

A Review update of Fenugreek (*Trigonella foenum graecum*) seed : with several speciality

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Abstract

Fenugreek (*Trigonella foenum graecum*) seed has been used natural food additive and herbal medicine since ancient times. It is an annual herb with white flowers and yellowish brown seeds . It has numerous medicinal properties which makes unique from others herbs. The fenugreek seeds are the rich source of fiber, alkaloid and volatile contents. Several investigations reported that fenugreek has antidiabetic, hypocholesterolemia, hypoglycaemia and antianorexia agents. It has also exhibit the properties of anticarcinogenic, antibacterial , antioxidant, anti-inflammatory, The present article is aimed to review the various application of fenugreek and its medicinal as well as nutritional value.

Key Words : Food additive, antidiabetic, antioxidant, antibacterial, anti-inflammatory, hypoglycaemia, anticholesterolemia.

Introduction

Fenugreek (*Trigonella foenum grecum*) one of the oldest cultivated spice crops of the world and it has much used in herbal medicines in India Fenugreek seeds used as spice and as herb(the leaves). Fenugreek is cultivated world wide , especially in Europe and Asia. The fenugreek seeds have been traditionally used in India and china . It is the source of flavouring . In many industrialised countries herbal medicines are gaining popularities as alternative medicines. Some plants exhibit various biological and pharmacological activities such as anti-cancer, antioxidant, antidiabetic, anti-microbial functions, among them fenugreek is one of the commonly used herbs. The fenugreek seeds have been used as a remedy for many conditions including gout, wound healing, gastrointestinal disorders. Inflammation, antihypoglycemia, anti-cancer activities. The pharmacological activities are antitumor, anti-inflammatory, hypertension, antiviral, antioxidant agents which reduce the cellular damages, the path way for cancer, aging and other disease by interact with free radicals and terminate the chain reactions before vital molecules are damaged. Around 260 species of Trigonella are diffused worldwide (Achara,2006). Fenugreek seeds have curative properties due to their polyphenolic flavonoid content vitexin, tricin, naringenin, quereetin and tricin-7-O-B-D-glucopyranoside (Shang *et al.*, 1998) with powerful antioxidant properties. Fenugreek seeds exhibits hypoglycemic, hypocholesterolemic and anti diabetic effects due to present of 4-hydroxy-isoleucine and amino acid (Vijaykumar *et al.*, 2005, Handa *et al.*, 2005). Numerous papers investigated the utility of fenugreek as a food supplements, in the treatment of type-2 diabetic (Braca *et al.*, 1999; Braca *et al.*, 2004; Srinivasan, 2006; Salimuddin *et al.*, 2003). There were two studies one on human change their liver cells (Kaviarsan *et al.*, 2006) and other in rats (Thirunavukkarasu *et al.*, 2003) investigated the implications fenugreek seeds preventing and treating alcoholic liver disease. Fenugreek exhibits the properties to reduce the oxidative damages and act as a hypoglycemic agents (Yadav *et al.*, 2004 , Siddiqui *et al.*, 2005, Preet *et al.*, 2005).

Classification

Kingdom – Plantae
Subkingdom – Trachcobionta
Superdivision– Spermatophyte
Division – Magnoliophyta
Class – Magnoliopsida
Subclass- Rosidae
Order – Fabales
Family – Fabaecae
Genus – Trigonella L.
Species - Trigonella foenum-graecum L.

Description

Fenugreek is an aromatic annual herb. It grows up to the height of 40 – 80 cm (Eccrop, 2017). Stems are erect up to 50 cm high, leaves are alternate, pinnately trifoliate light green and 7 – 12 cm long. The fruits occur in sickle like pods of 2–10 cm and contain 10–20 seeds. The seeds are 6 – 8 mm long green olive or brownish in colour with strong and spicy odour (Eccrop, 2017; Alaom, 2005). The fenugreek seeds contain large amount of fiber (Montgomery, 2009; Meghwal and Goswami, 2012), phospholipids, glycolipids, oleic acid, linolenic acid (Suliman *et al.*, 2000; Chatterjee *et al.*, 2010), choline, vitamin A, B1, B2, C, nicotinic acid, niacin (Leela and Shafeekh, 2008). (**Table- 1**)



fig-1 Fenugreek plant; image source Google



fig-2 Fenugreek seed; image source Google

Table- 1 Proximate composition of fenugreek seeds :

Particulars	Contents(g/100g)	References
Carbohydrates	42.3	El Nasri and El Tinay (2007)
Gum(seeds)	20.9	Kakani <i>et al.</i> (2009)
Ash(seeds)	3.38	Somya and Rajyalakshmi (1999)
Fiber(seeds)	50.0	Montgomery (2009)
Fats(seeds)	7.9	Altuntas <i>et al.</i> (2005)
Protein(seeds)	25.4 3	El Nasri and El Tinay (2007)
Moisture	7.49	Somya and Rajyalakshmi (1999)
Vitamin C	12-43	Leela and Shafeekh (2008)
Vitamin B ₁	0.41	Leela and Shafeekh (2008)
Vitamin B ₂	0.36	Leela and Shafeekh (2008)
Vitamin B ₆	0.600	Leela and Shafeekh (2008)

Fenugreek contains high amount of alkaloids, amino acids, saponins, flavonoids and other antioxidants. (

Table- 2)

Table - 2 Phytochemistry :

