for various health as well as nutritional purposes. The plant was useful as a source of fiber for weaving, oil from the seeds and feed from the meal, hence the species name '*usitatissimum*' meaning most useful. *Linum usitatissimum* Linn. is an annual plant grows up to 1.2m tall with slender stems. Leaves are simple, alternate, linear or lanceolate. The flowers are blue, bluish violet or white in terminal panicle. The fruit is round, dry capsule containing several glossy brown seeds. Seeds are with minutely pitted surface, elongated ovoid, flattened, rounded at one end obliquely pointed at another end.<sup>1</sup>

The origin of flax is uncertain. Some consider it to be indigenous to localities between the Persian Gulf and Caspian and black seas, while others ascribe its origin to India. The Indian treatises like *Manu smriti*, *Yagyavalka smriti* had been described the use of *Kshauma vastra* by Kshatriyas during *Upanayana*.<sup>2</sup> The two greatest epics of India *Ramayana* and *Mahabharata* also having the references of *Kshauma vastra* which was wore at that time. This indicates that *Kshauma* (Linen which made from flax) was used as textile in ancient Indian times. The seeds have both medicinal and nutraceutical properties. These seeds have been known to possess antidiabetic, antioxidant, estrogenic, antibacterial, cardio-protective activity. The texture of seed is crisp and chewy, having a pleasant nasty taste. It is the richest vegetarian source of Alpha linolenic acid [ALA], Lignans (Phytoestrogen) and soluble mucilage, all having benefits in overall health management. The flax seeds have a unique characteristic to reduce food craving and excessive hunger that occur in obese people when these seeds are eaten before a meal. So, these seeds can be included in the diet plans for losing weight.

All the part of plants has been used for the beneficiary purposes. Other than a medicinal value, various parts of the plant have been used to make fabric, dye, paint, varnishes, paper, fishing net and soap. Traditionally it is one out of the 5 flowers which are offered to *Goddess Durga* in Durga pooja.

## CULTIVATION

It is one of the major oil seed crops grown in India. It is grown in almost all parts of the country except Kerala, Tamil nadu and far east. Linseed is grown predominantly as a rainfed crop and cold season rabi crop. It can be grown as a mixed crop with Wheat, Gram, Barley etc. It is cultivated mainly in Uttar Pradesh, Bihar and West Bengal in India.<sup>1</sup>

## SCIENTIFIC CLASSIFICATION

Kingdom: Plantae	Order: Malpighiales
Division: Angiosperm	Family: Linaceae
Class: Eudicots	Genus: <i>Linum</i>
Subclass: Rosids	Species: <i>usitatissimum</i>

## GENERAL USES OF *Linum usitatissimum* Linn

1. **Linseed oil**- Linseed produced in India is utilized mainly for the expression of oil. The yield of oil is 28-30% on the weight of seeds. It is an edible oil in demand as a dietary supplement, as a source of alpha linolenic acid.

2. **Linseed cake/meal**-The residue that remains when oil is extracted from flaxseed is called linseed cake. It is used chiefly as a cattle feed and also used as fertilizer.

**3. Linseed mucilage** -It is prepared from aqueous extract of seeds precipitation (soaking in water for 24 hours). It is obtained as a white fibrous mass which becomes friable when completely dry. It is used in cosmetics for soothe, condition and protect the skin as well as hair.

**4. Linseed fibers** -Fiber is extracted from the stalk of plant. The color of raw fibers varies from creamy white to grey. Flax fibers are valued for its outstanding strength, fineness and durability. It is stronger and more durable than cotton. Textiles made from flax are known as *Linen* and are traditionally used for bedsheets, underclothes and table lines.

## AYURVEDIC VIEW OF ATASI

### SYNONYMS

Synonyms of Atasi shows its morphological, textile and nutraceutical properties.

Atasi -A potent medicine for vatika disorders

Neelapushpi- plant has blue flowers

Kshuma-Flowers shaped like nose

Tailaphala-Plant has oily seeds

Valkala/Masruna-Stem has fibres

Uma/Parvati-A potent remedy

Kshauma -Source of Linen

Other names- Pratharirkatama, Rudrapatni, Vasutarka, Sheeta, Palika, Pootipuraka,<sup>4</sup> Ratnapatra, Suvarchala, Velu<sup>5</sup>, Pichila, Devi, Madagandha, Madhotkada, Haimavati<sup>6</sup>

### CLASSICAL CATEGORIZATION

Bavaprakasha Nighantu<sup>3</sup> -Dhanya Varga[66,67]

Dhanwanthari Nighantu<sup>4</sup> -Suvarnadi Varga, Dhanya visheshm [102,103]

Kaiyyadeva Nighantu<sup>5</sup> -Dhanya Varga[84,85]

Raj Nighantu <sup>6</sup>-Shalyadi Varga[117,118]

### RASA PANCHAKAM

Rasam - Madhura Tiktam<sup>3</sup>

Gunam-Guru, Snigdham, Pichilam

Veeryam-Ushnam

Vipakam-Katu

Prabavam-Nil

Dosha karmam-Vata samanam, Kapha Pitha vardhanam

Atasi is also has properties like *Drughni/Achakshusya*<sup>5</sup>(Not good for eyes), *Sukraghni* (not good for aphrodisiac), *Balya* <sup>6</sup>(Improves strength and immunity), *Kushtahara*<sup>6</sup>(used in skin disorders) and *Rakta pitha prakopana* (not ideal in bleeding disorders).

