



IN-VITRO EVALUATION OF ANTI-ULCER ACTIVITY OF TRIGONELLA FOENUM-GRAECUM: A REVIEW

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ABSTRACT

There are several factors that may induce ulcers in human beings such as stress, chronic use of anti-inflammatory drugs, etc. Though in most cases, the etiology of ulcer is unknown, it has generally accepted that it is the result of an imbalance between aggressive factors and maintenance of the mucosal integrity through the endogenous defense mechanism. For centuries, many kinds of native plants and their products have been used for the treatment of peptic ulcers by traditional healers in Phayaoprovince. The current study aimed to investigate the polyphenol content in some of these medicinal plants and to point out the antiulcer activity. In this study, we assessed for anti-ulcer activities with aqueous extract and in-vitro method as the acid neutralizing capacity and H⁺/K⁺ - ATPase inhibition activity method and in acid-neutralizing capacity (ANC), the extract significantly reduced ANC to 9.33 at a concentration of 1500 mg as compared to 15.7 with standard Aluminium hydroxide + Magnesium hydroxide (500mg). While in H⁺ /K⁺ - ATPase inhibition activity, the extract showed maximum percentage inhibition of 62.18% at the concentration 100µg as compared to 69.56% with standard Omeprazole. Numerous natural products have been evaluated as therapeutics for the treatment of a variety of diseases, including peptic ulcer. There has been considerable pharmacological investigation into the antiulcer activity of some compounds. In this work, we shall review the literature on different medicinal plant and alkaloids with antiulcer activity. This article reviews the antacid/anti-peptic, gastro protective and/or antiulcer properties of the most commonly employed herbal medicines and their identified active constituents. The experimental parameters used for antiulcer activity were cold restraint stress-induced ulcer model, Diclofenac-induced ulcer model in rats, (HCl–ethanol)-induced ulcer in mice and water immersion stress-induced ulcer in rats. The ideal aims of treatment of peptic ulcer disease are to relieve pain, heal the ulcer and delay ulcer recurrence. About 70% of patients with peptic ulcer disease are infected by Helicobacter pylori and eradication of this microorganism seems to be curative for this disease. This article reviews drugs derived from medicinal plant more commonly used in the world

for peptic ulcer and, if reported, the antiulcer activity. This article will be concerned only with the antiulcer and protective effect.

Keywords-Anti-ulcer, Anti-inflammatory drugs, Acid neutralizing, Helicobacter pylori, Microorganism.

INTRODUCTION

An ulcer is basically an inflamed break in the skin or the mucus membrane lining the alimentary tract. Ulceration occurs when there is a disturbance of the normal equilibrium caused by either enhanced aggression or diminished mucosal resistance. About 19 out of 20 peptic ulcers are duodenal. Gastric ulcers, found in the stomach wall, are less common. The gastric mucosa is continuously exposed to potentially injurious agents such as acid, pepsin, bile acids, food ingredients, bacterial products (*Helicobacter pylori*) and drugs. Secretion, inhibition of prostaglandin synthesis and cell proliferation growth, diminished gastric blood flow and gastric motility. In this work, we shall review the literature on different medicinal plant and alkaloids with antiulcer activity. This article reviews the antacid/anti-peptic, gastroprotective and/or antiulcer properties of the most commonly employed herbal medicines and their identified active constituents. The experimental parameters used for antiulcer activity were cold restraint stress-induced ulcer model, Diclofenac-induced ulcer model in rats, (HCl–ethanol)-induced ulcer in mice and water immersion stress-induced ulcer in rats. The ideal aims of treatment of peptic ulcer disease are to relieve pain, heal the ulcer and delay ulcer recurrence.¹

About 70% of patients with peptic ulcer disease are infected by *Helicobacter pylori* and eradication of this microorganism seems to be curative for this disease. This article reviews drugs derived from medicinal plant more commonly used in the world for peptic ulcer and, if reported, the antiulcer activity. This article will be concerned only with the antiulcer and gastro-protective effects.²



