

Medicinal value of Phytoestrogens in *Trigonella foenum-graecum* L (Fenugreek) - Review

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Trigonella foenum-graecum known as fenugreek, is a widely used spice and an abundant source of phytoestrogens. Fenugreek has a wide range of pharmacological effects, such as hypoglycemic, hypolipidemic, obesity, antioxidant activity, osteoporosis, anti-inflammatory, and antirheumatic effects. Phytoestrogens are one of the constituents of fenugreek. These are nonsteroidal compounds that resemble the structure of 17 β -estradiol and can bind to the ER α and ER β estrogen receptors. It acts as an estrogen receptor modulator, producing antiestrogenic and/or estrogenic effects. The protective effect was also apparent in the cellular architecture of the kidney, liver, and common carotid artery. Several beneficial effects are ascribed to the phytoestrogens present in fenugreek. In the present review, we focused on the medicinal values of phytoestrogens in fenugreek.

Keywords: Bone health; Menopausal symptoms; Phytoestrogens; *Trigonella foenum-graecum*; Tumor cells.

The fenugreek (*Trigonella foenum-graecum* L.) belongs to the family *Fabaceae*. It is one of the most significant commercial spice crops. Its fresh leaves, shoots (tender), and seeds are widely used in food, medicine, and cosmetics¹. Fenugreek showed many pharmacological effects, such as hypoglycemic effect², hypocholesterolemic effect³, antioxidant action⁴, gastroprotective activity⁵, stimulator of appetite⁶, antirheumatic effect⁷, for reducing the adipose tissue weight in the body⁸. It has also been shown that flavonoids in fenugreek act as an estrogen-mimicking agent.

Phytochemical analysis shows that the fenugreek seed contains carbohydrates (45-60%), including mucilaginous fiber; proteins (20-30%),

mostly tryptophan and lysine; lipids (5-10%); and pyridine-type alkaloids, mostly choline, trigonelline (0.5%), carpaine and gentianine. The flavonoids such as orientin, apigenin, vitexin, and quercetin are also found in them. Amino acids (4-hydroxy isoleucine (0.09%); arginine (Arg), histidine (His), and lysine (Lys)) are also detected in seeds. Saponins (0.6-1.7%); glycosides generating sapogenins on hydrolysis (cholesterol and vitamins A, B₁, C), and 0.015% volatile oils (sesquiterpenes) similarly identified in fenugreek seeds⁹. Fenugreek is also found to contain yamogenin, gitogenin, tigogenin, and trigoneoside, choline, saponin, and nicotinamide¹⁰. It has been found that unhydrolyzed fenugreek seeds contain

phytoestrogens such as isoflavones (daidzein, genistein), lignans (secoisolaricresinol), and coumestrol in hydrolyzed fenugreek seeds¹¹.

Fenugreek seeds contain diosgenin¹², which is recognized to be a significant precursor for the production of testosterone and estrogens¹³. Even the highest dose of 1000 mg/kg body weight, fenugreek seeds (FenuSMART®; FHE) administered to animals in a toxicological evaluation did not cause appreciable toxicological changes in feed consumption, body weight, biochemical parameters, behavioral observations, ophthalmic examinations, and urinalysis compared to normal animals.

MATERIALS AND METHODS

The literature search was conducted in Scopus, PubMed, ScienceDirect, and Google Scholar to identify all published articles on *Trigonella foenum-graceum* (Fenugreek) between June 2021 and September 2022. The search criteria was based on the phytoestrogen role of fenugreek in postmenopause, pregnancy, offspring, sexual functions, bone and skin health, milk production, ovary, vagina, cardiovascular system, eye, tumor cells, pancreas, and kidney. Studies with full text in the English language were included in this review. Non-English studies were excluded from the search. In each manuscript, the search outcomes were reviewed by all the authors.

