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Indian miracle Seed: Fenugreek (*Trigonella foenum - graceum* L.)

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Abstract

Food used as a preventative to disease and as an essential part of medicine has been established for over 4000 years by physicians of natural medicine. Fenugreek seed is one of the best medicines. It is commonly known as Methi an annual herb belonging to family Fabaceae. Chemical properties of fenugreek seeds were evaluated for nutritional study and found to be excellent source for protein, fibre and vitamins. It is common ingredient in dishes from the Indian subcontinent. It is known for its medicinal qualities such as antidiabetic, anticarcinogenic, hypocholesterolemic, antioxidant and immunological activities. Beside its medicinal value, it is also used as a part of various food product developments as food stabilizer, adhesive and emulsifying agent. Fenugreek seed helps for production of milk in lactating mother. Sprouted fenugreek seeds have amazing health benefits on the metabolic diseases and hence these seeds can be used as a large number of nutraceuticals.

Keywords: fenugreek seeds, antidiabetic, antibacterial, nutraceuticals, food stabilizer

1. Introduction

Food is a major determinant of health that is directly under our control. In fact, there is a growing consensus of individuals promoting and living a lifestyle where food is used as a form of medicine Nuts and Seeds one among the natural resource contributes to the essentials in combating disease [1].

Plants are used as food, some of which are good sources of medicine. Fenugreek (Trigonella Faenum-Graecum Linn.) is an annual herb indigenous to the countries bordering on the eastern shores of the Mediterranean and largely cultivated in India, Saudi Arabia, Egypt and Morocco [4]. The name "fenugreek" comes from foenum-graecum, meaning "grey hay", as the plant was traditionally used to scent inferior hay [5]. The leaves and seeds of the plant are widely consumed as spice in food preparations and as ingredient in traditional medicine [6].

Fenugreek, scientifically known as *Trigonella Foenum-Graecum*, is one of the oldest cultivated medicinal plants which belong to the family Fabaceae. In fact, several beneficial effects on health, attributed to the consumption of fenugreek, have been demonstrated during tests in both animals and human [13].

The medicinal value of fenugreek seeds is mentioned in Ayurvedic texts as well as in Greek and Latin pharmacopoeia. The Ayurvedic texts praise this herb for its power as an aphrodisiac, but modern *vaidyas* seem to be using it more for digestive and respiratory problems stemming from an excess of kaph (phlegm) and vat (wind) [7].

The fenugreek seeds are the most important and useful part of fenugreek plant. These seeds are golden yellow in colour, small in size, hard and have four- faced stone like structure. Raw fenugreek seeds have maple flavour and bitter taste due to the presence of bitter saponins, which limit their acceptability in foods. It has been possible to debitter fenugreek seeds by employing various processing methods such as soaking, germination, roasting etc., their bitterness can be reduced and flavour can be enhanced. Germinated seeds have several beneficial properties over ungerminated seeds. Germination improves in vitro protein digestion, as well as fat absorption capacity. The whole seeds or its ground powder is used in pickles, vegetables dishes and spice powder. Dried seeds are used as condiments. Fenugreek seeds are gummy, fibrous and sticky in nature [8].

Sprouted fenugreek seeds have amazing benefits on the metabolic diseases and hence we can use these seeds as a large number of nutraceuticals. These sprouted fenugreek seeds lower the absorption of glucose from the large intestine and improves beta cells generation in the pancreatic Islet's of Langerhans. Also imparts the antioxidant property on various systems to protect from free radical's generation [7].

The herb of fenugreek has been used for centuries as a cooking spice in European countries and it remains a popular ingredient in curry powders, pickles and spice mixtures in India Pakistan, Bangladesh and other Asian countries. Fenugreek has been used in the folk medicines for the treatment of cellulitis, boils, and tuberculosis. Fenugreek remained a key ingredient in a 19th century patent medicine for dysmenorrheal and postmenopausal symptoms. It also has been recommended for the promotion of lactation. The seeds are also eaten raw as sprouts and used medicinally. In Egypt and Ethiopia, methi is used in baking bread, and the Swiss use it for flavoring cheese. In the USA, it is mainly used to make spice blends for soups and stews [9]. It also has been recommended for the promotion of lactation. The maple aroma and flavor of fenugreek have led to its use in imitation maple syrup [10].

Chemical properties of fenugreek seeds

Chemical properties such as moisture, fat, protein, ash&carbohydrate content were found to be 11.21%, 07%, 23.30%, 03% & 55.49% respectively in raw fenugreek seeds

whereas 13.50%, 6.24%, 24.12%,3.14%& 53% respectively in germinated fenugreek seeds. Germinated fenugreek seeds have higher moisture, protein, ash &carbohydrate content Whereas low fat content as compared to raw fenugreek seeds [8].

Nutraceutical effect of fenugreek seeds

Table 1

Nutraceutical properties	Description
Lactation aid	It has been found to stimulate sweat production as it contains hormones precursor to increase milk formation. It can increase a nursing mother's milk supply within 24-72hr after first taking herb.
Immunological Activity	It stimulates immune system.
Hypoglycemic Effect	Hypoglycemic effect may be mediated through stimulating insulin synthesis & /or secretion from the beta pancreatic cells. The hypoglycemic effect of fenugreek has been especially reported in humans & animals with type1 & type 2 diabetes mellitus. Management of newly diagnosed type2 diabetes.
Hypercholesterolemic Effect	It reduces the cholesterolemia, body weight
Antioxidant Activity	Free radical scavenging activity. It can be used in the treatment of patients with calcic urolithiasis.
Anticancer Effect	Anti-breast cancer effect. Inhibited 7, 12-dimethyl benz (a)anthracite-induced mammary hyperplasia & ability to induce death of cell, despite simultaneous upregulation of growth stimulatory pathway in normal cells. It was seen that diosgenin could modulate the stat 3 signaling pathway in hepatocellura carcinoma by suppressing the activation of c-src, jak1&jak 2
Antibacterial & Antifungal Effect	Having potential to develop better & novel antifungal drug. It can be used in the treatment of patients with calcic urolithiasis.
Gastroprotective Effect	Lowering mucosal injury having antiulcer potential.
Anti-Inflammatory & Antipyretic Effect	Tf & 55 also significantly reduced hyperthermia induced by brewer's yeast.

