Phytoconstituents, Medicinal, Culinary and other Commercial Applications of Fenugreek (*Trigonella foenum-graecum* Linn.)

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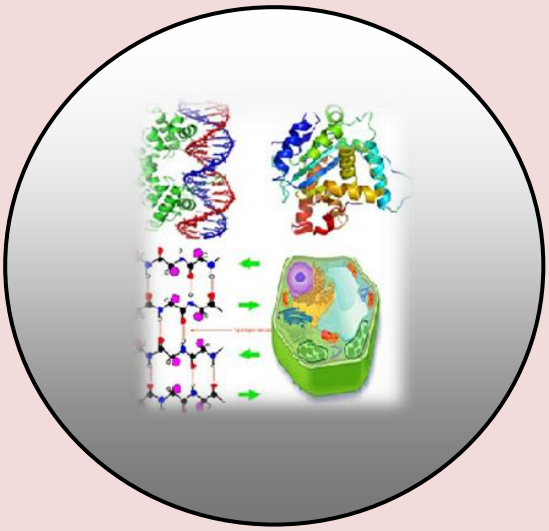

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REVIEW ARTCILE

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ABSTRACT

Medicinal plants are employed to treat many health ailments by many people globally. Fenugreek (Trigonella foenum-graecum), a herb, is amongst oldest medicinal plants. It is a leguminous crop, possessing many medicinally useful properties such as hypocholesterolemic, anticancer, antidiabetic and antioxidant besides having immunological activities. The major phytoconstituents of fenugreek are flavonoids, saponins, polysaccharides, alkaloids, fibers and oils. Mature seeds harbour vitamins, saponins, fatty acids, amino acids and folic acid. Saponaretin, tigogenin, diosgenin, neotigogenin, gitogenin, neogitogenin and homorientin are also present. Galactomannan is the compound found predominantly in endosperm of seed. The young seeds are mainly made up of carbohydrates. Fenugreek has many traditional uses. It is employed in digestive and respiratory problems and as aphrodisiac, for enhancing lactation, easing child birth and for menstruation and menopause problems. It is also employed as kitchen spice globally. Other uses of fenugreek are as adhesive, emulsifying agent and food stabilizer. It is employed in the manufacturing of nutritious extruded and bakery items. This review paper takes into account the bioactive compounds, pharmacological activities and role of fenugreek in health improvement and preventing diseases.

Keywords: Anti- Diabetic, Bakery Products, Dietary fibers, Nutraceutical, Seed Spice and Steroidal Saponins.

INTRODUCTION

Fenugreek (*Trigonella foenum-graecum* L.) which is amongst the important seed spices of the country basically belongs to Leguminosae (Fabaceae). Genus name *Trigonella* has been adapted from Latin language, the meaning of which is "little triangle" because of its yellowish-white triangular flowers while species name *foenum-graecum*, which means 'Greek hay' is because of its initial introgression from Greece (Flammang et al., 2004; Basu, 2006). Fenugreek is an annual herb having length of about 30-60 cm, leaflets are long axillary, sessile and about 2-2.5 cm. This crop is cultivated in whole country and its applications as spice and food additive are well known globally. This crop grows in temperate season globally. Fenugreek has self-pollinated nature with a shorter life span and it is native to the Indian Subcontinent and Eastern Mediterranean region. Fenugreek has yellowish brown, hard angular seeds, having nutritional as well as medicinal importance. It is used as food and spice (Figure 1-2). It is also employed in many traditional medicinal therapies. The systematic position of fenugreek is given in Table 1.

Table 1: Systematic Position of Fenugreek (*Trigonella-foenum-graecum* L.)
(http://plants.usda.gov/java/ClassificationServlet?source=display&classid=TRFO80; http://www.mdidea.com/products/new/new004paper.html)

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Rosidae
Order	Fabales
Family	Fabaceae
Genus	*Trigonella*
Species	*foenum-graceum* Linn.

Figure 1-2. Leaves and Seeds of Fenugreek.

Fenugreek seeds chiefly contains phytoconstituents such as flavanoids, alkaloid, saponin, gum, fibre and volatile matter. Soluble fibre is main component of fenugreek. In addition to fibre, it also harbours compounds having glucose-cholesterol and triglyceride reducing properties. The high content of fibre in fenugreek makes it useful as emulsifying agent, food preservative and adhesive (Sharma et al., 1996; Srinivasan, 2006; Meghwal and Goswami, 2012). Recently many health improving properties of fenugreek have been observed in animals as well as in humans. Fenugreek has also been employed in numerous traditional medicinal systems as a remedy for loss of appetite for food, antibacterial, antidiabetic and as promoter of lactation. Fenugreek seeds are also beneficial in constipation. The scope of this review article encompasses phytochemical and pharmacological attributes and possible uses of fenugreek as a functional food and nutraceutical.