Phytoestrogen

Phytoestrogens are one of the constituents of fenugreek, and these are nonsteroidal compounds that resemble the structure of 17 β -estradiol and can bind to the ER α and ER β estrogen receptors. It acts as an estrogen receptor modulator and produces antiestrogenic and/or estrogenic effects depending on the blood estrogen levels¹⁴. Several health benefits are due to phytoestrogens, such as lowering the hot flashes and risk of cardiovascular disease (CVD), metabolic syndrome, brain function disorders, osteoporosis, and other malignancies (breast, prostate, and bowel). On the contrary, it has also been shown that phytoestrogens may act as anti-estrogenic agents and adversely disrupt endocrine functions¹⁵. The main functions of phytoestrogens are depicted in Figure 1

In addition to phytoestrogen activity via estrogen receptors and their downstream

gene activity, they also can act by altering the specific gene epigenetics, by the initiation of AMP-activated protein kinase pathway, by kinase inhibition activity, by activating the PPAR (NRC1C) family, or by the initiation of antioxidant or electrophile response element (EpRE)-mediated gene expression by stimulation of nuclear factor erythroid 2-related factor 2-Keap1 signaling¹⁶. Furthermore, Sirotkin and Abdel have extensively explored the potential issues with understanding and using phytoestrogens since they have many targets and various estrogen receptor-dependent and -independent modes of action¹⁷. Because pS2 gene expression is used to test the estrogenicity of multiple drugs, fenugreek seeds were shown to promote pS2 transcription, which might impact the transcription of estrogen-sensitive genes, resulting in estrogenic effects¹⁸.

Use of Phytoestrogens of Fenugreek in Typical Menopausal Symptoms

Menopausal changes are known to be initiated by the decrease in estrogen level, which induces signs like osteoporosis, depression, hot flashes, anxiety, and dementia. As life expectancy increases with advances in medical sciences, women live 1/3 of their lives with disorders related to menopause. The current treatment for these complications is estrogen replacement therapy (ERT). However, prolonged ERT increases the frequency of uterine, ovarian, and breast cancer, limiting ERT in clinical use. Instead, phytoestrogen-rich plant products such as fenugreek are considered the alternative strategy to treat menopause-related ailments without many adverse side effects.

At a dosage of 1000 mg per day, fenugreek (*Trigonella foenum-graecum*) standardized extract (FenuSMARTTM) has been demonstrated to enhance plasma estradiol, decrease the frequency of hot flashes, and play a significant role in managing the lipid profile in menopausal women¹⁹. When treated with fenugreek seed extract, postmenopausal women were reported to show improvements in somatic, psychological, and urogenital issues (reduction in hot flashes, pain in leg muscles and joints, night sweats, less irritability, and vaginal dryness). In these women, a significant rise in estradiol and progesterone and a decline in follicular stimulating and luteinizing hormone levels were observed, indicating the achievement of hormonal balance²⁰. Phytoestrogen-rich food such

as fenugreek has effectively reduced the severity of premenopausal/menopausal symptoms such as forgetfulness, swelling, and weight fluctuation²¹.

Menopause and the associated loss of estrogen-related hormones cause inflammation, which results in the expression of circulating cytokines and other inflammatory responses. Menopause is associated with an increase in triglycerides (TG), low-density lipoproteins (LDL), increased tunica intima and media thickness, and an increased risk of cardiovascular diseases (CVD). Inflammation in menopause with dyslipidaemia is a source of TNF- α (increases the expression of leptin and metabolic syndrome), a contributing factor in the etiopathogenesis of atherosclerosis²².

Menopausal obesity is associated with decreased PPAR- γ and adiponectin expression. Few studies support fenugreek's phytoestrogen action in postmenopausal women^{23,24}. According to a meta-analysis, the cardiometabolic risk is decreased by fenugreek in humans²⁵. The advantages of fenugreek in reducing cholesterol and metabolic disorders are discussed in another systematic review. This effect may be due to the existence of phytoestrogens²⁶. Fenugreek therapy for 12 weeks lowered total cholesterol (TC), TG, AST, and ALT while increasing mRNA expression of PPAR and adiponectin. TNF- α and leptin levels returned to normal following supplementation with fenugreek seed extract. Furthermore, fenugreek seed extracts reduced renal glomerular hypertrophy, microsteatosis in the liver, and thickness of tunica intima (TI) and media (TM) of the common carotid artery (CCA). The phytoestrogen components of fenugreek are responsible for the protective effect^{24,27}.

Menopausal cognitive impairment with estrogen insufficiency results in lower levels of brain-derived neurotrophic factor (BDNF). Declined BDNF levels influence the growth of neurons, dendritic spine density, and arborization in postmenopause. Ovariectomized rat menopausal model supplemented with fenugreek seed extract and choline-DHA suggestively elevated BDNF, dendritic branching points, and intersections, thus modulating the learning and memory problems caused by menopause through phytoestrogen properties²⁸. Similarly, it was shown that ovariectomized rats displayed poor memory and learning abilities and neuronal

atrophy and death in the hippocampal CA1 and CA3 regions. Fenugreek seed extract dramatically improved memory and learning while protecting hippocampus neuronal architecture and survival in these ovariectomized rats. These changes could be due to the phytoestrogen components in fenugreek, and they may be useful in addressing menopausal-induced cognition deficits²⁹.

