



**ORIGINAL RESEARCH PAPER**

**Medicinal Plants**

**KATAN (FLAXSEED): TRANSFORMATION FROM ANCIENT UNANI DRUG TO MODERN NUTRACEUTICAL**

**KEY WORDS:** Katan, *Linum usitatissimum L.*, potential

<b>Fouzia Bashir*</b>	Research Associate, Central Council for Research in Unani Medicine, Janakpuri, New Delhi. *Corresponding Author
<b>Jamal Akhtar</b>	Research Officer, Central Council for Research in Unani Medicine, Janakpuri, New Delhi.
<b>Nighat Anjum</b>	Research Officer, Central Council for Research in Unani Medicine, Janakpuri, New Delhi.
<b>Shah Alam</b>	Research Associate, Central Council for Research in Unani Medicine, Janakpuri, New Delhi.

**ABSTRACT**

The Unani system of medicine is one of the traditional systems of medicine practised since centuries in many parts of the world. *Katan* or *Alsi* is popularly known as flaxseed and is one of the famous Unani drugs used in various pathological conditions. It belongs to the family *Linaceae*. Although entire plant has medicinal value but its seed and oil are more important and have wide medicinal use. It is an emerging important functional food ingredient as of its rich contents of  $\omega$ -linolenic acid (ALA, omega-3 fatty acid), lignans, and fiber. In classical Unani literature, many physicians have mentioned *Katan* for various potential health benefits such as in reduction of cardiovascular disease, atherosclerosis, diabetes, cancer, arthritis, osteoporosis, gout, sciatica, autoimmune and neurological disorders. It also supports the immune system. Through this review, an effort has been made to focus on the evidence of the potential health benefits of *Katan*.

**INTRODUCTION**

*Linum usitatissimum L.*, known as common Flax or linseed, belongs to the family *Linaceae*, has long been cultivated in different nations due to its applications in medicine and industry. It is an annual herb and one of the most ancient crops of native of Egypt. It was introduced in United States by colonists, primarily to produce fiber for clothing. Every part of the flaxseed plant is utilized commercially, either directly or after processing (Laux 2011).

**Taxonomic Classification (USDA)**

- Botanical Name - *Linum usitatissimum*
- Kingdom - Plantae
- Phylum - Magnoliophyta
- Class - Magnoliopsida
- Order - Linales
- Family - Linaceae
- Genus - *Linum*
- Species - *Linum usitatissimum*
- Synonyms - Linseed, Common Flax, Flax Weed, Lint Bells, and Toad Flax

**Habitat**

The plant is native to the temperate regions of Europe and Asia.

**Morphological Description**

*Katan* is an annual herb of about 0.7 m high with blue flowers and a globular capsule. Its leaves are linear, lanceolate or ovate, attenuated at both ends, acute at the apex and up to 3.8 cm long. Flowers are small about 2.5 cm long, blue, bluish violet or white in terminal panicles in corymbose. Sepals: the 2-outer elliptic, acuminate, with entire membranous margins the 3 inner broader, acuminate, with ciliate margins, all strongly 3 nerved, the middle along reaching the apex. Petals are blue and slightly crenate. Fruits are capsular with 5 cells containing compressed, ellipsoid, smooth, dark brown and shining seeds. (Anonymous 2000; Anonymous 2010; Kapoor 2005; Dymock 2005) The seeds are ovate, flattened and obliquely pointed at one end, about 4– 6 mm long and 2– 2.5 mm broad. The testa is brown, glossy and finely pitted odourless, taste mucilaginous and oily. Seeds are mucilaginous, oily and slightly bitter in taste (Anonymous 2000; Kapoor 2005; Bentley 1880). 10-20 seeds in the capsule, oval lenticular 4-6 mm in length. Surface is smooth, shiny and dark brown (Tarpila 2005; Shah 1975). A light depression in

one edge enclosed in hilum and micropile, from hilum a yellow raphae runs to the chalaza (Baghdadi 2005).



