

# Study of Bioactive Components Present in Oil Extracted from Fenugreek Seed: Review

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**Abstract**— A fenugreek seed (*Trigonella foenum-graecum*) is a native of India, and also found in Mediterranean region, southern Europe, Africa and western Asia. These seeds have their importance due to the medicinal properties as well as nutraceutical value present in their chemical composition. This fenugreek seeds were used for treating diabetes, menstrual cramps, cancer, heart related disease, skin and hair fall treatments, high per tension, weight loss, to increase milk supply in women who were breastfeeding. This seeds is found to be abundant in N-Dimethylaminomethyl, 1-ptoprnl, 2, 2-dimethyl-aceto, Aziridine,1,2,3-trimethyl-trans, 2-pentanone,4-hydroxy-4 meth, 2-trimethylsilyl-1,3-dithiane, 3-0-methyl-d-glucose, d-mannopyranoiside,uronate,Diazidine1,3,3-trimethyl,Methyl 4,8dimethylnonanoate There are numerous methods available on extraction of these compounds right from conventional (Maceration, Percolation, Reflux extraction, Soxhlet extraction, microwave assist extraction, pressurised liquid extraction, super critical fluid extraction, Pulsed electric field extraction, Enzyme assisted extraction, Ultrasound assisted extraction) apart from this some water based extraction technique may also use to extract bioactive compounds from fenugreek seeds. In present article a focus has been given to highlight importance of fenugreek seeds extract in terms of extraction of bioactive compounds and their probable application in the area of food and pharmaceuticals.

**Keywords**— Fenugreek seeds, Extraction, Bioactive compounds, Medicinal properties, Food applications.

## I. INTRODUCTION

Fenugreek (*Trigonella foenum-graecum*) is a short annual plant of the legume family. The name *Trigonella foenum-graecum* is a Latin-Greek name because it has typical triangular flowers and is used as a common animal feed in Greece (fig.1). It is found all over the world and is commonly used as a spice, condiment and medicine. To a large extent, fenugreek leaves and seeds have been used as spices all over the world. Fenugreek powder is used as a seasoning, and seed endosperm is used to fix fenugreek gum. In India, leaves and seeds are used as flavouring and flavouring agents. (Ravindra *et al.*, 2013)



Fig.1.Fenugreek seed

The seeds have a strong aroma and bitter taste. The main chemical components found in fenugreek seeds are galactomannas (fibre), osapogenin, triamcinolone (alkaloid) and 4-hydroxyisoleucine, which has anti-diabetic properties. Can also be used to treat breast cancer and other diseases. (Shrivastava *et al.*, 2010)

In Africa, fenugreek is used as a supplement in the bread preparation process, and the seed ingredients of fenugreek

can improve the nutritional quality of bread. In China, it was used to treat edema, while the ancient Egyptians used fenugreek to incense mummies. In addition, fenugreek is used as an anti-inflammatory antioxidant, anti-cancer agent, liver protecting, antibacterial agent and antifungal agent, as well as a medicine for the treatment of various diseases. In addition, fenugreek is also used as a supplement to off-season feed and animal food.

## II. BIOACTIVE COMPOUNDS

Bioactive compounds are essential and non-essential compounds that exist in nature. They are part of the food chain and can prove to have an impact on human health.

Biesalski et al., (2009)

The causes of many diseases, including certain types of cancer, atherosclerosis, cardiovascular diseases,

neurodegenerative diseases, infections, chronic inflammatory diseases, diabetes, and autoimmune diseases, are all affected by elevated levels of free radicals and subsequent serious effects of oxidative stress. In order to treat oxidative stress, researchers are interested in plants that are important sources of naturally presents in bioactive compounds like antioxidants phenolic, compounds, flavonoid, and vitamins. Gutteridge et al., (2020)

Laila et al., (2015) a scientist studied the bioactive components of fenugreek seeds by extracting the seeds with hexane as a solvent and subsequently carried out GC-MS analysis and found the presence of bioactive compounds.

Norziah et al., (2015) Fenugreek seeds were extracted using methanol as an organic solvent by this scientist in order to investigate their antioxidant and antimicrobial properties.