Figure 1: Fenugreek Leaves

HEALTH BENEFITS OF FENUGREEK

These amazing seeds have been used for medicinal purposes since ancient times. From giving you the best flavor to your food, fenugreek seeds help in relieving various ailments. Here are some incredible benefits of fenugreek seeds:

- **Makes your hair healthy**

We all face various hair problems such as dandruff, hair fall, and dry hair, etc. If you are tired of trying different shampoos and medications then it's time to go for some natural therapies. Fenugreek seeds contain proteins and nicotinic acid which helps to strengthen your hair roots and reconstruct damaged hair follicles. It also contains lecithin, a slippery substance is produced by soaked seeds which give shine to your hair.³

For best results soak the fenugreek seeds overnight to soften them. Grind them in the morning and add curd to the paste. After the paste is ready, apply it to your scalp and massage the roots of your hair. Wash off your hair after 30 minutes, and say goodbye to hair problems. Fenugreek seeds also have some medicinal properties that help hair to preserve its pigment. It also helps in delaying of gray hair.^{4, 5, 6}

- **Get radiant and acne-free skin**

Acne and its scars are the most common problem, especially in teenagers. Due to recurrent acne, your skin may get damaged and look dull and unhealthy. Fenugreek seeds contain a Diosgenin which has antibacterial and anti-inflammatory properties. These properties help the skin to fight against acne. It also destroys free radicles in our body which is responsible for wrinkled skin, dark spots, and infections.^{7, 8}

Germinated fenugreek seeds are full of antioxidants that help to delay the aging process and moisturize your skin. Apply fenugreek seed paste with honey on the face at night and wash it off in the morning gives you acne-free and radiant skin. Also, a face pack prepared from fenugreek seed paste with gram flour and curd exfoliates the skin and removes dark spots and dark circles.⁹

- **Enhance weight loss**

Consuming fenugreek seed water daily on empty stomach can boost your metabolism which ultimately helps in weight reduction. It is full of natural fibers which will help to reduce your calorie cravings and suppresses your appetite. These seeds give a feeling of stomach fullness which can reduce overeating and lead to weight loss.^{10, 11}

- **Blood sugar regulation**

Fenugreek seeds are an excellent remedy to control and prevent diabetes. It helps to increase insulin sensitivity and action which leads to lowering the blood sugar level. You can have fenugreek seed water or simply soaked seeds to control blood sugar levels.^{12, 13}

- **Helps in the digestion**

For those who are suffering from hyper-acidity or bowel problems, fenugreek seeds work like magic for them. Its regular consumption can reduce acidity problems and digestive problems. To get benefit from fenugreek seeds for digestive problems, add grated ginger to its paste, and eat one tablespoon before your meals. Fenugreek water helps to flush out the harmful toxins from your body and it helps in improving your bowel movement.^{14, 15, 16}

- **Enhance milk production in new mothers**

Fenugreek seeds are widely used to enhance milk production in new mothers. It contains phytoestrogen which helps to increase milk production in lactating mothers. Drinking fenugreek tea increases milk level and also helps to gain weight in infants.¹⁷

- **Alleviate menstrual cramps**

Fenugreek seeds have anti-inflammatory properties that help to reduce menstrual cramps and other menstrual-related issues. Researchers assume that it relieves pain due to the presence of alkaloids in it. It was found that fenugreek seed powder reduces these cramps and other problems like fatigue, nausea, etc.¹⁸

- **Boosts libido**

Since ages, it has been used to treat various sexual problems like erectile dysfunction, impotency, loss of sexual desire, etc. Recent studies suggest that it may boost libido in both males and females. Fenugreek seed extract or tea is recommended to boost libido and alleviate other related problems.¹⁹