**Fig. 1a. Plant of *Linum usitatissimum***

**Fig. 1b. Part used in Traditional Medicine (Seeds)**

**Fig. 1 *Linum usitatissimum***

**Vernacular Names**

- Arabic : Bazrul Katan, Buzruk, Bazen, Katan
  - Bengali : Masina, Tisi, Alasi
  - English : Common Flax, Flax, Blaebows, Flix, Linseed, Lint Bells
  - Gujarati : Alshi, Arasi
  - Hindi : Alsi, Tisi
  - Kannada : Agasebeeja, Semeegara, Agasi, Kain Atish, Agashi
  - Malayalam: Agastha, Cheruchana
  - Marathi : Alashi, Javas
  - Persian : Bazarug, Kuman, Tukhm-e- Katan, Zaghira, Zaghru
  - Punjabi : Alish, Alsi, Tisi
  - Sanskrit : Atasi, Atima, Chanaka, Haimwati, Madagandha
  - Tamil : Alshi
  - Telugu : Atasi, Madanginjalu, Ullusulu
  - Urdu : Alsi, Katan
- (Baitar 2003; Sina 2007; Ghani 1920; Chopra 1958; Nadkarni 1982; Khory 1993; Kirtikar 2008; Anonymous 1962).

**Mizaj (Temperament)**

- Hot 1° and Dry 1° (Seed) (Dymock 2005; Baitar 2003; Ghani 1920)
- Hot and Wet (Oil) (Baitar 2003)
- Hot 1° and Equable between Wet & Moist (Mo'atadil) (Sina 2007; Baghdadi 2005)

**Therapeutic Uses of Tukhm-e-Katan**

S. No.	Actions and Therapeutic Uses	Reference/s
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1.	Muqawwi Aam (General tonic), Zof-e-Aam (General weakness)	(Ghani 1920)
2.	Mufajjir Auraam (Resolvent)	(Ghani 1920; Kabeeruddin 1951; Multani YNM)
3.	Jaali (Detergent) Basoor-e-labniya (Acne vulgaris)	(Halim 2009; Baghdadi 2005; Kabeeruddin YNM and 1951; Multani YNM)
4.	Mujaffif (Desiccant/Siccative) Qooba (Dermatophytosis), Qurooh-e-Reham (Uterine ulcer)	(Ali 1989; Ghani 1920; Baitar 2003; Kabeeruddin YNM and 1951; Multani YNM; Nabi 2007)
5.	Muhallil-e-Warm (Anti-inflammatory), Warm-e-Jigar (Hepatitis), Warm-e-Tihal (Inflammation of Spleen), Warm-e-ghilaf-e-Qalb (Pericarditis), Zat-ul-Janab (Pleurisy)	(Halim 2009; Ali 1989; Baghdadi 2005; Ghani 1920; Kabeeruddin YNM and 1951; Multani YNM)
6.	Mukhrij-e-Balgham (Phlegm Expectoant) Warm-e-Urooq-e-Khashna (Bronchiolitis)	(Ali 1989; Kabeeruddin 1951; Multani YNM)
7.	Munaqqi Sadar (Chest cleanser) Zeeq un Nafs (Bronchial Asthma), Zatur-Riya (Pneumonia), Warm-e-Shoab-e-Muzmin (Bronchitis)	(Ali 1989; Multani YNM; Baghdadi 2005; Ghani 1920; Baitar 2003; Kabeeruddin 1951)
8.	Musakkin-e-Alam (Analgesic) Waja ul mafasil (Arthritis) Irq un Nisa (Sciatica) Niqras (Gout), Ikhtenaq-ur-reham (Hysteria), Waja-e-Ain (Pain in eyes)	(Halim 2009; Ali 1989; Baghdadi 2005; Ghani 1920; Kabeeruddin YNM and 1951; Kirtikar 2008; Multani YNM)
9.	Munaffit (Vesicant) Awram-e-Zahira-wa-Batina (Inflammation of external and internal organs)	(Baghdadi 2005; Ghani 1920; Kabeeruddin YNM and 1951; Baitar 2003; Qahaf YNM; Multani YNM)
10.	Mufattit-e-Hisaat (Lithotriptic) Sang-e-Gurda wa Masana (Renal & Vesicle calculus)	(Anonymous 1987; Ghani 1920; Nabi 2007; Ali 1989; Multani YNM)
11.	Muqawwi Baah (Aphrodisiac)	(Anonymous 2000; Anonymous. 1987; Anonymous. 1962; Anonymous. 2011; Ghani 1920; Kabeeruddin 1951; Kirtikar 2008; Kapoor 2005; Singh 2005; Shah 1975; Agarwal 1990; Dymock <i>et al</i> 2005)
12.	Mughalliz-e-Mani (Inspissant to semen)	(Ali 1989; Anonymous. 1987; Ghani 1920; Multani YNM; Nabi 2007)
13.	Muwallid-e-Mani (Spermatogenesis)	(Ghani 1920)
14.	Muqee (Emetic), Sozish-e-Halq (Throat irritation)	(Ghani 1920; Kabeeruddin YNM and 1951)
15.	Mulattif (Demulscant), Kalaf (Melasma) Sa'afa (Alopecia)	(Ali 1989; Kabeeruddin YNM and 1951; Ghani 1920; Baitar 2003; Qahaf YNM; Multani YNM)
16.	Mudir-e-Baul (Diuretic), Amraz-e-kulliyya (kidney diseases)	(Halim 2009; Anonymous 1987; Ghani 1920; Kabeeruddin 1951; Multani YNM; Nabi 2007; Anonymous 1962; Baitar 2003)