Use of Phytoestrogen in Fenugreek in Sexual Functions

Phytoestrogens present in the fenugreek are shown to have several effects on sexual function. Significant improvement in sexual interest was observed after supplementation with the fenugreek husk¹⁹. Crude fenugreek seed oil significantly affected spermatogenesis in young male patients with complaints of infertility due to natural oligospermia^{30,31}. An increase in sexual function, fertility, free testosterone levels, and sperm profile has been recorded in male individuals treated with the fenugreek extract^{32,33}. Kassem *et al.* stated that *Trigonella foenum-graecum* (TFG) administration has reduced plasma androgen levels and significantly decreased sperm count³¹. This effect could be due to saponins in fenugreek seeds, which can act like estrogen. The reduction in sperm count and plasma testosterone level may also be attributed to the fact that TFG can increase prolactin, and its high levels are known to obstruct the production of gonadotropin-releasing hormone (GnRH). This in turn leads to a decline in FSH and LH and thus decreases spermatogenesis³⁴. It has been shown that phytoestrogens on long-term exposure (or high-dose exposure) severely affect sperm count by reducing male reproductive function³⁵ and increasing apoptosis of developing germ cells³⁶.

Similarly, Sreeja and Anuj found that when fenugreek seeds are included in the diet of rabbits, the testis weight is reduced, seminiferous tubules and interstitial testis tissue sections are damaged, which is followed by a drop in androgen hormone and sperm concentrations¹⁸. Several studies show that fenugreek induces a significant decrease in sperm motility and count, a rise in spermatozoa morphology and chromosomal abnormalities³⁵, and a decreased concentration of testosterone and sperm mass and motility³⁶. Male infertility and antiandrogenic activities of fenugreek are attributed to a decrease in cholesterol

level, which is the primary precursor of the sex hormone².

Effect on Pregnancy and Offspring

In a study of prenatal exposure to fenugreek seeds (aqueous extract), the progeny of exposed mice in the post-weaning period showed growth retardation, such as reduced body weight and reduced brain weight at birth. These pups (both male and female) also showed a significant decrease in neurobehavioral performances, such as locomotor activity, motor coordination, and a substantial decrease in successful impulsive alternations in the T-maze test. These changes

may be attributed to phytoestrogens such as form ononetin in fenugreek³⁷. Contrary to that, if consumed in moderation, fenugreek is only safe for pregnant women. Excessive intake may result in premature uterine contractions³⁸. Consuming an excess of fenugreek in late pregnancy causes miscarriage and premature labor³⁹.

Phytoestrogens in Fenugreek on Bone Health

A study showed that estrogen deficiency worsens the increases in bone turnover indicators, bone mineralization and mechanical properties of tibial metaphysis. Trigonelline (alkaloid), found in TFG seeds and coffee, has demonstrated



Fig. 1. Effect of Phytoestrogen components present in fenugreek

Table 1. Beneficial effects of *Trigonella foenum-graecum*

No	Different organs	Beneficial effect
1.	Bone	Lowers the mineralization and mechanical characteristics of cancellous bone ⁴ and also increases the maximum flexor load, dry weight, preserves the trabecular and cortical bone thickness. ⁴¹
2	Skin	Improves the secretion of COL1A1 and COL3A1 through ER α , and ER β . ⁴⁷
3	Ovary	Affects ovarian growth factors or decreases the pituitary gonadotropin hormones. ⁶⁴
4	Uterus and vagina	Increases uterine weight and proliferation of epithelial cells ⁶⁶ , effectively reduces postmenopausal vaginal atrophy. ⁶⁷
5	Cardiovascular system	The hypocholesterolemic role is shown by increased faecal excretion of bile acids, sterols and reduced cholesterol. ⁷³
6	Eye	Improves signs and symptoms of postmenopausal women with severe evaporative dysfunctional tear syndrome. ⁸⁰
7	Tumor cells	In MCF-7 breast cancer cell lines- lowered cell feasibility and triggered early apoptotic alterations such as reversing phosphatidylserine activity and lowering the potential of mitochondrial membrane. ⁸²
8	Pancreas	Increasing the insulin level in hyperglycemic rats and humans and showing antidiabetic effects. ⁸⁷
9	Kidney	Preserved architecture, normal glomeruli, and tubules with normal cortical blood vessels. ⁹¹