- **Controls cholesterol levels**

Fenugreek seeds contain flavonoids that lower the bad cholesterol or LDL in our bodies. Soaked fenugreek seeds amazingly reduce high cholesterol levels.²⁰

Fenugreek Seeds Benefits for Females

Fenugreek seeds are packed with essential nutrients such as fiber, iron, magnesium, and manganese, and are a rich source of phytoestrogens, which are compounds that mimic the effects of estrogen in the body.²¹

Here are some of the potential benefits of fenugreek seeds for females:

- **Enhances breast milk production:** Fenugreek seeds have been traditionally used to promote lactation in breastfeeding mothers. Studies suggest that the galactagogue properties of fenugreek may help increase milk production.
- **Regulates menstrual cycle:** Fenugreek seeds contain diosgenin, a compound that can help regulate menstrual cycles and relieve menstrual cramps.
- **Reduces menopausal symptoms:** The phytoestrogens in fenugreek seeds can help alleviate hot flashes, mood swings, and other menopausal symptoms.²²

Side-Effects & Allergies of Fenugreek Leaves (Kasuri Methi)

There are numerous benefits of fenugreek leaves but only if it is consumed in moderation. Since it is very bitter in taste it is not easy to consume it in a large quantity but if large quantities are consumed it has an allergic reaction similar to that of peanuts as it belongs to the same category.²³

With fenugreek, the most common problem is a feeling of nausea. It has great skin advantages but prior to its application on the face; test it on the skin as it has allergic reactions to various

types of skin. Pregnant women should avoid consuming it because of its labor inducing effect. If you are on any other medicine then consume fenugreek at least a couple of hours before you take your medicine.

Why you should start the day with Fenugreek (Methi) water

There are certain herbs that can help boost digestion and improve metabolism which when used in proper amount can accelerate weight loss, especially with fenugreek or methi.

Aiming for an ideal weight is a constant struggle despite hours of intense workouts and strict calorie-restricted diets. However, there are certain herbs that can help boost digestion, improve metabolism and accelerate weight loss, when used in proper amounts, especially fenugreek or methi. This potent natural ingredient can trigger the burning of belly fat and other adipose tissues.

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It is believed that drinking warm water mixed with fenugreek seeds or powder can reduce weight quickly. A 2015 study published in the International Journal for Vitamin and Nutrition Research, found that a daily dose of 10 grams of fenugreek seeds soaked in hot water may help control Type-2 diabetes. It mentioned that ‘methi dana (seeds)’ water has the ability to lower blood sugar in people with diabetes.

What’s the best way to consume it?

Add one tsp of fenugreek seeds in a glass of hot water and let it steep for about 10 minutes. Strain and add lemon and a pinch of honey for flavour and enjoy your cup of hot tea.



Figure 2-Health benefits of fenugreek leaves

Supplement Facts²⁵

- **Active ingredients (s):** Galactomannan fiber, saponin, hydroxyisoleucine

- **Alternative name(s):** Fenugreek, *Trigonella foenum-graecum*, Trigonella, Alhova, Bird's foot, Bockshornklee, Bockshornsame, Chandrika, Fenogreco, Foenugraeci Semen, Greek Clover, Greek Hay, Greek Hay seed, Hu luba, Medhika, Methi, Senegrain, Woo Lu Bar, and more.
- **Legal status:** Legal in most states (United States). Generally recognized as safe (GRAS).⁴ Substance added to food.
- **Suggested dose:** May vary based on plant part, dosage form, and medical condition.
- **Safety considerations:** Substance added to food.
- Children. Pregnancy (high dosages), breastfeeding (limited safety data). Fenugreek may also interact with some prescription medications and other supplements.

Fenugreek is available in a few different forms, including capsules. If you have difficulties swallowing pills, fenugreek might also be available in the following dosage forms:

- Liquid
- Powder
- Tea bags

There are also vegetarian options.

National Institutes of Health Office of Dietary Supplements.

