Fenugreek: A Miraculous Medicinal Herb

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Submission: November 01, 2017; Published: August 24, 2018

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Constituents of Fenugreek and their uses

Saponins are amphipathic glycosides having hydrophilic glycoside moieties combined with a lipophilic triterpene derivative. The glycoside free (aglycone) portion of the saponin is termed as sapogenins. There are different sources of saponins and one of the chief source is fenugreek. Fenugreek contains approximately 4 to 8% saponins and about 1% alkaloids. The main steroidal sapogenins obtained from fenugreek seeds are diosgenin and yamogenin which are used as steroid intermediates in the pharmaceutical industry. The occurrence of diosgenin [(25R)-spirost-5-en-3β-ol] in the seeds of fenugreek has been well expected for over 50 years [15]. Other saponins and steroidal saponins present in fenugreek include fenugrin B, fenugreekine, trigofoenosides A-G, tigogenin, neotigogenin, gitogenin, neogitogenin, yuccagenin and saponaretin [16]. The plant alkaloid Trigonelline (0.3-0.4%) was first isolated from the seeds of fenugreek. It is a pyridine alkaloid, known for its hypoglycaemic and hypocholesterolemic activity. Trigonelline (N-methylnicotinic acid) is derived from nicotinic acid and the reaction is catalysed by S-adenosyl-L-methionine (SAM)-dependent nicotinate enzyme N-methyltransferase. Nicotinamide and nicotinic acid, the products of pyridine nucleotide cycle (PNC) give rise to trigonelline. The synthesis of trigonelline from nicotinamide mononucleotide (NaMN) is shown in the Figure 2. Other alkaloids present in fenugreek include Choline, Gentianine, Carpaine and Betain [16-18].

Figure 1: Structure of trigonelline.
Various amino acids have been found to be present in fenugreek which includes 4-Hydroxyisoleucine, Histidine, L-tryptophan, Arginine, Isoleucine, Leucine and lysine [19]. Flavonoids constitute about 100 mg/g of fenugreek seed such as as apigenin, luteolin, orientin, quercetin, vitexin and isovitexin [20,21]. Fenugreek is abundant in polyphenolic compounds. 4-Hydroxyisoleucine (4-OH-Ile) is known to be present only in plants and is particularly plentiful in the seeds of fenugreek, where it comprises almost 80% of the total content of free amino acids. The amino acid, 4-OH-Ile stimulates the release of insulin and controls blood sugar levels [3].

The seeds of fenugreek are rich source of vitamins namely choline, vitamin A, B1, B2, C, nicotinic acid and niacin, biotin, calcium pantothenate, pyridoxine, vitamin C and cyanocobalaminine [22]. They also contain significant amount of minerals like sulphur, phosphorus [23] and calcium [24]. Besides above, fenugreek contains a lot of other useful products and compounds like fiber (galactomannans), natural antioxidants and flavonoids etc [25-27].

References


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DOI: 10.19080/JCMAH.2018.07.555710

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