phytoestrogen action and did not affect the bones of non-ovariectomized (with an average level of estrogen) rats, while in ovariectomized (with low estrogen level) rats phytoestrogens significantly lower the mineralization and mechanical characteristics of cancellous bone. Trigonelline's detrimental effects on the skeletal system depend on estrogen, and it only affects cancellous bone in ovariectomized rats⁴. However, supplementation of TFG seed extract significantly increased the maximum flexor load, tibia dry weight, and preserved the trabecular and cortical bone thickness suggestively compared to ovariectomized rats⁴¹. The protective action of fenugreek on osteoporosis by enhancing bone mineral density and restoring bone physiology is via the estrogenic activity of trigonelline in them⁴². Fenugreek mucilage in arthritic rats significantly decreased the activity of inflammatory enzymes myeloperoxidase and lipoxygenase⁴³. Diosgenin, another constituent in fenugreek seed, is also shown to increase the protein synthesis of bone matrix and Runx2 transcription in an osteoblastic cell line MC3T3-E1⁴⁴. Diosgenin is also known to inhibit osteoclastogenesis, invasion, and proliferation of osteoclast cells by downregulating the Akt, I κ B kinase activator, and NF κ B-regulated gene expressions⁴⁵.

Skin Health

Oral or topical estradiol treatment in postmenopausal women is known to enhance skin thickness and collagen synthesis, and inhibition of the ER α and ER β (estrogen receptors) by the antagonist decreases the secretion of these proteins. Because of the risks of breast and endometrial cancer associated with estradiol, topical use of phytoestrogens is an alternate therapy for age-related skin alterations in postmenopausal women. Research has been conducted to demonstrate the advantages of phytoestrogens as a substitute for HRT to improve or decrease the detrimental influence of menopause-induced aging of the skin⁴⁶. Fenugreek supplementation enhances the secretion of COL1A1 (collagen type 1 alpha 1) and COL3A1 (and type 3 alpha 1) through estrogen receptor α , and estrogen receptor β , and is primarily arbitrated by ER β in fibroblasts of menopausal women. Thus, the phytoestrogen constituent of the fenugreek may act as a ligand to ER α and ER β ⁴⁷.

Breast Size and Milk Production

Nursing women also use dietary supplementation of fenugreek as a galactagogue to enhance insufficient breast milk production and improve the indications of breast milk sufficiency in newborns⁴⁸⁻⁵⁴. Similarly, breastfeeding women fed with fenugreek tea three times a day showed increased breast milk volume and an increase in prolactin levels in the early days of breastfeeding. However, such influence of fenugreek was found in the latter days of breastfeeding⁵⁵. Further, it has also been shown that the consumption of fenugreek increases breast size in women⁵⁶.

Earlier studies explain the possible mechanisms by which the phytoestrogens act as galactagogues agents. They may act via binding to receptors in the mammary gland and induce the proliferation of alveolar cells. They may also bind to the ER β through the pituitary membrane isoform (associated estrogen) and promote the expression of prolactin. These phytoestrogens act as agonists to dopamine receptor-activated pathways and increase prolactin secretion⁵⁷.

Egg Production

Dietary supplementation of phytoestrogen plant products such as fenugreek seeds improved the egg mass and production, egg weight, albumen, and yolk content in aged laying hens. An increase in the crude fat and calcium in the yolk and a decrease in cholesterol in the egg yolk were observed in these hens. The supplementation of fenugreek seeds with flax seeds also positively affected plasma hormones (LH & FSH)⁵⁸. Adding turmeric and fenugreek in the hen's diet increases production, quality of eggs and improves the financial efficiency of hen foods (Sinai local) at the late phase of productive age (59 – 74 weeks)⁵⁹. Another study showed that supplementing the mandarah hen diets with fenugreek delayed sexual maturity but increased ovarian weight, egg mass with increased egg yolk albumin, and reduced cholesterol level⁶⁰.

Effect on Ovary

Fenugreek also influences the structure and functions of the ovary. Treating the mice with fenugreek seed extract significantly decreases the number of primaries, secondary, and griffin follicles⁶¹. It was also found that fenugreek directly affects ovarian growth factors or decreases the pituitary gonadotropin hormones (FSH and LH)⁶².

