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A REVIEW ON ETHANOMEDICINAL USES, PHARMACOLOGICAL ACTIVITIES OF TRIGONELLA FOENUM

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ABSTRACT

Fenugreek (*Trigonella foenum-graecum*) typically called Methi is an annual herb belonging to own circle of relatives Fabaceae. It decreases the bad cholesterol stage reduces the frame weight through lowering plasma triglycerides tri glycerides. Fenugreek is thought to have hypocholesterolemic, antioxidant potency, digestive stimulant movement, and hepatoprotective effect. It is anticarcinogenic, antioxidant, antibacterial agent, and anti-anorexia agent. Recent studies discovered that fenugreek is a treasured medicinal plant of multipurpose makes use of and can be used for getting ready diverse merchandise consisting of steroidal hormones. This assessment gives the principal medicinal and different useful makes use of fenugreek determined thru final a few years of studies in animal and human topics in addition to in different experimental studies. In this assessment, we can summarize antioxidant, anti-diabetic, PCOS, anti-microbial, hyperlipidemic movement, anti-most cancers movement and medicinal properties of fenugreek.

Keywords: Fenugreek, bioactive compounds, anti-oxidant, anti-diabetic, alkaloid, medicinal properties.

1. INTRODUCTION

Fenugreek (*Trigonella foenum-graecum*) is an herb just like clover. The seeds flavor just like maple syrup and are utilized in meals and medication. Fenugreek is local to the Mediterranean, Europe, and Asia. *Trigonella foenum-graceum* (Fenugreek) herb has lengthy been utilized in conventional medication and has many healing benefits. The fenugreek seeds comprise the alkaloid trigonelline with tannic acid, mucilage, constant and unstable oils, a sour extractive, and yellow coloring matter, in addition to steroidal saponins inclusive of diosgenin, gitogenin and a hint of trigogenin and diet A. In addition, this seed is a wealthy supply of fiber and proteins. (Zia T, Hasnain SN,2001; Bahmani M) Both of those consequences decrease blood sugar in human beings with diabetes. Fenugreek may enhance ranges of testosterone and estrogen, assisting to enhance hobby in sex. People usually use fenugreek for diabetes, menstrual cramps, sexual problems, enlarged prostate, excessive cholesterol, obesity, and plenty of different conditions, however there may be no desirable clinical proof to help maximum of those uses.

The fenugreek seeds comprise the alkaloid trigonelline with tannic acid, mucilage, constant and unstable oils, a sour extractive, and yellow coloring matter, in addition to steroidal saponins inclusive of diosgenin, gitogenin and a hint of trigogenin and diet A. In addition, this seed is a wealthy supply of fiber and proteins. (Zia T, Hasnain SN, 2001; Bahmani M) Several reviews exhibit the healing consequences of fenugreek plant inclusive of hypoglycemic, analgesic,

anti-atherosclerotic, anti-inflammatory, antispasmodic, anticancer, cardioprotective, blood cholesterol-lowering, lipid-lowering, hard work induction, selling milk flow, antibacterial, and anti-worm. (Basch E, 2003; Yadav UC, 2013)

Many former research indicated the antidiabetic impact of fenugreek and confirmed that fenugreek seed extract had excessive capacity in casting off unfastened radicals and inhibiting oxidative stress; therefore, it's miles extensively used to deal with DM. (Haber SL, 2013; Belguith-Hadriche O, 2013) Moreover, its Cardio protective impact in diabetic coronary heart has been proven recently (Pradeep SR2018), however its consequences on cardiac apoptosis have now no longer been investigated. Several mechanisms are counseled for the hypoglycemic impact of fenugreek seed; four hydroxyl isoleucine content material of fenugreek seed will increase mobileular glucose uptake through growing Glut-four at the mobileular membrane surface, polyphenol issue of fenugreek and cuerestin can boom insulin sensitivity through improving phosphorylation of tyrosine kinase and enhancing insulin signaling.(Kannappan S,2013; Jaiswal N ,2012).Furthermore, a few mechanisms liable for the anti-hyperlipidemic belongings of fenugreek play their roles on this regard; it consists of diosgenin that would alternate intracellular calcium awareness through which regulates membrane binding protein and in flip will increase lipid transportation into the cells and reduces tissue fatty acids. (Naidu PB, 2015)