Fenugreek seeds have been employed as spice globally. The use of fenugreek seeds dates back to long time in history. It has been mentioned by various names in different languages such as Fenugreek in English, Bockshornklee in German, Fenugrec in French, Fienogreco in Italian, Alholva in Spanish, Pazhitnik in Russian, Fenegriek in Dutch, K'u-Tou in Chinese, Koruha in Japanese, Hulba in Arabic, Shanbalileh in Persian, Menthiyam in Nepali and Halba in Malaya. Besides this in India, Fenugreek has been known by different names in various local languages such as Methi dana, Sag Methi (fresh leaves), Kasuri methi (dried leaves) in Hindi, Methika in Sanskrit, Methi in Urdu, Punjabi, Bangla and Assamese, Menthya in Kannada, Uluva in Malayalam, Methya in Marathi, Menthulu in Telugu and Vendayam in Tamil (Nathiya et al., 2014). The fenugreek leaves find their use as green leafy vegetables. India contributes a significant portion of fenugreek production and fenugreek has a good demand due to its culinary and medicinal applications. The medicinal uses of fenugreek have been mentioned in different medicinal systems including Ayurvedic system. Fenugreek harbours properties such as antifertility, antiparasitic, antifungal, anticancer, antioxidant and antiinflammatory, hypoglycemic, immunomodulatory, antigastric, ulcer and antigallbladder. The fenugreek seed consumption also resulted in reduction of total cholesterol and LDL (Low density lipoprotein) levels which may contribute towards its antiobesity effect and it also harbours hepatoprotective and nephroprotective action (Pandian et al., 2002; Srinivasan, 2005; Mercan et al., 2007; Haouala et al., 2008; Meera et al., 2009; Reddy and Srinivasan, 2011; Roberts, 2011; Xue et al., 2011; Joglekar et al., 2012; Snehlata and Payal, 2012; Alsemari et al., 2014). Recently in the study of Alghamdi et al. (2021), methanolic extract (containing flavonoids) obtained from *Trigonella foenum-graecum* seeds has been shown to possess anticancer activity which may be exerted through inhibition of tubulin polymerization. The dietary fibre of fenugreek is mainly responsible for antidiabetic and hypocholesterolemic properties of fenugreek.

Phytochemical and Pharmacological Attributes

The phytochemical constituent of fenugreek includes flavonoids, polyphenols, alkaloids, saponins, steroids, lipids, amino acids and carbohydrates. It has also been found beneficial in alleviating conditions such as high blood levels of fats such as cholesterol and triglycerides. It is also employed in treatment of atherosclerosis (thickening or hardening of arteries) which if not treated properly, can cause heart attack. Fenugreek is also employed as remedy for bronchitis, boils, mouth ulcers, cellulitis (Infection of the deeper tissue layers below the skin surface), chronic coughs, tuberculosis, hair problems, Parkinson's disease, kidney ailments and beriberi (a vitamin B deficiency disease).

Fenugreek has been found to improve men's libido and male infertility. This action of fenugreek may be linked with enhanced testosterone levels by fenugreek. Fenugreek is helpful in relieving complexities associated with menopausal period, polycystic ovary syndrome, obesity and (Yadav and Kaushik, 2011; Akbari et al., 2012; Ghosh et al., 2015), menstrual pain, headache, nausea and fatigue in women. These properties of fenugreek positively affecting men and women, are due to prescence of phytoestrogens (palmitic acid, stearic acid, beta-sitosterol) and steroidal saponins (tigogenin, neotigogenin, diosgenin and yamogenin). The prescence of dietary fibre, polysaccharide galactomannan and omega-3-fatty acids may be behind (Fig. 3a), positive effects of fenugreek on metabolic activity. Additionally, galactomannan stops assimilation of glucose in gastrointestinal passage and helps in controlling digestive enzymes. Phytomenadione b (a vitamin K derivative that helps in coagulation), found in fenugreek, amino acids (lysine) and alkaloids are behind galactagogue, hormone balancing and hypoglycemic actions of fenugreek.