Dietary supplement label database.²⁶

According to a review, fenugreek might also be available in the following forms:

- Whole raw seeds
- Cooked whole seeds
- Cooked leaves
- Extracted powder
- Gum isolates of seeds
- Degummed seeds

Your specific product will depend on your preference and what you hope to get in terms of effects. Each product may work a bit differently, depending on the form. So, following your healthcare provider's recommendations or label directions is essential.

Table 1- FENUGREEK NUTRITION FACTS

Nutrition	% Daily value
Total Fat 6g	9%
Saturated Fat 1.5g	7%
Cholesterol 0 mg	0%
Sodium 67mg	2%

Potassium 770mg	22%
Total carbohydrates 58g	19%
Dietary fiber 25g	100%
Protein 23g	46%
Vitamin C	5%
Iron	186%
Vitamin B6	30%
Calcium	17%

CONCLUSIONS

From this study we can conclude that studies with plant sources can result in novel and effective pattern of treatment. Current stalemates of modern medicine in the management of various ailments incline research tendencies to traditional medicine. In this respect, traditional medicine has introduced good protocols for treatment of various gastrointestinal disorders. All of the remedies presented here had adequate evidence from traditional or scientific source for their efficacy in management of ulcers.

According to the old hypothesis, acid secretion was thought to be the sole cause of ulcer formation and reduction in acid secretion was thought to be the major approach towards therapy. However, in the light of recent evidences this concept has changed. Now treatment of ulcer mainly targets the potentiation of the defensive system along with lowering of acid secretion.

Chemical substances derived from plants have been used to treat human diseases since the dawn of medicine. Roughly 50% of new chemical entities introduced during the past two decades are from natural products. Recent technological advances have renewed interest in natural products in drug discovery. Therefore, efforts should be directed towards isolation and characterization of the active principles and elucidation of the relationship between structure and activity. There are various medicinal plants and their extracts (containing active chemical constituents, e.g., tannins and flavonoids) that have significant antiulcer activity in in vivo experiments on animal models. Furthermore, detailed analysis of the active constituents of natural drugs should be directed towards clinical relevance. Standardization is indispensable to maintain reproducible quality in biological evaluation. Although the clinical efficacy of these preparations is reported by traditional practices, they have not been scientifically validated.²⁷

Ayurveda, the oldest medicinal system in the world, provides leads to find therapeutically useful compounds from plants. Therefore, Ayurveda knowledge supported by modern science is necessary to isolate, characterize, and standardize the active constituents from herbal sources for antiulcer activity. The combination of traditional and modern knowledge can produce better drugs for the treatment of peptic ulcer with fewer side effects.

It is apparent that experimental evaluation of herbal drugs for the treatment of gastric ulcer is rather impressive but very few have reached clinical trials and still few have been marketed. This shows

that the benefits of research are not reaching the people to whom medical research is directed and hence the time, manpower, and resources are not efficiently utilized. Hence, pharmacologists need to take more active interest in evaluation of herbal drugs for potential antiulcer activity and standardization of such herbal drugs to be clinically effective and globally competitive.

The combination of herbal products and standard anti-gastric ulcer drugs might present asynergistic effect against *H. pylori* and gastric ulcer disease and improve the outcome for patients with gastric ulcer. With only a few human studies, it is suggested to conduct further clinical studies with larger sample sizes on the efficacy and safety of medicinal plants with antiulcer activity. Also, it would be beneficial to design studies to investigate and further elucidate the mechanisms of action of medicinal plants used for the treatment or prevention of peptic ulcer. Finally, herbal products used for medicinal purposes require licensing in order to ameliorate their safety and quality, and ensure that randomized controlled investigations validate demands of its possible efficacy. With increased reports of herb–drug interactions, there is still a problem of deficient research in this field, with no measures taken to address this problem. Hence, pharmacists and doctors should be aware especially of the risks associated with the usage of herbal preparations, whether on their own or in combination with other herbal or standard conventional therapy.

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