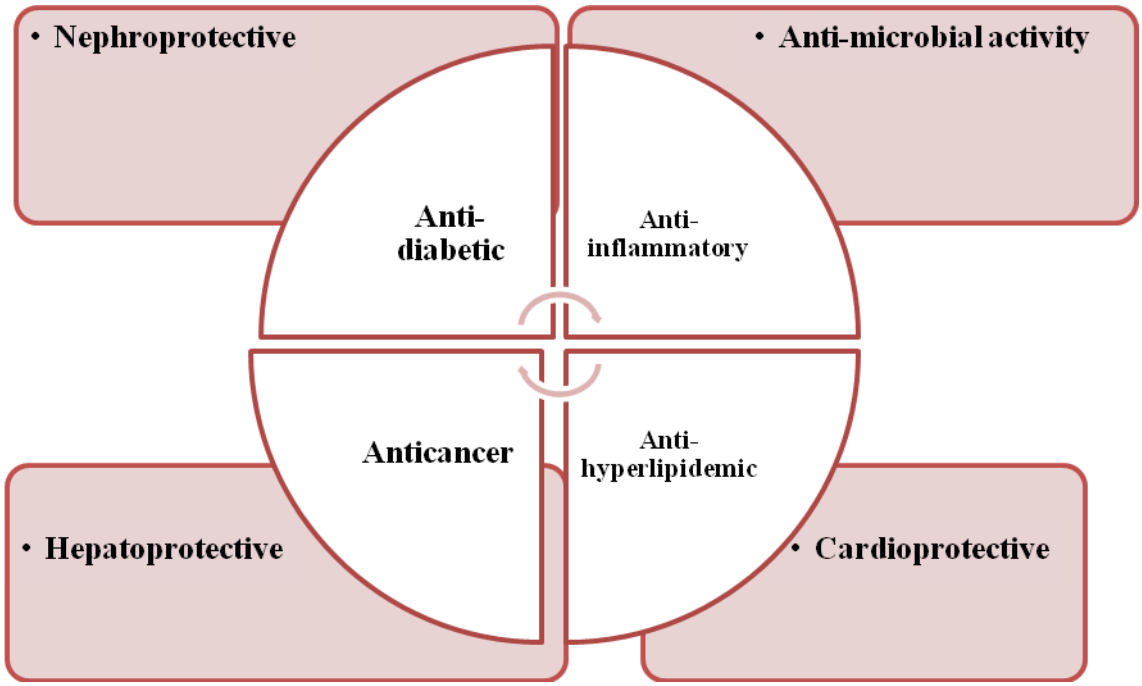
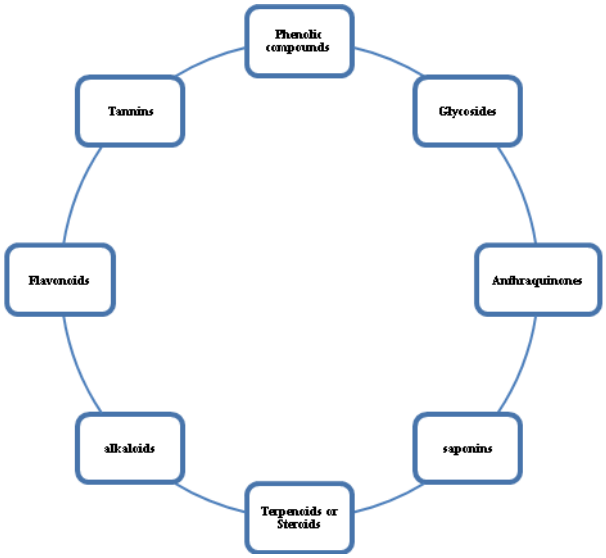


Figure 1.Pharmaceutical properties of ***Trigonella foenum***

Evidence from preceding investigations indicated antioxidative houses of fenugreek. Annida B, 2005; Khole S,2014) Our consequences additionally indicated that remedy with fenugreek seed extract and metformin had defensive consequences on oxidative harm through attenuating the TBARS degree and augmenting the full thiol awareness, catalase and SOD activities. According to the received data, fenugreek, similarly to antidiabetic consequences, indicated huge anti-oxidant and anti-apoptotic consequences, in addition to its effectiveness in lowering hyperlipidemia is a great deal higher than that of metformin.