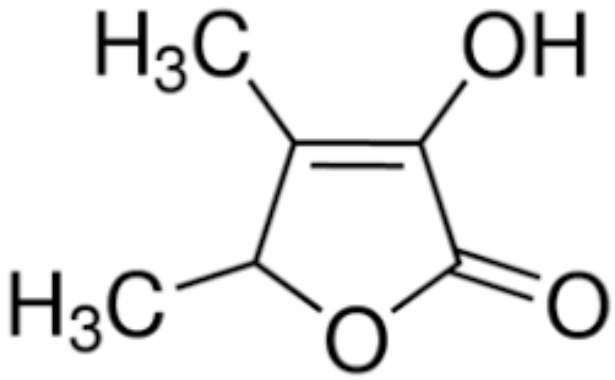

Figure 3a. Galactomannan structure.

Fenugreek seeds have bitter, slightly sweet flavour. The peculiar aroma and flavour of fenugreek are due to prescence of fenugreek lactones (sotolone Fig. 3b), (Singhal and Glatzel, 1968, Wani and Kumar, 2018).

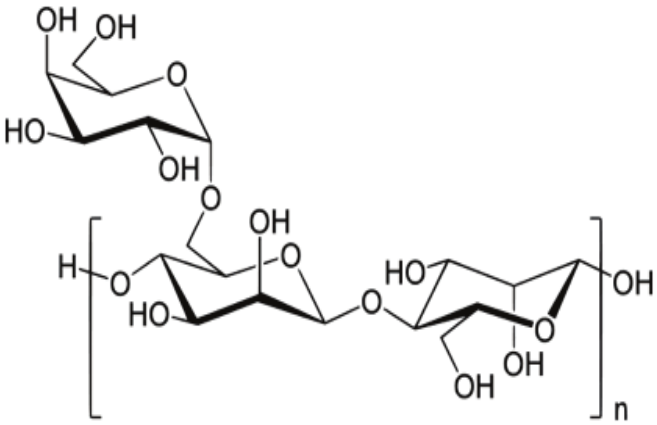

Figure 3b. Structure of Fenugreek Lactone.

Steroidal sapogenins are important phytoconstituents of fenugreek. Of these, diosgenin compounds are observed in the fenugreek embryo. There are two fuarastanol glycosides, F-ring open diosgenin precursors which are found in fenugreek as hederagin glycosides. Alkaloids named as trimethyl coumarin, trigonelline, trigocoumarin and nicotinic acid, are reported in stem. The large portion of seeds is mucilage. About 28% mucilage; 2 alkaloids (trigonelline and choline), bitter oil with strong smell (5%), yellow colouring compound and volatile oils are found in stem. Fenugreek harbours protein (23-26%), fat (6-7%) and 58% carbohydrates. About 25% portion of this carbohydrate is dietary fibre. Fenugreek also abundantly contain iron (Basch et al., 2003; Bukhari et al., 2008; Chatterjee et al., 2010; Chang et al., 2011). The leaves harbour many saponins, termed as graecunins (glycosides of diosgenin). Leaves contain protein (4.4%), fat (0.9%), fibre (1.1%), carbohydrates (6%) and minerals (1.5 %). The leaves contain minerals iron, zinc, phosphorus, calcium and vitamins like vitamin B (thiamine, niacin, riboflavin), carotene and vitamin C (Rao, 2003). Leaves of fenugreek have been observed as stable source of nutrients. Fresh leaves are employed as vegetables. The seeds are employed to impart flavour to foods, chiefly curry powders, spice blends and teas. Amongst different portions of fenugreek, endosperm contained highest amount of saponin (4.63 g/100g) and protein (43.8 g/100g) content. Husk portion harboured higher total polyphenols and total dietary fibre (Naidu et al., 2011). Diosgenin, a commercially important compound has been found (0.1-0.9 %) in seeds of fenugreek. Fenugreek seeds when cultured *in vitro* have yielded about 2 % diosgenin alongwith trigogenin and gitongenin (Im and Maliakel, 2008; Chauhan et al., 2010). Fenugreek seeds harboured numerous coumarin compounds and many alkaloids (e.g. gentianine, trigonelline, carpaine). Seeds are the source of saponin (fenugrin B) also.

