

**Review Article****Alsi (*Linum usitatissimum*): A potential multifunctional Unani drug**Anju<sup>1\*</sup>, Mohammad Idris<sup>2</sup><sup>1</sup>Research Associate, Central Council for Research in Unani Medicine, New Delhi, India<sup>2</sup>Principal & Head, PG Department of Ilm-us-Saidla, Ayurvedic&UnaniTibbia College & Hospital, Karol Bagh, New Delhi, India

Received: 24 May 2018

Revised: 18 June 2018

Accepted: 24 June 2018

**Abstract**

Herbal medicines have been widely used among the society as they are multifunctional drugs. Alsi or *Katan* (*Linum usitatissimum* Linn.) is popularly known as flax seed or linseed belongs to the family Linaceae. Flaxseed has many potential activities such as antidiabetic, antiatherosclerotic, anticancer, antihypertensive, antibacterial and antifungal. *Katan* plays an important role in the prevention and treatment of cardiovascular diseases and in supporting the immune system. Various scientific/ experimental studies have been performed presently on Alsi (Flaxseed) namely, phytochemical, physicochemical, pharmacological and clinical studies. In this review, Significant information about various actions and clinical indications of Alsi have been elaborated in the Unani classical literature and properties namely Anti-inflammatory, Anti-peptic ulcer, Anti-fungal, Antibacterial, Antioxidant and Anti-stress activities have been revalidated in the light of recent scientific researches.

**Keywords:** Alsi, *Katan*, flaxseed, *Linum usitatissimum*, linseed, Unani drug

**Introduction**

The herbal medicinal drugs are being therapeutically exploited throughout the world for treatment of various diseases, and it is the oldest and the safest method too to manage or cure ailments. Alsi or *Katan* is popularly known as flax seed or linseed, consists of the dried, ripe seeds of *Linum usitatissimum* Linn. *Katan* belongs to the family Linaceae which is a very large family containing 19 Genera and about 290 species. Alsi became a material of commerce being supplied as whole seeds or powder. It is obtained from Argentina, Egypt, Morocco, India and other countries. It issued as bulk forming laxative, demulcent. It has importance of traditional knowledge as evident from the traditional knowledge database. As many as 417 patents have been granted till 2001 (Anonymous, 1992a, 1992b; Barun & Cohen, 2007; Anonymous, 1996; Prajneshu and Gupta, 2001).

The most common traditional use of Alsi is as a laxative. It is

also used for hot flushes and breast pain and its oil has different traditional uses, including arthritis. Both, *tukhm* (seed) and *roghan* (oil) have been used for high cholesterol levels and in effort to prevent cancer. Flaxseed oil is available in liquid and capsule forms whereas flaxseed is available in powder form. Flaxseed contains soluble fibre, like that found in oat bran, and it may have a laxative effect. Some studies suggest that flaxseed may reduce the risk of certain cancers, but enough research is not done to support this use. National Centre for Complementary and Alternative Medicine (NCCAM), USA, is funding studies on flaxseed. Its seeds and oil are used in pharmaceutical and as well as cosmetic purposes (Anonymous, 2016; Anonymous, 2003).

Flaxseeds occur in two basic varieties; one brown and, other is yellow or golden (also known as golden linseeds). Consumption of flaxseed or its derivatives may reduce total and LDL-cholesterol in the blood, with greater benefits in women and those with high cholesterol. The plant of *Katan* is grown for its oil, used as a nutritional supplement (Muir and Westcott, 2003; Pullaiah, 2006).

**Ethno-pharmacological description**

The plant of Alsi is about 1gaz in height. Its branches and

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DOI: <https://doi.org/10.31024/apj.2018.3.3.2>

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leaves are small. The color of flowers is like *lajward* (blue), and fruits are of berry type and full of seeds. Seeds are flat, long and smooth. The color of seeds is blackish-red, but according to some Unani Physician, it is of yellowish or black color. It is odorless and insipid (Kabiruddin, 2000; Ghani, Ynm). Its seeds are shiny, sweet, heavy and hot (Krishan, Ynm). In *Zakhira Khwarzam Shahi*, it is mentioned that Alsi is effective in female diseases, such as *waram-e-rahem* and *quruh-e-rahem* (Jurjani, 1878).