Figure 2. ***Trigonella foenum*** **-Phytochemicals**



Thus, fenugreek seeds may be used as a normal nutrient to relieve the facet consequences of Al ingestion, now no longer handiest withinside the mind and bone, however additionally withinside the kidneys, mainly for continual renal failure sufferers who're greater prone to growing aluminum toxicity. *Trigonella foenum-graecum* is one of the famous Mediterranean plants, originating from the Middle-East and India, whose seeds are extensively utilized in peoples medication to deal with lithiasis sufferers, mainly in Morocco and Arabie Saoudite [Laroubi A,,2007].

Trigonella is likewise recognised for its a couple of pharmacological consequences, inclusive of its antidiabetic, antioxidative, antineoplastic, anti-inflammatory, antiulcerogenic, antipyretic, antitumor and immunomodulatory consequences [Satheeshkumar N, 2010]. The lively additives of fenugreek seeds at the back of their maximum not unusualplace houses had been defined as polyphenolic flavonoids, steroid saponins, polysaccharides specially galactomannans and four-hydroxyisoleucine [Satheeshkumar N,2010].

1.1. Antioxidant activity

The antioxidant consequences of fenugreek in preceding research had been taken into consideration on its flavonoid and polyphenol compounds (Annida B, 2005) . Furthermore, this plant consists of numerous antioxidant substances, and its most important antioxidant compounds are flavones of vitexin and isovitexin. (Khole S, 2013) Hyperglycemia and hyperlipidemia are not unusualplace elements concerned withinside the induction of ROS generation; (Fakhruddin S, 2017; Amiya E, 2016). Therefore, the anti oxidative assets of fenugreek seed extract can be related to its anti-hyperglycemic and anti-hyperlipidemia consequences. Although the prevalence of apoptosis became assessed handiest with the aid of using measuring the expression of apoptosis-associated genes, it's far endorsed that greater reviews be carried out on the protein degree to higher elucidate the impact of this plant on apoptosis withinside the direction of diabetes. The ICAM1 marker, further to being related to apoptosis, is an inflammatory factor. However, to analyze the anti inflammatory consequences of fenugreek on this model, it's far important to examine different associated inflammatory indicators and cytokines. Nevertheless, in view that fenugreek has been historically used as an antidiabetic natural remedy, greater research are important to in addition monitor the cardiovascular protecting consequences of this plant on diabetes via numerous mechanisms. 1.2.**Fenugreek reduces renal failure**

Oral AlCl3 management in the course of five months brought about plasma biochemical modifications, an inhibition of alkaline phosphatase (ALP), a lower of overall antioxidant status (TAS), and an induction of lipid peroxidation (LPO) withinside the blood and mind, further to kidney atrophy and morphological changes at the extent of Bowman's capsule, the glomerulus and exclusive varieties of tubules, harking back to a few acknowledged kidney sickness. The remedy with the entire fenugreek seed powder (FSP) (five% withinside the food plan) over the past 2 months confirmed its effectiveness in restoring everyday plasma values of urea, creatinine, ALP and glucose, in addition to re-growing the TAS, inhibiting LPO and assuaging histopathological modifications withinside the injured kidneys. This examine highlights the caused nephrotoxicicity, in addition to the associated toxicity withinside the mind and bone, with the aid of using continual oral ingestion of the aluminum salts. However, the upkeep of a food plan supplemented with fenugreek seeds may want to provide safety for the kidney, bone and mind, on the equal time. Several flora were mentioned to be powerful withinside the remedy of spontaneous or xenobiotics caused kidney diseases; however, research concerning the recuperation consequences of flora in opposition to Al-caused nephrotoxicity are lacking. Trigonella foenum-graecum is one of the famous Mediterranean flora, originating from the Middle-East and India, whose seeds are extensively utilized in peoples remedy to deal with lithiasis sufferers, in particular in Morocco and Arabie Saoudite [Laroubi A,2004]. Trigonella is likewise acknowledged for its a couple of pharmacological consequences, inclusive of its antidiabetic, antioxidative, antineoplastic, anti inflammatory, antiulcerogenic, antipyretic, antitumor and immunomodulatory consequences [Satheeshkumar N,2010]. The lively additives of fenugreek seeds at the back of their maximum not unusualplace houses were defined as polyphenolic flavonoids, steroid saponins, polysaccharides specifically galactomannans and 4-hydroxyisoleucine [[Satheeshkumar N,2010].]. Thus, the intention of this examine is to assay, through a biochemical and histological analysis, the healing impact of fenugreek (Trigonella

foenum-graecum) seeds supplementation on AlCl3- injured kidney and the resultant consequences at the mind and bone in rats.