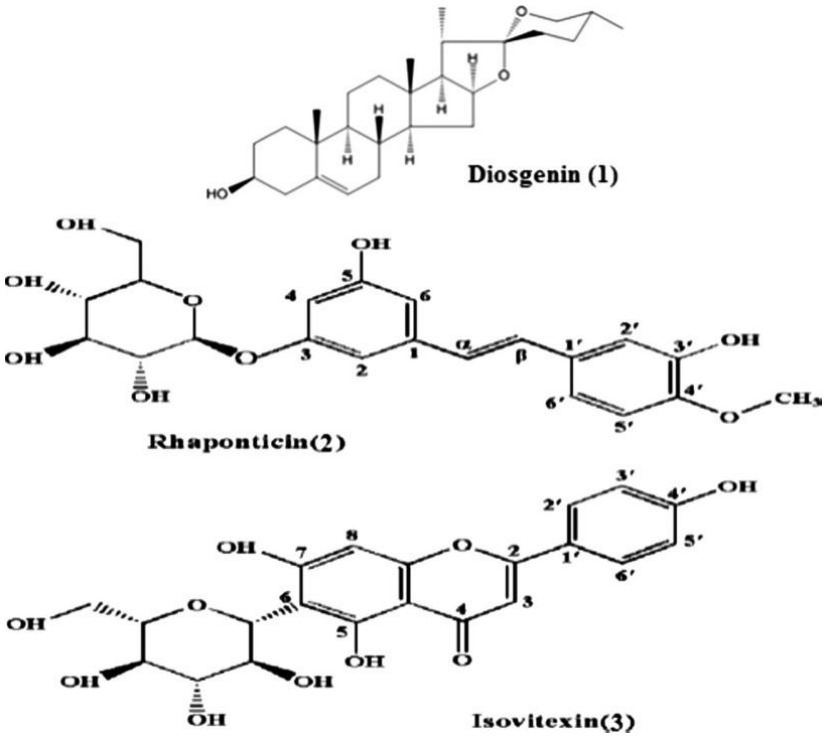

Figure 4. Chemical structures of (1) Diosgenin (2) Rhaponticin and (3) Isovitexin (Volatile contents).

The alkaloid trigonelline is transformed to nicotininc acid and related pyridines upon roasting (Acharya et al., 2006). The fenugreek seeds contain polyphenol category of compounds, such as isovitexin and rhaponticin (He et al., 2015); (Fig. 4).

Fenugreek seeds also harboured volatile oils and fixed oil (Sowmya and Rajyalakshmi, 1999). The volatile compounds believed to be playing important role in fenugreek odour are olfactometry diacetyl, 1-octene-3-one, sotolon, acetic acid; 3-Isobutyl-2-methoxypyrazine, butanoic acid, isovaleric acid, 3-isopropyl-2-methoxypyrazine, caproic acid, eugenol, 3-amino-4,5-dimethyl-3, linalool, (Z)-1,5-octadiene-3-one, 4-dihydro-2(5H)-furanone with aroma resembling buttery, roasty/earthy, metallic, pungent, paprika like, sweaty/rancid, flowery, musty, spicy respectively (Blank et al., 1997).

The phytochemial compounds behind the strong maple-syrup odour in human sweat after fenugreek consumption were worked out as following: 2,5-dimethylpyrazine, pinene, β-caryophyllene, 3-octen-2-one, terpinen-4-ol; β-; camphor; 4-isopropyl-benzaldehyde; neryl acetate but 2,5-dimethylpyrazine was observed as chief sweat odour determining compound (Meghwal and Goswami, 2012).

Common Applications of Fenugreek

Fenugreek (Methi) seeds by their property of regulating blood sugar, are very useful in controlling diabetes. The amino acid portion of fenugreek seeds enhances insulin secretion in pancreas which subsequently causes decrease in blood sugar level. Fenugreek is useful in therapy of kidney stones. Fenugreek is good for skin and hair health. It has been found as a therapy for hair problems such as dandruff and in countering roughness of hairs. Methi water is helpful in detoxification of body and in digestive problems such as constipation, gastritis and bowel movement. The dietary fibres present in Methi are good for health. By suppressing appetite and providing a feeling of fullness upon consumption, they are found to be helpful in preventing unneccessary calories consumption and in this way they help in controlling weight. Methi also prevents bloating (Passano, 1995; Snehlata and Payal, 2012). Fenugreek seed extract is employed as tobacco-flavouring constituent, in the manufacturing of simulated maple syrup, for giving taste to hydrolyzed vegetable protein, as base material for perfume and as a source of steroid sapogenin employed in drug manufacturing buisness. The leaves are used as vegetable (Akbari et al., 2012; Ghosh et al., 2015).