Swaroop *et al.* investigated the effectiveness of TFG seed extract on PCOS in women aged 18 to 45 years. Reduced levels of LH were observed after the first month of administration and reverted to baseline after two months in the individuals who received fenugreek seed extract. After three months of treatment, the LH levels have significantly increased. Similarly, FSH levels gradually increased. Further, the irregular cycle rate remained unaffected in women after one month. At two months, 33.33% of patients stated a regular cycle, but at three months (the conclusion of the trial period), 71.43% of patients reported a normal cycle⁶³.

Estradiol 2 has a significant role in the pathophysiology of ovarian hyper-stimulation syndrome (OHSS) through VEGF. Prevention of OHSS requires a reduction in E2 levels. A recent study found that fenugreek extract effectively reduces blood Estradiol 2 (E2) levels in ovarian hypersensitivity syndrome animal models⁶⁴. Fenugreek extract may also act through inhibition of aromatase, leading to reduced testosterone breakdown to estrogen⁶⁵, which may be the reason for the reduction in serum E2 levels in these animals.

On the Uterus and Vagina

Research by Hilles *et al.* stated that fenugreek seeds, which contain phytoestrogens with estrogenic activity, increased uterine weight and proliferation of epithelial cells, which increased the uterine layers. The use of fenugreek seeds is also considered a safe contraceptive method⁶⁶. Vaginal atrophy is one of the most prevalent postmenopausal complications. Consuming estrogen hormone to progress these symptoms is inevitable. Alternatively, Fenugreek vaginal cream, containing phytoestrogens, effectively reduced postmenopausal vaginal atrophy and endorsed using this cream instead of estrogen (synthetic) to decrease the complications⁶⁷. However, it was also found that symptoms of atrophic vaginitis are diminished with fenugreek vaginal cream, although it is not as efficient as ultra-low-dose estrogen⁶⁸.

Cardiovascular System

In various animal and clinical studies, fenugreek is claimed to be hypocholesterolemic⁶⁹ owing to the presence of saponin (diosgenin) and other saponin⁷⁰. In the digestive tract, the saponins are hydrolyzed partly into saponin⁷⁰. Numerous

studies described the hypocholesterolemic effect of saponins and diosgenin^{71,72} in fenugreek.

The hypocholesterolemic role of fenugreek was shown by increased fecal excretion of bile acids, sterols and reduced cholesterol in the liver⁷³. Dietary fiber (galactomannans or beta-glucans) helps in the management of hypercholesterolemia. Fenugreek-derived galactomannans have abundant efficacy in decreasing plasma cholesterol. Additionally, soluble fiber elements lower LDL and increase HDL⁷⁴. These beneficial changes in the lipid profile by dietary fenugreek protect against coronary heart disease and atherosclerosis. In a study of rats supplemented with 400 mg/kg/day of the fenugreek seed extract, HDL levels improved significantly, and total cholesterol, TG, and LDL decreased significantly. This effect might be attributed to the saponins found in fenugreek extract, which slow down cholesterol absorption and hepatic cholesterol formation by lowering the activity of the regulatory enzyme of cholesterol synthesis^{24,27}.

Diosgenin-derived phytoestrogen from fenugreek has been shown to decline plasma and hepatic TG levels⁷⁵. Experimental studies have established the lipid-lowering potential of diosgenin. Diosgenin reduced the elevated cholesterol and increased HDL fractions in rats fed with cholesterol. Besides, diosgenin prevented cholesterol absorption and inhibited its uptake and accumulation in the liver⁷⁶. Diosgenin-mediated modulation of cholesterol-metabolizing enzymes reduced hepatosteatosis and hypercholesterolemia⁷⁷. Diosgenin also prevented angiotensin II-induced remodeling of cardiac fibroblasts in rats by suppressing the signaling growth factor $\beta 1$ / Smad3 pathway. Subsequently, diosgenin could have therapeutic potential to treat cardiac fibrosis⁷⁸.

Eye

A study confirmed that steroid hormones significantly influence ocular surface equilibrium and functions, and a reduction in these steroid hormones in conditions such as menopause can affect the eye's surface. However, in postmenopausal women, phytoestrogen treatment significantly alleviated the signs and symptoms of dry eye syndrome⁷⁹.