17.	Moarriq (Diaphoretic)	(Ghani 1920; Nabi 2007)
18.	Mudirr-e-Labn (Galactagogue)	(Ghani 1920; Nabi 2007)
19.	Mudirr-e-Haiz (Emmenagogue)	(Ghani 1920; Nabi 2007)
20.	Mulayyan (Laxative)	(Halim 2009; Hassan YNM; Kabeeruddin 1951; Multani YNM)
21.	Mufatteh Sudad (Deobstruent) Surkhi Ain (Redness of eyes)	(Ghani 1920; Kabeeruddin YNM; Multani YNM)
22.	Qabiz (Astringent)	(Anonymous 2000; Anonymous 2011; Baghdadi 2005; Anonymous 1962; Ghani 1920; Kirtikar 2008; Kapoor 2005; Singh 2005; Sala 1996; Shah 1975; Agarwal 1990; Dymock <i>et al</i> . 2005)
23.	Habis-ud- Dam (Haemostatic) Nafs-ud-dam (Hemoptysis)	(Ghani 1920)
24.	Munzif (Concoctive) Qurooh e Ama (Intestinal ulcers) Qurooh-e-Gurda-wa-Masana (Ulcers of kidney and urinary bladder)	(Halim 2009; Ghani 1920; Kabeeruddin YNM; Multani YNM; Nabi 2007)

**Miqdar e khuraq (Dosage)**

10-15gms (Anonymous 1987)

**Muzir (Adverse effects)**

It may cause improper digestion and visual disturbances (Baitar 2003; Ghani 1920; Kirtikar 2008; Kareem 1879)

**Musleh (Corrective)**

- *Punica granatum* (Anar) and Honey for improper digestion
- *Coriandrum sativum* L. (Kishneez) for refractory error (Sina 2007; Ghani 1920; Baghdadi 2005)

**Badal (Substitute)**

Tukhm-e-hulba (*Trigonella foenum-graecum*) (Halim 2009; Ghani 1920; Kabeeruddin 1951; Nabi 2007)