Local people are employing fenugreek to solve their health problems including respiratory problems, migraines and headaches, various pains such as pain during delivery of child and muscular pains. Fenugreek helps in pain management possibly due to prescence of alkaloids that stops sensory receptors that help brain to feel pain. Fenugreek is also beneficial in ulcers, boils and diabetes. Fenugreek is good for diabetic persons.

The bioactive compounds found in fenugreek have exhibited antidiabetic characteristics in animals by decreased intestinal glucose absorption, improving insulin sensitivity and activity, delaying gastric emptying and decreased levels of lipid binding protein. By controlling cholesterol levels, fenugreek helps in betterment of high blood pressure and heart health (Khorshidian et al., 2016).

Traditional Applications

Medicinal properties of Fenugreek have been mentioned in literature of different systems of medicine such as Indian Ayurvedic, Greek and Latin.

Indian Ayurvedic system employs fenugreek as aphrodisiac but more stress was on its use in digestive and respiratory abnormalities. In Chinese language, it was named as hu lu bu and employed as remedy for abdominal pain. Ancient Egyptian women employed fenugreek (Methi) for enhancing lactation and relieving pain associated with delivery of child. In India, methi seeds are used in culinary preparations to impart flavour. Methi seeds have medicinal importance also and they are consumed raw. Methi ka saag (stems and leaves) is used in winter as vegetable. It is frequently employed in pickels, spice mixtures and curry powders in India, Pakistan, Bangladesh and other Asian Countries. The fenugreek is used in kitchen as spice in European countries. In USA, it is often employed in preparation of spice mixtures for stews and soups (Naidu et al., 2011). In Switzerland it is used as a flavouring agent for cheese while in Egypt and Ethopia, Fenugreek is employed in bread preparation.
Fenugreek seeds were employed in older times for problems associated with menopause and menstruation, for increasing milk flow from breasts, as an oral substitute for insulin to reduce blood glucose levels (Youssef et al., 2009).

Bakery and extruded commodities derived from Fenugreek

Interaction of fenugreek protein with food components modifies its capacity to stabilize and emulsify food components. In this context it was observed that emulsifying action of soy protein isolate with fenugreek gum was enhanced four times as compared to either of them alone. Emulsifying action and solubility of soy protein isolate with fenugreek gum dispersions exhibited stability during exposure to broad spectrum of high temperatures, pH and ionic strength. The emulsifying stability of soy protein isolate and fenugreek gum dispersions was respectively three and two times enhanced as compared to soy protein isolate and bovine serum albumin (Hefnawy and Ramadan, 2011).
The higher amount of dietary fibre found in fenugreek increases its applicability in functional food. The fibre provides substrate material to Intestinal microorganisms for fermentation. The prescence of galactomannan possessing emulsifying and stabilizing action, in the fenugreek dietary fibre enhanced its applicability in food industry. Fenugreek seed contains good amount of dietary fibre and minerals. Adding fibre to refined flours maintains a healthy balance of insoluble and soluble fibres. Fibre mixed with flour is employed in manufacturing bread, cakes, pizza and muffins. The fenugreek supplemented bread and wheat bread were comparable in colour, texture and taste but fenugreek supplemented bread may be additionally helpful in reducing insulin and blood sugar. Fenugreek powder or crushed fenugreek seed is used in producing clarified butter. Fenugreek paste named as “Cemen”, created from ground fenugreek seeds is employed as food in Turkey. Fenugreek flour can be augmented (10%) in biscuits manufacturing without compromising their nutritional level and market acceptability (Hooda and Jood, 2005). Thus enhanced consumption of such composite foods besides improving nutritional status of population will also help in coping with degenerative diseases (Srinivasan, 2006; El Nasri and El Tinay, 2007). Research studies suggested that wheat flour can be substituted with soaked fenugreek (10%) and germinated fenugreek (20%) flours to generate biscuits with good nutritional quality and consumer acceptability. Fortification of food with fenugreek leaves, seeds and wheat flour mixed with germinated fenugreek powder (5-10%) enhanced the vitamin B_2, carotene, vitamin E, vitamin C, zinc, iron, calcium, fibres and total proteins contents. Supplementation with fenugreek proved to be beneficial for anaemic rats.