The parts of Alsi used are seeds, flowers, leaves and bark (Kabiruddin, 2000; Anonymous, 1992a, 1992b; Ghani, Ynm; Bnouham et al., 2002; Pullaiah, 2006; Khare, 2004; Wyk and Wink, 2004; Muir and Westcott, 2003; Chatterjee and Pakrashi, 1997). According to Unani scholars, its Mizaj is Hot and Dry in first degree (Kabiruddin, 2000; Ghani, Ynm). Dose of seeds is 5 to 10 grams (Kabiruddin, 2000; Ghulam, 2007; Fazalullah, Ynm; Ghani, Ynm). It is extensively cultivated throughout India mainly in Madhya Pradesh, Uttar Pradesh, Maharashtra, Bihar and Rajasthan. Flax plant is a native of Egypt (Kirtikar & Basu, 2005; Anonymous, 1992a, 1992b; Khare, 2004; Bentley & Trimen, 1880; Anonymous, 2003; Muir and Westcott, 2003; Pullaiah, 2006). The seeds of Alsi are shown in figure 1.



**Figure 1.** Seeds of Alsi

### Morphological description

It consists of dried, ripe seeds of *Linum usitatissimum* Linn. belonging to the family *Linaceae*. It is an erect annual herb, 0.6-1.2m high extensively cultivated throughout the plains of India upto an altitude of 800 m; growing up to a height of 100 cm. Leaves up to 3.8 cm. Long, linear-lanceolate, attenuated at both ends, acute at the apex. Flowers about 2.5 cm. across, in

corymbose panicles. Sepals: the 2 outer elliptic, acuminate, with entire membranous margins; the 3-nerved, the middle nerve alone reaching the apex. Petals blue, slightly crenate. Capsules mucronate, the edge of the dissepiments in the interior glabrous. Seeds compressed, ellipsoid, smooth, dark brown, shining (Anonymous, 1992b; Kirtikar & Basu, 2005).

### Microscopic description

Transverse section of seed shows testa consists of isodiametric cells with mucilaginous outer walls, collenchymatous cells of middle layer of seed coat cylindrical; single layered, yellowish brown, longitudinally elongated, about 120-190 long and 14-47 wide, thick, lignified and with pitted walls; single layer of flattened polygonal pigment cells with reddishbrown contents; aleurone grains in the cotyledons, upto 20 in diameter, each with globoid and crystalloid; abundant globule of fixed oil and occasional starch grains present (Anonymous, 1992b; Anonymous, 2001).

### Actions and clinical indications of Alsi

Various actions and clinical indications of Alsi are given below in the table 1.

### Phytochemical studies

Monica and Joseph, (2016) carried out a study aimed at exploiting the presence of various phytochemical present in fermented and unfermented/aqueous extract of flaxseed (*Linum usitatissimum* L.). The result showed the presence of secondary derived plant metabolites such as saponin, quinones, terpenoids, phenols, steroids, coumarins and betacyanin in both the extracts. The total phenol content of fermented and aqueous/unfermented extract of flaxseed was found to be 4.5mg (GAE/gram) and 3.4mg (GAE/gram), respectively indicating that fermented flaxseed had higher phenol content.

Kumanan et al., (2010) evaluated *Linum usitatissimum* seeds qualitatively for the identification of phytochemical constituents. The results showed the presence of bioactive constituents of carbohydrates, proteins and amino acids. The proximate analysis of the leaves revealed a composition of 3.21% total ash value, 7.61% alcohol soluble extractive value, 4.21% water soluble extractive value and 2.67% acid insoluble ash value.

### Physicochemical studies (Anonymous, 2001)

Foreign matter	: Not more than 1 per cent
Total ash	: Not more than 5 per cent
Acid-insoluble ash	: Not more than 2 per cent
Alcohol-soluble extractive	: Not less than 30 per cent
Water-soluble extractive	: Not less than 15 per cent
Fixed oil	: Not less than 25 per cent

Kandekar et al. (2015) carried out study to isolate the mucilage from *Linum usitatissimum* and tested it for different phytochemicals, characteristic functional groups, pH, swelling index and viscosity. It was found that mucilage contained carbohydrates, polysaccharides, mucilage, gum and protein which were common composition of polymers obtained from the natural sources. Loss on drying, ash value, acid soluble ash, water soluble ash values were 5.2%, 6.3%, 5.78%, 4.98% respectively. pH of the extract is 7.1 and swelling index is 8.5, viscosity at different speed is found in the range of 20.65-40.7 centipoise. It was concluded that isolated polymer was biocompatible.