- Tukhm-e-baqilla (*Vicia faba*) (Ghani 1920)

**Murakkabat (Compound formulations)**

- Lauq-e-Katan
- Qairooti Bazar-e-Katan
- Habb e Maghz Badam
- Lauq Zeeq un Nafas
- Majoon Mubhi Antaaki
- Marham e Dakhliyon
- Sufoof Muqliyasa
- Sharbat e Sadr
- Zimad e Kibrit (Anonymous 1987; Hassan YNM; Kabeeruddin YNM and 1921; Anonymous 2006a and 2006b; Ali 1989)

**Proven potential health benefits**

**Antidepressant Activity**

A study was conducted to evaluate the antidepressant activity of extract of *Linum usitatissimum* in wistar rats. Few parameters like locomotors activity, forced swimming test and tail suspension test were used to assess the activity. The study concluded that *Linum usitatissimum* has significant antidepressant activity in comparison to standard drugs Fluoxetine, Chlorpromazine and Imipramine. (Rath 2012)

**Anti hyperglycemic activity**

In a study, the effect of *ethanolic extract* of seeds of *Linum usitatissimum* was evaluated in alloxan induced diabetic rats. The result showed that treatment with *ethanolic extract* (200 mg and 400 mg/kg) significantly reduced serum glucose

level in both acute and sub-acute study (Bhatia 2006).

**Anti-diarrheal and Anti-spasmodic activity**

A study was carried out on the crude aqueous-methanolic extract of *Linum usitatissimum* using the in vivo castor oil-induced diarrhoea, gut motility and entero pooling assays. The extract reduced the diarrheal score in mice, by 39%, 63.90% and 68.34% at the respective doses of 100, 300 and 500mg/kg. So, it was proved that flaxseed extract is effective against both enteric and non-enteric pathogens causing diarrhoea (Palla 2015).

**Anti-arrhythmic effects**

Various scientific reviews suggest a possible anti-arrhythmic effect of alpha-linolenic acid (ALA) and omega-3 fatty acid present in flax seeds (Christensen 2005; Matthan 2005; Mozaffarian 2005). In another study, it was found that anti-arrhythmic effects were concentration-dependently enhanced by docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA), but not by ALA (Dhein 2005). Higher intake of dietary linolenic acid might be associated with a reduced risk of abnormally prolonged repolarization in men and women (Djousse 2005).

**Nephro-protective activity**

In a study conducted to check the anti-inflammatory properties of ω-3 fatty acids, it was found that ω-3 fatty acids has protective effects on kidneys from damage. Also polyunsaturated fatty acid (PUFA) supplementation was observed as reducing renal inflammation and fibrosis in animal models. It was also found that increased dietary intake of long-chain ω-3 PUFA was inversely associated with the prevalence of chronic kidney disease (CKD) (Baggio 2005; Gopinath 2011). Another study showed that long-term supplementation of omega-3 fatty acids helps in significant reduction in systolic and diastolic blood pressure. As hypertension is a risk factor for CKD; hence, the influence of long-chain n-3 PUFA on blood pressure may be a potential mechanism by which it protects the kidneys (Cicero et al. 2010).

**Anti-ulcer activity**

In a study conducted, water extract of whole seed of *Linum usitatissimum* in guinea pig and mouse stomach has shown significant spasmolytic effect and protective effect against experimental ulcero genesis (p< 0.01), each effect was observed to increase with increase in the soaking period (Shek et al. 2012).

**Anti-allergic activity**

Role of dietary long-chain polyunsaturated fatty acid (PUFAs) consumption during pregnancy and early childhood and its influence on allergy and respiratory diseases as the long-chain polyunsaturated fatty acids have been reported to have immunomodulatory effects (Shek et al. 2012). PUFAs act via several mechanisms to modulate immune function. Omega-3 fatty acids may alter the T helper 2 cell differentiation. PUFAs may further modify cellular membrane, induce eicosanoids metabolism, and alter gene expression.