Consumption of fenugreek products may be helpful in alleviating iron deficiency anaemia. Mixing of germinated fenugreek seed flour (10%) to wheat biscuits was helpful in removing scarcity of amino acids and improved nutritional profile. It was observed that fenugreek seeds have lipids and cholesterol lowering properties. Fenugreek seed flour (1.78%) and fenugreek leaf powder (0.66%) have been employed in manufacturing of extruded products with sensory and functional qualities acceptable to consumers.

A research was conducted to observe effects of mixing fenugreek flour and polysaccharide inclusion (from which bitterness was removed) on physical and sensory aspects and glycemic index (GI) of chickpea-rice based extruded commodities. Mixing of fenugreek polysaccharide altered the radial and longitudinal characteristics of products. Water solubility decreased while water absorption was enhanced. It was observed that mixing of fenugreek flour should be limited to 2% in chickpea-based products due to its bitter taste. Fenugreek polysaccharide upto 15% was meant to be acceptable to consumers as far as sensory characteristics are concerned. The products having fenugreek polysaccharide in 5-15% range were more or less similar as far as their texture, colour and taste are concerned. In a research study, an extrusion process was performed to minimize decrease in fenugreek gum molecular weight during extrusion. The extrusion has not much influence on steady and dynamic shear characteristics of gum. The extrusion altered fenugreek gum solutions showed a shear thinning flow property at 25°C, and there was a concurrent enhancement in consistency index and apparent viscosity with an increase in gum concentration. The ability of extrusion altered fenugreek gum solutions to store energy elastically and ability to dissipate stress through heat enhanced with increasing gum concentration and increasing frequency (Chang et al., 2011). Fenugreek gum was replaced for wheat flour at 0%, 5% and 10% (w/w) and resultant material's rheological properties and bread manufacturing characteristics were assessed. Fenugreek gum (5% and 10%) harbouring bread exhibited volumes and consistency like control bread. Fenugreek gum caused enhancement in dough farinograph water absorption, but extruding gum further elevated water absorption as compared with gum where extrusion process was not applied. Additionally extruding the FG enhanced its solubility. Mixing fenugreek gum (FG) to bread dough caused an increase in the ability of resultant material to store energy elastically and ability to dissipate stress through heat (Roberts et al., 2012). Effects of mixing of FG, guar gum and locust bean gum to extruded pea-rice snack commodities were observed. Addition of three gums at 20% concentration caused good enlargement of resultant products. The water absorption index (WAI) of extrudates harbouring FG enhanced with increasing inclusion levels. The WAI gives an idea about interaction of extruded product with water. The modified extruded pea-rice snack products contained good amounts of protein, dietary fibres and starch besides having low fat content thus having decreased GI especially in case of mixing fenugreek gum exudates (Ravindran et al., 2011).

Interplay between Fenugreek and Drugs

Fenugreek due to its supplementary effects may increase the action of cholesterol-decreasing agents. Fenugreek may interact with oral hypoglycaemic drugs sulfonylurea, biguanides, or both of them and may cause hypoglycaemia. There is interplay between fenugreek and exogenous insulin in diabetic patients who do not manage insulin dosage and it may cause hypoglycaemia.

Fenugreek may potentially interact with antiplatelet/anticoagulant drugs, especially a compound coumarin found in fenugreek may enhance the possibility of haemorrhage (The Wealth of India-A Dictionary of Indian Raw Materials and Industrial Procedures, NISC, CSIR, New Delhi, India, 1998; Genet et al., 1999; Bhattacharjee and Arunabha, 2019).

Unwanted Effects and Safe Use of Fenugreek

Plant based medicines although largely safe for consumption, may also have side effects, if not used in proper way and in right quantity. Therefore side effects of fenugreek and fenugreek based products have been studied to assess their safe use and clinical effectiveness. Some users observed side effects such as diarrhoea, gastric problems or bloating in animals (Muraki et al., 2011). Fenugreek use may cause some serious side effects including effects associated with low blood sugar such as fast heartbeat, sweating and nervousness. Minor allergic reactions such as swelling, rashes and breathing problems may occur in some users. Being hypoglycaemic, fenugreek consumption should be done under observation of doctors by patients already taking anti-diabetic drugs or employing insulin. Fenugreek consumption may result in changes in thyroid hormones levels.

