

Antioxidant activity in fenugreek seeds (*Trigonella foenum-graecum*) extract

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Abstract:

The plant known as fenugreek has been used for treating various medical conditions in traditional medicine for many years. Antioxidants are a vital component of fenugreek, which plays a significant role in the herb's ability to treat medical conditions. Antioxidants protect the body against oxidative stress by scavenging free radicals and other reactive species. This protects the body from the negative effects of oxidation. Fenugreek is a plant that contains polyphenols, a kind of antioxidant. Other plants also contain polyphenols. Flavonoids, phenolic acids, and tannins are several forms of polyphenols that may be found in fenugreek. We shall investigate the relationship between the antioxidants and polyphenols found in fenugreek and the health advantages they provide later in this essay. Fenugreek seed extracts were prepared using three distinct kinds of solvents to investigate the effects of extraction solvent on (DPPH) 1,1-diphenyl-2-picryl hydrazyl radical scavenging activity.

Keywords: Fenugreek, DPPH activity, Antioxidant, polyphenol, plant extract.

Introduction:

Fenugreek (*Trigonella foenum-graecum*) is a plant used in traditional medicine for its multiple health benefits [1]. Antioxidants are a crucial component of fenugreek that contributes to its therapeutic benefits. Antioxidants protect the organism from oxidative stress by scavenging free radicals and other reactive species. Polyphenols are antioxidants found in plants such as fenugreek. Flavonoids, phenolic acids, and tannins are among the polyphenols found in fenugreek [2]. In this article, we will look at the relationship between antioxidants and polyphenols in fenugreek and the health advantages they provide [3]. Fenugreek Antioxidants and Polyphenols: Polyphenols are a class of chemicals found throughout the plant world. They are well-known for their antioxidant capabilities and have been linked to various health benefits. Flavonoids, phenolic acids, and tannins are only a few of the polyphenols present in fenugreek [4]. Flavonoids are a

class of polyphenolic chemicals found throughout the plant world. They are well-known for their antioxidant capabilities and have been linked to various health benefits [5]. Among the flavonoids found in fenugreek are Fenugreek a prominent herb found in Indian and Middle Eastern cuisine. For decades, it has been used as a natural cure for a range of diseases, including digestive problems, menstrual cramps, and even diabetes [6]. In recent years, scientists have gained interest in fenugreek's potential as an antioxidant and polyphenol source [7]. Antioxidants are chemicals that may harm cells and contribute to the development of chronic illnesses such as cancer, heart disease, and Alzheimer's disease. Polyphenols are antioxidants in many plant-based foods such as fruits, vegetables, and herbs such as fenugreek [8]. The DPPH (2,2-diphenyl-1-picrylhydrazyl) test is one of the most extensively used techniques for evaluating antioxidant activity. This test assesses antioxidants' capacity to neutralize free radicals by measuring the amount of DPPH decreased when an antioxidant is introduced to a solution. Many researchers have used the DPPH test to study the antioxidant properties of fenugreek [9]. According to one research, fenugreek seed extracts exhibited stronger antioxidant activity than fenugreek leaves, and the extraction process modified the antioxidant activity. Another research discovered that fenugreek seed extracts had stronger antioxidant activity than other spices like cumin and coriander extracts [10].

In addition to its antioxidant properties, fenugreek is a good source of polyphenols. According to one research, fenugreek seeds contain many polyphenols, including flavonoids and phenolic acids [11]. Another research discovered that fenugreek leaf extracts have significant quantities of gallic acid, a phenolic acid with anti-inflammatory and antioxidant characteristics [12]. Although additional study is required to fully understand the potential health benefits of fenugreek's antioxidants and polyphenols, these results imply that fenugreek might be a natural source of these critical nutrients. Adding fenugreek into your diet might be an easy and tasty method to increase your antioxidant consumption while supporting general health and well-being.

Materials and Methods:

The DPPH (2,2-diphenyl-1-picrylhydrazyl) test is a popular method to assess plant extract antioxidant capacity. This test is based on antioxidants' capacity to scavenge free radicals and decrease DPPH, a stable free radical with a deep violet hue [1, 13]. When DPPH interacts with an antioxidant, the color changes from violet to yellow, suggesting that antioxidant activity is present. The following are the specifics of the DPPH assay for plant extract:

Materials:

DPPH solution (0.1 mM), Plant extract, Solvent (methanol, ethanol, or water), and Microplate reader. 96-well microplate, Microplate shaker.

1. A stock solution of the plant extract was prepared by dissolving it in the appropriate solvent (methanol, ethanol, or water).
2. A series of dilutions of the plant extract were prepared in the solvent to obtain different concentrations.
3. A 180 μ L of the DPPH solution was added to each well of a 96-well microplate.