Table.1: Extraction method (Zhang et al. 2018)

Method	Solvent	Pressure	Polarity of natural products extracted
Maceration	Aqueous and non-aqueous solvents used	Atmospheric	Dependent on extracting solvent
Percolation	Aqueous and non-aqueous solvents used		Dependent on extracting solvent
Reflux extraction	Aqueous and non-aqueous solvent used		Dependent on extracting solvent
Soxhlet extraction	Organic solvents used		Dependent on extracting solvent

For fenugreek seed extraction, four methods are used. The first method is the maceration method in this method the extraction was carried out using both aqueous and non-aqueous solvents under atmospheric pressure. Natural products extracted in this manner differ in polarity depending on the extracting solvent.

Second method is Percolation this method was also carried out using both aqueous and non-aqueous solvents under atmospheric pressure. Third method is Reflux extraction in this using both aqueous and non-aqueous solvents under atmospheric pressure. Natural products extracted in this manner differ in polarity depending on the extracting solvent. As a fourth method, Soxhlet extraction uses organic solvents under atmospheric pressure and the extraction solvent determines the polarity of natural extracts.

## III. WATER BASED EXTRACTION METHOD

Extraction is the process in which one or more components are separated selectively from the liquid or solid mixture. The water-based extraction method is an alternative to the solvent extraction method, which changes the use of solvents in the extraction method. The product from water based extraction is more beneficial and safe for consumption. As water based extraction is eco-friendly method it ultimately reduces the toxicity and pollution. As water has cheaper rates as compared to solvents and it is easily available, also have negligible side effects.

## IV. METHODOLOGY FOR EXTRACTING FENUGREEK SEEDS WITH WATER

Water-based extraction is performed with a soxhlet machine and rotary evaporator machine. Firstly, the fenugreek seed is dried in a hot air oven and then ground

in a mixer grinder to prepare a fine powder. The powder is then packed in the cotton bag and kept in the Soxhlet machine for extraction. During the extraction process, the extract is collected in distilled water, and this water extract is transferred to a rotary evaporator to evaporate the water from the extract. After the final extract has been collected in the Eppendorf tube, it can be analyzed.

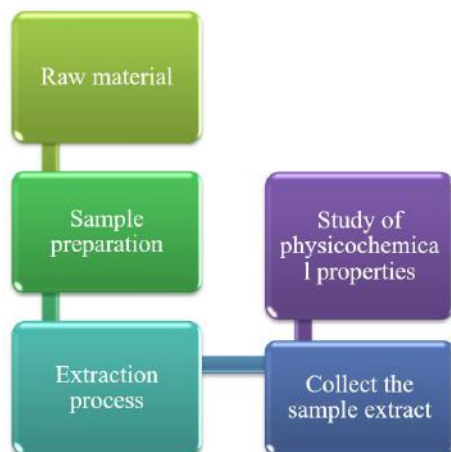


Fig.2: Methodology of water extraction of fenugreek seed

## V. HEALTH BENEFITS OF BIOACTIVE COMPOUNDS OF FENUGREEK SEED

### 5.1 Galactomannans

Galactomannans lowering LDL level (low-density lipoprotein) it also called bad cholesterol in hypercholesterolemia. It also lowers lipids, blood pressure, and fibrinolysis in healthy men. Hannan *et al.* (2007)

### 5.2 4-hydroxyisoleucine

It was also reported by this agent as having played a key role in improving glucose in the type 1 and type 2 diabetes maintain homeostasis. It improved glucose in human body by delaying the digestion and absorption of carbohydrates. Hamden *et al.* (2010)

### 5.3 Osapogenin

Molecular docking calculations reveal that Osapogenin has a high docking score, stable molecular dynamics (MD) simulation results, and low binding energy calculations, thus making it a potential anti-breast cancer drug candidate. Rampogu *et al.* (2018)

### 5.4 Triamcinolone (alkaloid)

It was pointed out that fenugreek seeds contain Triamcinolone (alkaloid) that can act a probiotic. The flora in the stomach is largely controlled through the growth of beneficial microorganisms on its surface. Majeed *et al.* (2018)

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