Thus, fenugreek seeds may be used as a normal nutrient to relieve the aspect consequences of Al ingestion, now no longer handiest withinside the mind and bone, however additionally withinside the kidneys, in particular for continual renal failure sufferers who're greater prone to growing aluminum toxicity.

2. Anti-Hyperlipidemic activity

The gift examine confirmed that the *Trigonella foenum-graecum* seed powder answer taken with the aid of using newly identified kind II diabetic sufferers produced a considerable discount in TC, TG, and LDL-C ranges and growth in HDL-C degree. This research well-knownshows that *Trigonella foenum-graecum* seed powder answer is a strong herbal meals supply that has a ability to manipulate dyslipidemia. And additionally, it wishes in addition complete paintings to evaluate at a bigger scale and lengthy-time period results of *Trigonella foenum-graecum* seed powder answer.

3. Anticancer Effect of Fenugreek

The anticancer sports of fenugreek seed extract, on MCF-7 breast most cancers cells, liver most cancers HCAM cells and the non-cancerous Vero mobileular lines, had been investigated the use of colorimetric MTT assay. A developing frame of proof supported with the aid of using several research on tumorigenesis confirms that it's far feasible to goal numerous hallmarks of most cancers. Recent researches have proven that plant-derived molecules can be utilized in focused on distinct signaling pathways for most cancers drug discovery. The gift paper offers an perception into the anticancer capacity of fenugreek and lists the present research which have been performed to illustrate the benefits of using fenugreek in most cancers remedy and prevention. It additionally ambitions at commencing up new views withinside the improvement of latest tablets of herbal origins withinside the destiny medical trials. This evaluate article will discuss; (Acharya SN,2008) the chemical ingredients and bioactive compounds of fenugreek; (Aggarwal BB,2008) results on oxidative strain and inflammation; (Aggarwal BB,2006) results on proliferation, apoptosis, and invasion; (Ahmad N,,2001) toxicity of fenugreek; and Al-Daghri NM, 2012) destiny instructions in most cancers drug improvement. All of the experimental research mentioned on this paper advise that a couple of signaling pathways (hallmarks) are concerned withinside the anticancer sports of fenugreek, however their efficacy continues to be unclear, which calls for in addition investigation.

4. Hepatoprotective action

Carbon tetrachloride (CCl four) is a notably poisonous chemical agent, the maximum well-known drug used to result in liver harm experimentally. The CCl four accelerated serum enzyme sports of liver and a few biochemical parameters in rats (Althnaian et al., 2013). Histological sectioning of liver tissues indicated that CCl four prompted fibrosis, cirrhosis and hepatocarcinom (Junnila et al., 2000). It prompted infiltration of notable quantity of mononuclear cells, necrotic cells and few fibroblasts in liver of CCl four dealt with rats (Althnaian et al., 2013). The poisonous impact of CCl four is attributed to trichloromethyl radical produced throughout oxidative strain (Stoyanovsky and Cederbaum, 1999). Once

the liver have become injured, its green remedy with well-known chemical tablets is limited (Lee et al., 2007). Therefore, hobby involved using opportunity drug treatments for the remedy of hepatic disorder has been arisen. Natural merchandise obtained notable interest as doubtlessly antitoxic and antioxidants agents (Lee et al., 2007). Fenugreek (Trigonella foenum-graecum) is one of the oldest medicinal plant life, relationship lower back to Hippocrates and historic Egyptian times (Jensen, 1992). The leaves and seeds are used to put together extracts or powder for medicinal makes use of (Muralidhara et al., 1999).

5. antihyperlipidemic activity

The antihyperlipidemic residences of oral fenugreek seed powder has been counseled in rats (Shrivastava et al., 2009; Elmahdi et al., 2014), in rabbits (Al-Habori et al., 1998) and human (Awal et al., 1999). The mechanism of movement of hypocholesterolemic impact of Fenugreek has been established with the aid of using Sharma (1984, 1986). Authors defined that, fenugreek management expanded excretion of bile acids and impartial sterols in feces, for that reason depleting the LDL cholesterol shops withinside the frame of experimental rats. the antioxidant hobby of fenugreek aqueous extract has been permitted withinside the modern look at as pondered on widespread discount of lipid peroxidation biomarker (TBARS) and widespread elevation of antioxidant enzymes sports (CAT and GPX) in liver of CCl four intoxicated rats. As withinside the modern experiment, preceding experimental research have proven that CC1 four expanded extensively serum ALP tiers (Khan and Al-Zohairy, 2011; Althnaian et al., 2013; Table 1) and reduced general protein)Fahim et al., 1999; Khan and Al-Zohairy, 2011; Althnaian et al., 2013) and albumin (Fahim et al., 1999; Khan and Al-Zohairy, 2011; Althnaian et al., 2013) 6. **Polycystic Ovary Syndrome (PCOS)**