[11]. recently fenugreek seeds are used as a cheap source of good quality protein. Fenugreek seeds can be a good supplement to cereals because of its high protein (25%), lysine (5.7g/16g N), soluble (20%) and insoluble (28%) dietary fiber besides being rich in calcium, iron and beta-carotene. Fenugreek endosperm is rich in protein such as globulin, histidine, albumin and lecithin and 100g of fenugreek seed contains 25.4g protein. It has a high proportion of protein ranging from 20 to 30% as well as amino 4-hydroxyisoleucine in particular, which has high potential for insulin-stimulating activity [8].

Fenugreek fibre

Fenugreek seeds are rich source of soluble dietary fibre content. Raju [3] reported that the fibre content of fenugreek extract plays a role in its ability to moderate metabolism of glucose in the digestive tract. The 100 g of seeds provide more than 65% of dietary fibre. Fenugreek contains saponins, hemicelluloses, mucilage, tannins and pectin and these compounds help to decrease the level of low density lipoprotein-cholesterol (LDL) in blood by inhibiting bile salts re-absorption in the colon. Following are the advantages of fibre present in fenugreek seed.

1. It binds to toxins in the food and helps to protect the colon mucus membrane from cancer causing toxins.
2. It has been established that the amino-acid, 4-hydroxyisoleucine present in the fenugreek seed has facilitator action on insulin secretion.
3. Fibre helps to lower rate of glucose absorption in the intestines controlling blood sugar levels.
4. The higher content of soluble fibre in fenugreek enhances its strength for glucose level tolerance [12].

Benefits of Fenugreek

1. 25 - 50 grams of fenugreek seeds eaten daily can diminish reactive hyperglycemia in diabetic patients.
2. Fenugreek leaves and seeds help in blood formation. They are good for preventing anaemia and rundown conditions.
3. Including fenugreek seed in lactating mother increases the flow of milk.
4. If half a teaspoon of fenugreek added to the lentil and rice mixture while soaking, dosa's will be more-crisp [1].

Fenugreek and Obesity

Obesity is one of the major risk factor for morbidity and mortality. Obesity may be defined as abnormal growth of adipose tissue. Some researchers indicated that fenugreek seed extract supplementation in reducing the body and adipose tissue weight. The probable mechanism of fenugreek decreasing the total body and adipose tissue weight. Fenugreek flushes out the carbohydrates from the body before they enter the blood stream resulting in weight loss. Fenugreek seeds contain a high proportion (40%) of soluble fiber. This fiber forms a gelatinous structure (similar to gaur gum) which may have effects on slowing the digestion and absorption of food from the intestine and create a sense of fullness in the abdomen, thus suppresses appetite and promotes weight loss [7].

As a food stabilizer, adhesive & emulsifying agent

Only galactomannan presence in fenugreek seed alone accounts for approximately 15-50% dry weight of seed which is a standard source of dietary fiber in plant which helps in many disease combating symptoms. Dietary fibres in fenugreek seed have potential effect in reduction of cardiovascular diseases and also have an effect of anticancer by reducing the effect of low-density lipoprotein and total cholesterol. Galactomannan act as a thickener in certain foods like soups & ice-creams. Due to its low cost it may be used to stabilize the foods in industries as compared to locust beans gum & guar gum which are used as an emulsifiers, thickeners & stabilizer [11].

Diabetes management

Das [2] has reported that 25-50 g fenugreek seeds were given to diabetic patients daily in diet to prevent and manage long

term complications of diabetes whereas studies have been made about the glycemic index of fenugreek recipes and found that the soluble fenugreek fibre has significantly reduced the glycemic index and therefore, they recommended the inclusion of fenugreek recipes in daily diet to provide at least 25 g fenugreek seeds that helps in diabetes management. On the other hand, water extract of fenugreek seeds has higher hypoglycemic and antihyperglycemic potential and for this reason it may be used as a supplementary medicine to treat the diabetic population by significantly reducing the dose of standard drugs [12].

Antibacterial activity of fenugreek

Screening of medicinal plants for antimicrobial activities is important for finding potential new compounds for therapeutic use. Fenugreek have activity antibacterial, according reports, this plants kill bacteria. The use of synthetic α–glucosidases inhibitors such as acarbose, cause adverse side effects such as abdominal distention due to the excessive inhibition of pancreatic enzymes, resulting in the abnormal bacterial fermentation undigested carbohydrates in the colon. Hence, research on the development and utilization of anti-diabetic plants with mild inhibition of pancreatic enzymes is beneficial [7].

Conclusion

Fenugreek seeds have antidiabetic, anti-inflammatory, hypocholesterolemic, anti-cancer, antimicrobial, lactogogue and antioxidant property. Fenugreek sprouts has been very useful bioactive compound used as nutraceutical. The sprouts of fenugreek seeds have been used as food stabilizer, food adhesive, bakery products, food emulsifier and gum. The fenugreek seed is beneficial as a spice in food and management of diseases. It should be taken as a part of our daily diet as its liberal use is safe and exhibits several health benefits.

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