## THERAPEUTIC USES IN CLASSICS

*Acharya Charaka* included the Atasi in **Rakshogna** group [Cha. Sa. 8/61] which should be used for fumigation of clothes used for beds and apparel of child with other drugs, for making them disinfectant<sup>7</sup>. Atasi is also included in **pakwasothaprabedana gana**[Cha. Chi 25/54]. This is the group of drugs which helps in tearing a ripened inflammation in delicate patients otherwise it should be operated upon surgically<sup>14</sup>.

*Acharya Susruta* advised to scatter the grains of Atas(linseed)i, Tila(Sesamum )and Sarshapa(mustard ) on the floor of neonatal room for protecting them from evil spirit<sup>8</sup>[Su. Sa. 10/23]. Also advised to cover the neonates with *Kshauma Vastra* (Linen cloth) and child should be laid to sleep on a bed covered with linen<sup>8</sup>Acharya Susruta also used *Kshauma Sootra* (fine fibre of flax) for *Seevana Karma*<sup>9</sup>(Stitching) [Su. Su. 25/20].

Atasi Taila gunas are described in *Taila Varga* by Brihatrayis. It is said to be *Ushna Veerya*(Hot potency ), alleviates *Vata*, vitiates *Rakta and Pitha*<sup>10</sup>. [ Cha. Su. 27/292].

Other therapeutic uses of Atasi includes: -

- 1.Vataraktha (Gout)- For the cure of pain caused by the predominance of vatha in vata rakta, apply the paste of Atasi, fruits of eranda or satahva prepared by triturating with milk<sup>11</sup>. [Cha. Chi. 29/140].
- 2.Swelling of ulcers (Wound)- The bolus of parched grains flour mixed with tila, linseed, sour curd, yeast, kusta(Saussurea lappa) and salt is recommended as poultice for ripening of inflammation faster<sup>14</sup>. [Cha. Chi. 25/51]
- 3.Seed oil of Atasi is used internally in diabetes<sup>12</sup>. [Su. Chi. 31/5]
- 4.Vatika galagandam(Goiter )-After bloodletting apply poultice with sesamum mixed with Sana, Atasi and other drugs to the wound of vatika galagandam<sup>13</sup> [Su. Chi 18/45].

## PHARMACOLOGICAL STUDIES

A number of studies have been carried out on *Linum usitatissimum* in recent years showing that it possesses diverse Pharmacological effects. Some of the important Pharmacological effects are as follows-

**LAXATIVE** -Linseed have good dietary fiber content. It is reported that flaxseeds produce laxative effects by increasing fecal volume and fecal weight. It stimulates peristalsis due to stretch reflexes. Thus, used as laxative<sup>17</sup>.

**ANTIOXIDANT** -The antioxidant activity of ethanolic extract of *Linum usitatissimum* in vitro model has been evaluated. The result indicated significant dose dependent inhibition against reducing power, superoxide anion radical scavenging, hydroxyl radical scavenging, metal chelating and hydrogen peroxide scavenging<sup>15</sup>.

**ANTI BACTERIAL ACTIVITY**- Flaxseed protein extract showed an antibacterial activity against the most test microorganisms especially gram negative bacteria<sup>16</sup>.



**ANTI ULCER** -In a study flaxseeds oil and flaxseed mucilage showed significant protective activity against gastric ulcers. [Reduces length and number of gastric ulcers induced by ethanol<sup>15</sup>.

**ATHEROSCLEROSIS** -Linseed is effective in reducing hypercholesterolemic atherosclerosis by reducing oxidative stress and lowering serum levels of HDL-C in the early stage. Thus, it reduces the relative risk of coronary artery disease. Due to the presence of Lignans, flaxseed shows favorable effect on atherosclerotic plaque<sup>15</sup>.

**CARDIOVASCULAR DISEASES** -Due to the presence of alpha linolenic acid in flaxseed oil, it has protective effects against cardiovascular diseases and have ability to decrease the tendency of platelets to aggregate<sup>17</sup>.