Polycystic ovary syndrome (PCOS) is one of the maximum general hormonal issues amongst ladies of reproductive age inflicting abnormal menstrual cycles, immoderate frame or facial hair, miscarriage and infertility. Polycystic ovary syndrome (PCOS) is a prime hyper-androgenic sickness wherein a woman's hormones are out of balance (Eisenberg E.,2 Palomba S,2015). The sickness is related to immoderate frame and facial hair, male-sample baldness, acne, weight gain, excessive tiers of androgens, pelvic pain, abnormal or absence of periods, capacity to have children, miscarriage and infertility, excessive tension tiers, depression, in addition to bad standard bodily appearances (Rocca ML,2015). Marshall et al.2011, Marshall JC,2012) talked about that PCOS may also have a important hyperlink with insulin resistance; and, therefore, the PCOS sufferers have to be dealt with for insulin resistance (Marshall K.2001, Marshall JC,2012). In every other look at, De Leo et al. (De Leo V,2013).confirmed that estradiol and non-androgenic progesterone might be endorsed as an oral contraceptives in ladies with PCOS who're insulin resistant and/or overweight (De Leo V,2013). These findings sincerely exhibit the complex affiliation of insulin resistance and PCOS.

7.Antimicrobial activity

(Trigonella foenum-graecum) is a usually used herbaceous plant withinside the legume own circle of relatives. It is a multipurpose herb. People in Western Asia and the Mediterranean have used it for heaps of years to prepare dinner dinner meals, enhance health, and soothe pores and skin diseases. The oil may be extracted from fenugreek seeds, and it incorporates antioxidants, and lots of different components, which include unsaturated fatty acids, consisting of linoleic

acid, linolenic acid, and oleic acid. The oil incorporates many vitamins which might be useful to health, which include magnesium, iron, manganese, fiber, and different vitamins. The oil has a great antimicrobial impact in opposition to a few micro organism and fungi species. Fenugreek is a promising defensive medicinal herb in most cancers sufferers below chemotherapeutic intervention due to the fact fenugreek extract suggests a defensive impact with the aid of using enhancing the cyclophosphamide prompted apoptosis and unfastened radical mediated lipid peroxidation withinside the urinary bladder of mice [Bhatia K,2006]. Diosgenin (C27 H42 O43) is a crystalline steroid saponins observed in fenugreek and used as a sarting cloth for the synthesis of steroid hormones which include cartison and progesterone, it's been observed to be doubtlessly in remedy of most cancers [Aggrawal BB,2006]. Herbs and spices been substantially used as meals components for herbal antioxidants. Trigonella feonum-graecum L. usually referred to as Fenugreek, belongs to the own circle of relatives of Fabaceae. It is the maximum promising medicinal herb regarded from historic time. Traditional makes use of of plant life have caused investigating their bioactive compounds which had resulted withinside the detection of a widespread wide variety of therapeutics residences. Trigonella foenum-graecum L. is thought to be local to the Mediterranean vicinity or Asia; it's far one of the maximum historic medicinal herbs. Fenugreek incorporates distinct alkaloids, flavonoids and saponins. In gift research the antimicrobial hobby of Fenugreek leaves, seeds and stem extract (Methanol, Acetone and aqueous extract) in opposition to E. coli and Staphylococcus had been decided with the aid of using the nicely diffusion method. The most region of inhibition become given with the aid of using methanol i.e. 20 mm and 19 mm in opposition to E. coli and Staphylococcus respectively, accompanied with the aid of using Acetone extract which offer the identical region of inhibition for each organism i.e. sixteen mm whilst the aqueous extract suggests nill region of inhibition. Thus from bacteriological factor of view Fenugreek leaves and stem seems to play a notable function in medical in addition to antibacterial agents.