## Pharmacological activities

### Antibacterial study

Al Bayati (2007) studied antibacterial *Linum usitatissimum* seeds and detected its active compound. The ethanol extract possessed considerable antibacterial activities against the pathogenic bacteria, the highest inhibitory effect was observed against *B. cereus* using the extract concentration 200mg/cm<sup>3</sup>. Thus, it was showed evidence of antibacterial activity of seeds of *Linum usitatissimum*.

Patani et al. (2013) evaluated the antimicrobial activities of

**Table 1.** Actions and Clinical indications of Alsi

Action and clinical indication	References
<i>Habis-ud-Dam</i> (Styptic/Haemostatic)	Kirtikar & Basu,2005; Dymock,1995;
<i>Jali</i> (Detergent)	Baghdadi, 2005; Kabiruddin, 2000; Fazalullah, Ynm; Ghani, Ynm; Baghdadi, 2005
<i>Muhallil-e-Waram</i> (Anti inflammatory), <i>Waram-e-Rahem</i> (Metritis), <i>Waram-e-Mafasil</i> (Arthritis), <i>Waram-e-Baritoon</i> (Peritonitis), <i>Waram-e-Shobatein</i> (Bronchitis)	Kabiruddin, 2000; Anonymous, 1992a, 1992b; Ghani, Ynm; Khare, 2004; Fazalullah, Ynm; Krishan, Ynm; Baghdadi, 2005
<i>Munzj</i> (Concoctic)	Kabiruddin, 2000; IbnSina, 2007; Baghdadi, 2005
<i>Mufattit-e-Hisat</i> (Lithotriptic)	Anonymous,1987; Ghani, Ynm; Ghulam, 2007
<i>Mulattif</i> (Demulcent)	Kirtikar & Basu, 2005; Dymock, 1995; Kabiruddin, 2000; Ghani, Ynm; Chatterjee and Pakrashi, 1997; Pullaiah, 2006
<i>Musakkin-e-Sual</i> (Antitussive), <i>Sual</i> (Cough)	Fazalullah, Ynm; Krishan, Ynm; Baghdadi, 2005
<i>Basoor</i> (Boils)	Ghani, Ynm; Hakim, 2002; Kabiruddin, 2000; IbnSina, 2007; Chatterjee and Pakrashi, 1997; Pullaiah, 2006
<i>Basoor-e-Labniya</i> (Acne vulgaris)	Kabiruddin, 2000; Ghani, Ynm; IbnBaitar, 2003
<i>Mukhrjij-e-Balgham</i> (Expellant of Phlegm)	Kabiruddin, 2000; Ghulam, 2007
<i>Munaffis-e-Balgham</i> (Expectorant)	Anonymous,1992a, 1992b; Ghulam, 2007; Kirtikar & Basu,2005; Baghdadi, 2005; Pullaiah, 2006
<i>Mufajjir-e-Waram</i>	Kabiruddin, 2000; Anonymous,1992a; Dymock, 1995; Ghani, Ynm
<i>Mulayyin</i> (Laxative), <i>Qabz</i> (Constipation)	Kabiruddin, 2000; Khare,2004; Wyk and Wink, 2004; Bnouham et al., 2002; Khan,1874; Pullaiah, 2006
<i>Mudir-e-Baul</i> (Diuretic)	Hakim, 2002; Kirtikar & Basu, 2005; Anonymous,1992;Ghani, Ynm; Fazalullah, Ynm; Khan,1874; Pullaiah, 2006
<i>Mudir-e-Labn</i> (Galactogogue)	Kirtikar & Basu, 2005; Anonymous, 1992a,1992b; Ghulam, 2007; Ghani, Ynm;

Table 1. Continue.....