**Anticoagulant and anti-platelet activity**

Two studies comparing flaxseed oil to a linoleic acid control (one study in healthy volunteers (N=11) and one study in patients with rheumatoid arthritis (N=22)) reported that flaxseed oil decreased collagen-stimulated platelet aggregation and bleeding time (Allman 1995; Nordstrom 1995).

**Anti-cancerous activity**

The early risk markers for Anti-cancerous activity and incidence of mammary and colonic carcinogenesis in animal models (Serraino 1991 and 1992; Jenab 1996; Thompson 1996). Lignans from flaxseed have been shown to reduce mammary tumor size by >50% and tumor number by 37% in carcinogen-treated rats (Thompson 1997). Effect of flaxseed feeding on risk markers of cancer in humans demonstrated that the ingestion of 10 g of flaxseed per day elicited several hormonal changes associated with reduced breast cancer risk (Phipps 1993).

**Proven clinical studies of *Linum Usitatissimum***

S. No.	Preparation of the plant given	Number of subjects	Duration	Therapeutic potential	Reference
1.	Raw seeds	10 healthy volunteers	4 weeks	Bowel movement per week was increased by 30% while linseed was consumed (p<0.05).	Cunnane et al. (1995)
2.	50 g/day ground, raw linseed	09 healthy female volunteers	4 weeks	Significant reduction in serum total cholesterol by 9% and LDL-Cholesterol by 18%	Cunnane et al. (1993)
3.	10 g/day linseed supplement	18 normally cycling women	For 3 cycles	LP progesterone/ oestradiol ratios were significantly higher in linseed cycles.	Phipps et al. (1993)
4.	25 g linseed daily	25 postmenopausal women	30 days	Improvement of menopausal oestrogen deficiency	Wilcox et al. (1990)
5.	40 g/day linseed-supplement	25 menopausal women	NA	40 g Flaxseed v/s HRT in hypercholesterolemic menopausal women reported to lower insulin glucose/ insulin levels (no effects on cholesterol)	Lemay et al. (2002)
6.	25 g flaxseed muffin	32 patients with breast cancer		Significant changes in cerbB <sub>2</sub> score and apoptotic index	Thompson 2003
7.	30 g/day linseed-supplement	55 postmenopausal women	3 months	Dietary linseed supplementation lowered TC and LDL-C by approximately 7% and 10%, respectively	Patade et al. (2008)

**Conclusion and perspective**

Unani system of Medicine presents avenues in the search for new and alternative drugs. There are thousands of plants in the Unani System of Medicine used as therapeutics for various ailments. These medicinal plants have promising futures because most of them have not been investigated for pharmacological activities. The present review concludes that *Linum usitatissimum* has anti-depressant, anti-diabetic, anti-diarrheal, nephroprotective, and anti-arrhythmic activities in several preclinical studies. In clinical studies, *Linum usitatissimum* showed improvement in bowel movement, a significant reduction in serum total cholesterol, and improvement in menopausal estrogen deficiency. In Hypercholesterolemic menopausal women, it lowers insulin

glucose/ insulin levels. These pharmacological activities of *Linum usitatissimum* attributes to the alkaloids present in the seeds of *Linum usitatissimum* such as α-linolenic acid (ALA, omega-3 fatty acid), lignans, and fiber. Moreover, the seeds of *Linum usitatissimum* contain tocopherol (Vit E) in large quantities. This review suggests that seeds of Katan (*Linum usitatissimum*) have immense potential to treat a wide variety of diseases. Its therapeutic uses as an analgesic, diuretic, aphrodisiac, lithotriptic, galactagogue, and anti-inflammatory have not been studied scientifically despite empirical evidence available in classical literature. Further rigorous studies are required to establish the efficacy of *Linum usitatissimum* is a potent drug for constipation, liver diseases and Bronchial Asthma.



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