Antidiabetic Effect of Fenugreek

Many pills are commercially to be had to be used withinside the control of diabetes. However, their aspect consequences and excessive fees underscore the want for natural opportunity pills. *Trigonella foenum-graecum* is one of the medicinal flora which might be critical withinside the control of diabetes mellitus. This examine investigated the impact of *Trigonella foenum-graecum* seed powder answer at the lipid profile of newly identified kind II diabetic sufferers. *Trigonella foenum-graecum* (fenugreek) seeds have formerly been proven to have hypoglycemic and hypocholesterolemic consequences on kind 1 and kind 2 diabetes mellitus sufferers and experimental diabetic animals. The *Trigonella foenum-graecum* extract has now been investigated for its consequences on trendy houses, blood glucose and blood lipid, and hemorheological parameters in experimental diabetic rats. Type II diabetes is a sickness characterised with the aid of using continual hyperglycaemia and oxidative stress. Among the herbal products, *Trigonella foenum-graecum* (Fenugreek) is located to have many lively bio molecules. It is used historically in Indian peoples remedy to deal with diabetes. *Trigonella foenum-graecum*, aside from controlling the blood glucose ranges, additionally has antioxidant capacity to guard the organs consisting of liver and pancreas in opposition to the oxidative

harm caused with the aid of using diabetes. Fenugreek seeds can be beneficial for humans with diabetes. The seeds incorporate fiber and different chemical substances which could sluggish digestion and the frame's absorption of carbohydrates and sugar. The seeds can also assist enhance how the frame makes use of sugar and will increase the quantity of insulin released. Many pills are commercially to be had to be used within side the control of diabetes. However, their aspect consequences and excessive fees underscore the want for natural opportunity pills. *Trigonella foenum-graecum* is one of the medicinal flora which might be critical within side the control of diabetes mellitus. This examine investigated the impact of *Trigonella foenum-graecum* seed powder answer at the lipid profile of newly identified kind II diabetic sufferers. Diabetes mellitus (DM) is a metabolic sickness characterized with the aid of using continual hyperglycemia both due to the fact the pancreas does now no longer produce sufficient insulin or the peripheral goal tissues are not able to reply to the everyday awareness of insulin [E. Yibru,2015; Tadesse, 2008]. It is a main motive of morbidity and mortality with an growing incidence and the quickest developing sickness worldwide [F. Assefa, 2013]. The WHO estimates a incidence of 347 million humans with diabetes and an predicted 4.6 million deaths every year [WHO, 2013]. The incidence is predicted to double in 2030, and the extra percentage of this growth might be withinside the low- to middle-profits nations of Asia, Africa, and South America [K. Kumar,]. Trigonella foenum-graecum is a beneficial medicinal plant belonging to own circle of relatives Fabaceae (G. Birhane,2013]. It is a yearly grown herb that is cultivated at some point of the arena inclusive of Ethiopia. Trigonella foenum-graecum is appropriate for regions with mild or low rainfall. It is an erect plant with a top of 30–60 cm, with compound pinnate trifoliate leaves, auxiliary white to yellowish flowers, and 3–15 cm lengthy skinny pointed beaked pods, which incorporate 10–20 rectangular greenish-brown seeds [M. Prasanna,2000; M. Meghwal,2012]. The seeds are used as spices worldwide, while the leaves are used as inexperienced leafy veggies in a food plan. *Trigonella foenum-graecum* seeds are sour to flavor and are acknowledged for a long term for his or her medicinal qualities [J. I. Campbell-Tofte,2002; M. Prasanna, 2000; G. Birhane,2012].

SUMMARY AND CONCLUSION

Fenugreek has been determined to have critical bioactive compounds. From this overview it became located that fenugreek has been used as meals stabilizer, meals adhesive, meals emulsifier and gum. Fenugreek has been used to supply diverse sorts of bakery merchandise and extruded product. Based on those numerous fitness usefulness as mentioned in overview, primarily based totally on diverse beyond stated clinical findings, fenugreek may be encouraged and need to be taken as part of our every day food plan as its liberal use is secure and diverse fitness advantages may be drawn from this herbal herb. The above-noted research on fenugreek advise that the functional, dietary and healing traits of fenugreek may be exploited in addition within side the improvement of healthful merchandise. Fenugreek having antioxidant, anti-diabetic, PCOS prevention action, anticancer, antimicrobial and hypocholesterolemic effects has been mentioned on this overview.

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