Action and clinical indication	References
<i>Mudir-e-Haiz</i> (Emmenagogue)	Kirtikar & Basu, 2005; Ghulam, 2007; Khan, 1874
<i>Murkhi</i> (Relaxant)	Kirtikar & Basu, 2005; Dymock, 1995; Ghulam, 2007; IbnSina, 2007; Pullaiah, 2006
<i>Maghliz-e-Mani</i> (Semen Inspissant)	Ghulam, 2007; Ghani, Ynm; Fazalullah, Ynm
<i>Muqawwi-e-Bah</i> (Aphrodisiac), <i>Zof-e-Bah</i> (Sexual debility)	Kirtikar & Basu, 2005; Dymock, 1995; Ghani, Ynm; Baghdadi, 2005; Bnouhamet al., 2002; Khan, 1874
<i>Musakkin-e-Alam</i> (Analgesic), <i>Dard</i> (Pain)	Kabiruddin, 2000; Ghulam, 2007; Ghani, Ynm; IbnSina, 2007; Baghdadi, 2005
<i>Mustahi</i> (Appetizer)	Kirtikar & Basu, 2005; Ghulam, 2007; Ghani, Ynm; Ibn Sina, 2007
<i>Mujaffif</i> (Desiccant/Siccative)	Ghani, Ynm; Kabiruddin, 2000
<i>Musakkin-e-Laza</i> (Anti-pruritic), <i>Laza</i> (Pruritus)	Kabiruddin, 2000; Ghani, Ynm
<i>Nafakh</i> (Flatulent)	Kabiruddin, 2000; IbnSina, 2007; Baghdadi, 2005
<i>Mushil</i> (Purgative)	Wyk and Wink, 2004
<i>Qabiz</i> (Astringent), <i>Ish'al</i> (Diarrhoea), <i>Zaheer</i> (Dysentery)	Kirtikar & Basu, 2005; Dymock, 1995; IbnSina, 2007; Baghdadi, 2005; Pullaiah, 2006
<i>Qooba</i> (Ring worm)	Kabiruddin, 2000; Ghani, Ynm; Kirtikar & Basu, 2005; Ghulam, 2007; Baitar, 2003
<i>Zat-ur-Riya</i> (Pneumonia)	Kabiruddin, 2000; Anonymous, 1992a, 1992b; Ghani, Ynm; Khare, 2004
<i>Suzak</i> (Gonorrhoea)	Kabiruddin, 2000; Ghani, Ynm; Chatterjee and Pakrashi, 1997; Pullaiah, 2006
<i>Qurooh-e-Ama</i> (Peptic ulcer)	Ghani, Ynm; Ghulam, 2007; Kabiruddin, 2000

isolated fraction of *Bixaorellana* and *Linum usitatissimum* against five bacterial and five fungal pathogen. After comparison to standard drug tioconazole fraction-1 and 2, *Linum usitatissimum* had very good antibacterial activity against fungal strain and fraction 3 and 4 had moderate activity against fungal strain. Thus, it was concluded the evidence for antibacterial activity of seeds of *Linum usitatissimum*.

#### Antioxidant and antimicrobial study

Amin and Thakur (2014) carried out a study to assess the proximate composition, phytochemical screening, antimicrobial and antioxidant activities of ethanol and chloroform extracts of *Linum usitatissimum* L. The results of this study showed that chloroform extracts were more effective than ethanol extract of seeds against various test micro-organisms. Thus, it was concluded positive results of antioxidant and antimicrobial activity of *Linum usitatissimum*.

#### Antiinflammatory, analgesic and antipyretic study

Kaithwas et al. (2011) conducted a study on fixed oil of *Linum usitatissimum* as antiinflammatory, analgesic and antipyretic activity. The results showed that the fixed oil of *Linum* inhibited PGE<sub>2</sub>, leukotrienes, histamine, bradykinin and also arachidonic acid induced inflammation. The results of the study showed that *Linum* had an excellent peripherally acting analgesic activity in comparable to aspirin against acetic acid induced writhing in mouse and, it was also found to have a significant antipyretic activity in typhoid paratyphoid vaccine induced pyrexia.

#### Anti-acne study

Singh and Jain (2011) studied on anti-acne activity of flaxseed. Flaxseed, due to the presence of  $\omega$ -3 fatty acids, may also help to reduce acne. Lignans in flaxseeds inhibited 5- $\alpha$ -reductase, an enzyme that was involved in the transformation of testosterone to DHT. On the basis of results of the study, it was concluded that flaxseed supported the skin cell membranes by moistening its innermost layers and made the skin less prone to hormonal fluctuations and consequent infections. Thus, it showed the anti-acne activity of the flaxseed.