Use of fenugreek seeds during pregnancy period has been linked with many birth defects. Fenugreek was toxic for reproductive performance and may induce birth defects in developing fetuses (Khalki et al., 2010). Prenatal exposure of mice to enhanced amount of fenugreek seeds caused inhibition in growth and neurobehavioral changes in post-weaning period (Khalki et al., 2012). Araee et al. (2009) observed that fenugreek can reduce bone marrow cell proliferation and enhance fetal death in rats (Araee et al. 2009). Muraki et al. (2011) worked out that around 2.50% (w/w) is the effective and safe fenugreek extract dose in experimental rats.

DISCUSSION AND CONCLUSION

Medicinal plants are frequently employed as neutraceuticals, pharmaceuticals, as health supplements and in cosmetics. Fenugreek is frequently used as spice for flavouring food globally. Different parts of fenugreek such as green leaves and seeds have culinary as well as medicinal applications. Fresh fenugreek leaves are helpful as remedy for digestive problems and excess gas in alimentary canal, in liver therapy and also useful for hair growth and dandruff problems. Fenugreek has been found to be useful in reducing the possibility of colon cancer by stopping the activity of some enzymes which may be associated with incidence of colon cancer in animal studies. Fenugreek seeds have plenty of vitamin E. Amongst the important pharmacological properties of fenugreek are hypolipidemic, antibacterial, antidiabetic, antioxidant, antiinflammatory, immunological activity, antiplasmodic activity and analgesic properties. Fenugreek seeds are useful as remedy for kidney stones and also for enhancing lactation in feeding mothers. Most of these pharmacological activities are due to their dietary fibres. Fenugreek harbours commercially important steroid diosgenin which is employed as precursor for other steroids. Fenugreek contains gum, fibre, many important bioactive compounds and volatile contents. Fenugreek has been employed as food stabilizer, adhesive and emulsifying agent due to its enhanced fibre, gum and protein content. It is also used to amend food texture. Fenugreeek's food modifying and food texture alteration properties are potentially helpful in its use in manufacturing bakery products and extruded products.

Taking into consideration, fenugreek's beneficial medicinal properties which are largely without any side effects, it should be included in our daily diet. The fibres (both dietary and mucilaginous), essential oils, steroidal saponins and fixed fatty acids are the important phytoconstituents that are responsible for many therapeutic and medicinal values of fenugreek. The free unnatural amino acids (4-hydroxyisoleucine), alkaloids (gentianine, cholin, trigonolline, carpaine), spirostanols and furastanols like gitogenin, diosgenin, and yamogenin have also been identified as the important bioactive compounds in fenugreek. The bioactive compounds of fenugreek are responsible for anti-cancer, antidiabetic, activity, antiinflammatory, antioxidant and hypocholesterolemic properties. Different portions of the fenugreek especially seeds and leaves are employed as spice in food, flavouring agent and in traditional medicine in Indo-Pak region and other oriental countries and also in other parts of world. Since longtime fenugreek was employed as remedy of ulcer and digestive problems, arthritis, wounds, abscesses and bronchitis. It was employed to alleviate the problems related to male reproductive system and kidney problems. Fenugreek as a spice and food is consumed globally. The seeds and plants are basically hot and dry and also they are suppurative, for stimulating bowels, and diuretic. They are helpful as a remedy for hepatic and spleen problems, cough and dropsy. Seeds are employed for stimulating sexual desire and preventing or relieving gas problems in alimentary canal. Fenugreek is also helpful for making childbirth comfortable, for relieving menstrual pain and promoting lactation and for stomach ailments. The plant is also useful in diarrhoea of postpartum women, rheumatism and appetite loss. Seed infusion is also used in small pox. Different phytoconstituents such as saponins (graecunins, fenugreekine, fenugrin B), amino acids (histidine, leucine, lysine, isoleucine, 4-hydroxyisoleucine) and flavanoids (vetexin, quercetin, rutin) are found in fenugrek seed. Fenugreek plant also exhibits anti-allergic activity, used for diabetic retinopathy, bronchitis, asthma, sore throat, abscesses, anaemia, boils, fevers, gallbladder, heartburn, sinus problems. Fenugrek can be effective in therapy of type II diabetes. It is employed in control of glucose and lipid levels for non-insulin dependent diabetic patients. Fenugreek is a source of many important phytoconstituents of culinary and medicinal value. Due to researches supporting its myriad uses and recent resurgence in health awareness amongst people, the use and demand for fenugreek has increased nowadays although there is need to further enhance awareness of many important uses of fenugreek and its consumption.

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