It has been reported that tear osmolality and levels of sex hormones are negatively

correlated, and these sex hormones have a role in the pathogenesis of postmenopausal dysfunctional tear syndrome. Daily consumption of 200 mg of fenugreek seeds significantly improved signs and symptoms of postmenopausal women with severe evaporative dysfunctional tear syndrome without any significant side effects attributed to the phytoestrogens in fenugreek⁸⁰.

Tumor Cells

Phytoestrogens from different sources are known to act by various mechanisms, providing several health benefits and protect/treat different cancers (oral, breast, colon, liver, lung, prostate) and many other carcinomas⁸¹. In MCF-7 breast cancer cell lines, fenugreek seeds (ethanol extract) lowered cell feasibility and triggered (early) apoptotic alterations, such as reversing phosphatidylserine activity and reducing the potential of the mitochondrial membrane. Furthermore, DNA fragmentation and cell cycle arrest during the G2/M phase have been described⁸². In vitro, experiments have shown that the fenugreek constituent diosgenin, steroidal saponins which can act as phytoestrogen by preventing bcl-2 and increasing the expression of caspase-3 protein, promotes apoptosis and decreasing cell proliferation in the cell line of HT-29 human colon cancer. Diosgenin, in the fenugreek, is shown to have antitumor activity in azoxymethane-induced colon cancer model of rats and cell lines of HT-29 human colon cancer by inhibiting the aberrant crypt foci formation and inhibition of proliferation of cancer cell line along with apoptosis induction⁸³.

The diet containing fenugreek seeds inhibited colon cancer by significantly decreasing β -glucuronidase activity, thus preventing the hydrolysis of the carcinogen-glucuronide conjugate, which may release a carcinogenic substance that affects the colonocytes. It also declined the action of mucinase, thus reducing the hydrolysis of protective mucin in the colon and protecting the colonial lumen. These alterations are due to phytoestrogen saponins and other constituents of the fenugreek seeds⁸⁴.

Pancreas

Fenugreek controls blood sugar levels mainly by the presence of saponins (phytoestrogen components) inhibiting digestion and absorption of carbohydrates and enhancing the insulin peripheral

activity⁸⁵. In a trial with streptozotocin-induced diabetic rats, 45 days of oral diosgenin (15, 30, and 60 mg/kg) administration at elevated doses have resulted in the restoration of blood glucose and enzymes involved in the carbohydrate metabolism, indicating the antidiabetic potential⁸⁶. Saponin and an amino acid called 4-hydroxyisoleucine in fenugreek were attributed to increasing the insulin level in hyperglycemic rats and humans and showing antidiabetic effects⁸⁷.

Kidney

TFG seed extract restored kidney function in diabetic rats by ameliorating ultra-morphologic abnormalities, such as irregular thickening of the base membrane of the glomerulus. These results indicate that TFG extract offered a defense against functional and morphological kidney injury⁸⁸. Sayed *et al.* stated that renal histology of diabetic rats showed a mild diffuse mesangial expansion compared with normal glomeruli. In contrast, rats supplemented with 5% fenugreek seed powder mixed with a rat pellet diet showed a reduced score of mesangial development⁸⁹. The renal damage caused by $AlCl_3$ was confirmed by elevated plasma nephrotoxicity markers and altered histological features of the renal tissue. Aqueous fenugreek seed extract restored the function of diabetic rat kidneys through its phytoestrogenic antioxidant activity. On the other hand, flavonoids in the TFG seed powder have a beneficial effect on collagenous structure (filtration membrane and basement membrane)⁹⁰. The male albino rats treated with 2.5% TFG showed preserved architecture, normal glomeruli, and tubules with normal cortical blood vessels. The medulla showed normal tubules and blood vessels of interstitial tissue⁹¹. The beneficial effects of *Trigonella foenum-graecum* on different organs were presented in Table 1

CONCLUSION

Several components present in the fenugreek act like estrogen-mimicking agents. Several health benefits are attributed to phytoestrogens, such as lowering the menopausal adverse symptoms like hot flashes, inflammation, menopausal obesity, lowering the risks of CVD, type 2 diabetes, menopausal cognitive impairment, sexual functions, osteoporosis, breast cancer, and prostate cancer. Other purposes include

maintaining skin health, enhancing breast milk and egg production, increasing uterine weight, and maintaining ocular surface equilibrium. Based on the numerous health benefits highlighted in this study and several previously reported scientific findings, fenugreek may be advised and used as part of our regular diet. This natural herb is safe to consume in limited amounts and can provide a variety of health advantages.

Conflict of Interest

The authors declare no conflict of interest.

Founding Source

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