#### Antioxidant study

Zanwar (2010) conducted a study on *in vitro* anti-oxidant activity of ethanolic extract of *Linum usitatissimum* EE-LU (100, 200, 300, 400 and 500 $\mu$ g/ml). The results indicated significant dose dependent inhibition against DPPH radical, reducing power, superoxide anion radical scavenging, hydroxyl radical scavenging, metal chelating and hydrogen peroxide scavenging by EE-LU *Linum usitatissimum* and  $\alpha$ -tocopherol. The study showed positive results antioxidant activity of *Linum usitatissimum*.

#### Antipeptic ulcer study

Madhi et al. (2013) evaluated a study on the antipeptic ulcer action of the water extract of whole seed of *Linum usitatissimum* Linn. The study resulted that the extract was observed to show significant spasmolytic activity and

protective effect against experimental ulcerogenesis.

#### **Hair tonic study**

Beroual et al. (2014) studied the quantitative effects of linseed (flaxseed) (*Linum usitatissimum*) on hair growth in rabbits and also to study its safety. On the basis of results of the study, an increase in hair length (+26%) was observed in the third month (2.04±1.23cm) with a slight positive effect (+7%) on hair diameter (40.25±22.1µm). Thus, it was concluded evidence for hair tonic activity of linseed.

#### **Laxative and gastrointestinal motility study**

Kumar et al. (2007) studied laxative activity and gastrointestinal motility of aqueous extract of *Linum usitatissimum* Linn in rats at three dose levels (12.5, 25, 50 mg/kg). In this study, the laxative activity was determined based on the weight of the faecal matter at time interval of 8 and 16<sup>th</sup> and gastrointestinal motility was studied by using charcoal meal method. The results of the study showed increase in laxative activity and gastrointestinal motility at 25 mg/kg dose of *Linum usitatissimum*.

#### **Antifungal study**

Pawar (2016) carried out a study antifungal activity of flax seed extract against seed-borne pathogenic fungi. On the basis of results of the study, antifungal activity of flax seed extract against *F. moniliforme* was found maximum (Mean activity zone-18.33 mm) followed by *Aspergillus niger*.

#### **Effect on endothelial cells**

Gala et al. (2008) conducted a study of ground flaxseed (*Linum usitatissimum*), flax oil and atorvastatin on endothelial cells in terms of nitric oxide (NO) release and their interaction with monocytes. The results of the study proved the beneficial effects of flax seed, a cheap and easily available alternative for flax oil, on endothelial cells.

#### **Clinical studies**

##### **Clinical study on chronic cervicitis**

Unnisa et al. (2016) evaluated clinical efficacy of Unani formulation in the management of chronic cervicitis. The results of the study suggested that the trials formulations were quite effective in the management of chronic cervicitis. Hence, it could be used as an alternate therapy in the management of chronic cervicitis. No adverse effects were noted during the complete course of the study trial.

##### **Anti-breast cancerous study**

Thompson et al. (2005) carried out a randomized double-blind placebo-controlled clinical trial on the effects of dietary flaxseed on tumor biological markers and urinary lignan excretion in

postmenopausal patients with newly diagnosed breast cancer. The study concluded that dietary flaxseed had the potential to reduce tumor growth in patients with breast cancer.

##### **Antihypertensive study**

Caligiuri et al. (2014) conducted a clinical trial on flaxseed for its antihypertensive activity. On the basis of results of the study, it was concluded that  $\alpha$ -linolenic acid in flaxseed might have inhibited soluble epoxide hydrolase which altered oxylipin concentrations that contributed to the antihypertensive effects in patients with peripheral arterial disease.

#### **Conclusion**

In the current scenario, herbal medicines have been widely among the society used to avoid any side effect mostly occurs with the use of conventional therapies. Therefore, the trend for mode of treatment is shifting towards non-conventional systems of medicine specifically Unani tib. Alsi or *Katan* or flaxseed is widely used for antidiabetic, antiatherosclerotic, anti cancer, antihypertensive, antibacterial and antifungal activities. It has been used extensively for its great anti-oxidant property. Various scientific/ experimental studies have been performed presently on Alsi (Flaxseed) namely, phytochemical, physicochemical, pharmacological and clinical studies. This review provides extensive information on the medicinal or therapeutic uses of Alsi or *Katan* or Flaxseed, and supports the potential of Alsi as a promising health promoting herbal plant. Hence, more researches can be done to exploit the unexplored potentials of Alsi (*Linum usitatissimum*) which have already been mentioned in Unani classical literature.

#### **Conflict of interest**

There is no conflict of interest.

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