Chemical Group	Compounds	Reference
Alkaloids	Trigonelline, choline, carpine	Lee <i>et al.</i> (2005) Kaviarasan <i>et al.</i> (2007) Rababah <i>et al.</i> (2011)
Amino acids	Lysine, histidine, 4-hydroxyisoleucine, tryptophan, tyrosine, cystine, arginine	Gupta <i>et al.</i> (2001) Ruby <i>et al.</i> (2005) El Nasri and El Tinay (2007)
Coumarines	Methyl coumarin, trigocoumarin, trimethyl coumarin	Raju <i>et al.</i> (2001)
Flavonoids	Naringenin, lilyn, kaempferol, vecenin-1, tricin 7-O-D glycopyranoside, saponaretin, isovitexin, isoorientin, Orientin, vitexin, luteolin, quercetin	Blumenthal <i>et al.</i> (2000) Sauvare <i>et al.</i> (2000) Meghwali and Goswami (2012)
Saponins	Fenugrin, foenugracin, glycoside, yamogenin, trigonoesides, gitogenin, smilagenin, sarsapogenin, yuccagenin, hederagin, diosgenin, tigonenin, neotigogenin	Gupta <i>et al.</i> (2001)
Others	Vitamin A, folic acid, riboflavin, thiamin, ascorbic acid, biotin, nicotinic acid, gum	Hamden <i>et al.</i> (2010) Chaterjee <i>et al.</i> (2010)

Pharmacological Properties :

Fenugreek possesses pharmacological properties such as antimicrobial, febrifuge, laxarative, uterine tonic, anti-inflammatory, anti-carcinogenic, antiviral, antioxidant, anticholesterolemic (Moradi kor and Moradi, 2013). In addition it has potential to reduces body pain, relieves fever, increase appetite, promotes lactation and sex hormones. Fenugreek seeds have several activities including protection against malaria, cancer, allergies, bacteria and viruses(Naidu *et al.*, 2011; Priya *et al.*, 2011). Fenugreek has the remarkable properties that inhibit oxidative hemolysis in human erythrocytes (Rayyan *et al.*, 2010; Belguith-Hadriche *et al.*, 2013). It also reduces the cholesterol concentrations in the blood (Afef *et al.*, 2000), prevent cancer (Raju *et al.*, 2004). Some medicinal properties of fenugreek have been given in **Table-3**.

Table-3 Pharmacological and therapeutic benefits of fenugreek :

SL. No.	Disease/Disorders	Description	Reference
1	Antioxidant	Trigonelline, flavonoids and polyphenols detoxification of free radicals,	Anuradha <i>et al.</i> (2001) Kaviarasan <i>et al.</i> (2007) Preet <i>et al.</i> (2005)
2	Diabetes	4-hydroxyisoleucine (amino acid) stimulate insulin production there by control blood sugar level	Gupta <i>et al.</i> (2001) Zia <i>et al.</i> (2001) Vat <i>et al.</i> (2002)
3	Skin irritation	Seeds extracts reduces the skin irritation and pain	Sauvare <i>et al.</i> (2000) Meghawal and Goswami (2012)
4	Immunodeficiency	Natural antioxidants help to strengthen immune system	Kaviarasan <i>et al.</i> (2004) Bin-Hafeez <i>et al.</i> (2003)
5	Inflammatory	Mucilage from seed detoxify the oxidants and free radicals to reduce inflammation	Thakur <i>et al.</i> (1994) Sauvare <i>et al.</i> (2000) Ahmadiani <i>et al.</i> (2001)
6	Cancer	Polyphenolic compounds from seeds possess anti-carcinogenic activities	Raju <i>et al.</i> (2004) Yoshinari and Igarashi (2010) Mohamed <i>et al.</i> (2015)
7	Aging	Antioxidants improves reduces cell death and aging	Kaviarasan <i>et al.</i> (2004)
8	Anemia	Prevent red blood cell oxidation Being rich in iron(Fe) seeds are valuable to reduce anemia Restoration and Fe nutrition in iron deficiency patients	Kaviarasan <i>et al.</i> (2004) Kaviarasan <i>et al.</i> (2007) James <i>et al.</i> (2002) Mahmoud <i>et al.</i> (2012)
9	Kidney disorders	Protects functional and histopathological abnormalities of kidney in diabetic patients Reduces catalase(CAT) contents superoxide dismutase (SOD) activity in hypercholesterolemia patients Inhibit accumulation of oxidized DNA to prevent kidney injuries	Thakran <i>et al.</i> (2004) Hamed <i>et al.</i> (2010) Belguith-Hadriche <i>et al.</i> (2013) Xue <i>et al.</i> (2011)

10	Others	Respiratory disorders, bacterial infection, epilepsy, gout, chronic cough, paralysis, dropsy, piles, heavy metal toxicity, liver disorders and arthritis	Ahmadiani <i>et al.</i> (2001) Tayyaba <i>et al.</i> (2001) Kaviarasan <i>et al.</i> (2004) Amin <i>et al.</i> (2005) Belguith-Hadriche <i>et al.</i> (2013)
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Conclusion

The data collected from the different literature and the available reports it is concluded that *Trigonella foenum graecium* (fenugreek) seed is one of the inexplicable (miraculous) plant having great medicinal importance due to the richness (presence) of antioxidant, alkaloids, antifungal, anti-inflammatory, anticancerous and more than 50 beneficial chemical constituents make it unique. Not only medicinal properties it gives beneficiary effect on skin, hair, damage and good for eye sight due to presence of Vit-A. Keeping in view the excellent pharmacological activities the fenugreek (*Trigonella foenum graecium*) seed be utilised to cause large number of ameliorating agent against various types of toxicity.

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