**HEPATO PROTECTIVE** -Supplementation of omega -3-fatty acid reduces the burden of a number of diseases and have beneficial effects against a number of pathologies. Flax seed oil is the rich source of omega-3-fatty acid and so potent antioxidant<sup>16</sup>.

**ANTIDIABETIC EFFECT** -Studies suggest that after removing oil, the flax case mixed with antioxidant could serve as a supplement to the poor people suffering from diabetes in rural population, which reduce the postprandial glucose level by 27%<sup>17</sup>.

**BREAST CANCER**-The flaxseed is high in lignan, and the structure of flaxseed lignan are similar to that of endogenous sex steroid hormones. Thus, it acts in vivo to alter hormone metabolism and reduce subsequent cancer risk in post-menopausal woman<sup>15</sup>.

**POLY CYSTIC OVARIAN SYNDROME** -In a prospective open label, interventional study, linseed supplementation has resulted in significant reduction in ovarian volume and number of follicles in ovaries, improvement in frequency of menstrual cycle and has no effect on body weight, hirsutism<sup>15</sup>.

**PROSTATE CANCER** -Beside estrogenic activity flaxseed can interfere with steroid metabolism and bioavailability, also inhibit enzymes such as tyrosine kinase and topoisomerase which are crucial to cellular proliferation and hence may contribute to lower incidences of prostate cancer<sup>15</sup>.

**NEPHROPROTECTIVE** -Study shows that dietary Phytoestrogen has a beneficial role in chronic renal disease. Flaxseeds has been shown to limit or reduce proteinuria and renal pathological lesions associated with progressive renal failure<sup>16</sup>.

**BONE DEVELOPMENT** -Lignans present in flaxseed influence the development of bone<sup>15</sup>.

**HAIR GROWTH** -A study has shown that linseed increases hair length with a slight positive effect on hair diameter<sup>15</sup>.

**MEMORY BOOSTER** -Flaxseed reduce the spatial memory inhibitors in hippocampus and increases learning ability<sup>15</sup>.

## CHEMICAL CONSTITUENTS

Lignans, Isolariciresinol, pinoresinol, matairesinol, cyanogenic glycosides, protein, fatty oil, carbohydrates, carotenes, thiamine, riboflavin, niacin, pantothenic acid, choline, vitamin E, Campesterol, cholesterol, Sitosterol, Stigmasterol, cycloartenol, Linusitamarin, Cyclolinopeptide B, tocopherols(seeds)<sup>1</sup>

## TOXICITY

Flaxseed when consumed in excessive quantity may cause side effects like gastric disturbances, bloating, internal bleeding, stomach pain, Nausea, loose motion etc. The consumption of flaxseeds is precautions in pregnancy, lactation, bleeding disorders, low B. P, bipolar disorder, food allergy, gastric obstruction etc<sup>16</sup>.

## DISCUSSION

Flaxseed is a rich source of fat, protein and dietary fibers. It has around 41% -fat, 20%-protein, 28%-dietary fibers, 7.7%-moisture and 3.4%-ash<sup>16</sup>. It was valued because of the abundance of fats; Linseed is rich in polyunsaturated fatty acid. Flaxseeds also contains vitamin E in the form of gamma- tocopherol which is an antioxidant that prevents cell protein and fats from oxidation, increase sodium excretion in the urine, which helps in lowering blood pressure and decreases the risks of cardiac diseases. It also contains vitamin K in the form of phyloquinone, play a significant role in the formation of several proteins essential for blood clotting and bone development.

Another importance of flaxseed is that it contains Phytoestrogen that can mimic the human sex hormone estrogen. It is used in the treatment of breast cancer, infertility, menstrual cramps, endometriosis and menopausal problems. It contains both soluble and insoluble fibers. The soluble fiber helps to reduce cholesterol and regulate blood sugar level. While the insoluble fibers increase the bulk and prevents constipation. The milled flaxseed also contains large amount of calcium, potassium, magnesium, phosphorus, sodium and very low amount of copper, zinc, iron and manganese<sup>16</sup>.

## CONCLUSION

*Linum usitatissimum* (Atasi) is one of the best nutraceuticals as they have many medicinal values. It has been used for Ayurvedic preparations since ancient times. The herb found abundantly in India. It is cultivated mainly for fiber and oil. Flaxseed oil provides health benefits mainly due to its high content of omega -3-alpha linolenic acid. Due to the presence of this antioxidant it is considered as a good nutraceutical. Pharmaceutical supplements have high concentration of a single or small group of vitamins and minerals, while nutraceuticals have all the benefits of natural foods. Nowadays, nutraceuticals have received considerable due to potential nutritional, safety and therapeutic effects. It can be isolated nutrients, dietary supplements, specific diets, designer foods, herbal products, processed food or processed beverages. Flaxseed is an easily available, cost effective, an emerging nutraceutical.

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