4. A 20 μ L of each plant extract dilution was added to the corresponding wells of the microplate.
5. the contents of the wells were mixed thoroughly using a microplate shaker and incubated the microplate in the dark at room temperature for 30 minutes.
6. Measure the absorbance of the reaction mixture at 517 nm using a microplate reader.
7. The percentage of DPPH radical scavenging activity was calculate using the following formula:

$$\text{DPPH radical scavenging activity (\%)} = [(A_{\text{control}} - A_{\text{sample}}) / A_{\text{control}}] \times 100$$
 where A_{control} is the absorbance of the control reaction (without plant extract) and A_{sample} is the absorbance of the reaction mixture containing the plant extract.
8. The percentage of DPPH radical scavenging activity was plotted against the concentration of the plant extract and determined the IC₅₀ value, which is the concentration of the plant extract required to scavenge 50% of the DPPH radicals.

Results and discussion:

Figure 1 shows the free radical scavenging activity of fenugreek seeds extracted using various solvents. Figure 1 shows that antioxidant activity was responsive to extraction solvents, with methanol 70% providing the maximum extraction recovery. Water solvent produced the lowest results.

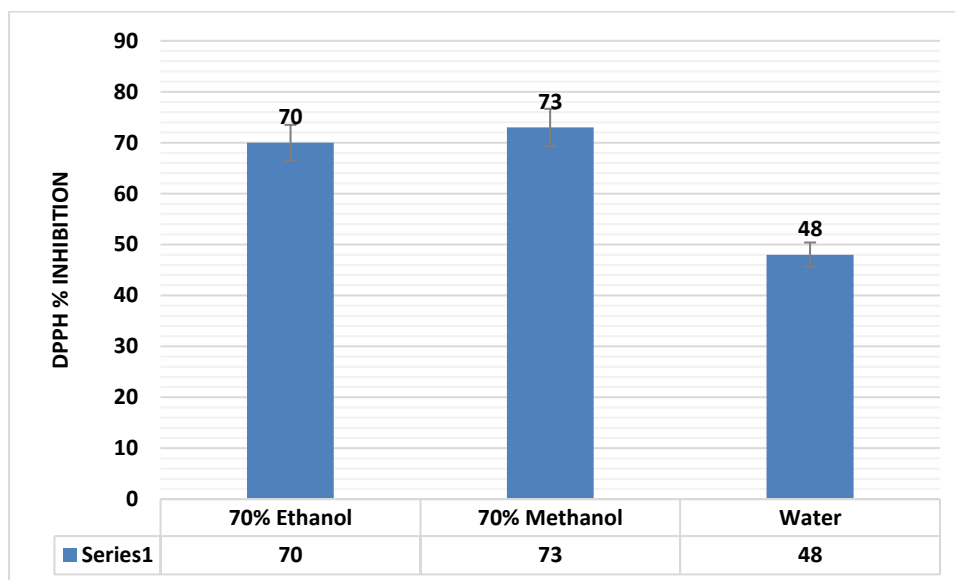


Fig 1: The DPPH activity of fenugreek seeds using different extraction solvents.

Fenugreek contains significant DPPH (2,2-diphenyl-1-picrylhydrazyl) activity, which indicates antioxidant capability. The strong DPPH activity of fenugreek is attributable to its high amount of polyphenols and other antioxidant chemicals [14]. Polyphenols are a kind of plant chemical that has antioxidant effects. They are well-known for their capacity to remove free radicals from the body and protect it from oxidative stress. Flavonoids, tannins, and lignans are among the

polyphenols found in fenugreek [15]. These polyphenols are thought to be responsible for fenugreek's strong DPPH activity. Flavonoids are a kind of polyphenol found in high concentrations in fenugreek. They have been proven to have antioxidant, anti-inflammatory, and anti-cancer effects [11]. Quercetin, a flavonoid in fenugreek, has been demonstrated to have substantial antioxidant activity and may protect against chronic illnesses, including heart disease and cancer. Tannins are a kind of polyphenol found in fenugreek. They are well-known for their anti-inflammatory qualities and ability to inhibit the development of dangerous germs and viruses. Tannins may also help prevent some forms of cancer. Lignans are a kind of polyphenol that is anti-cancer. Fenugreek contains lignans such as matairesinol and pinoresinol. In laboratory experiments, these lignans were proven to suppress the development of breast cancer cells. Fenugreek has additional chemicals that contribute to its antioxidant action, in addition to polyphenols, such as vitamins C and E. These vitamins are powerful antioxidants that protect the body from oxidative stress [2, 11, 15].

In conclusion, fenugreek's strong DPPH activity may be attributed to its abundant antioxidant components, including vitamins C and E, and polyphenols like flavonoids, tannins, and lignans. Fenugreek's strong DPPH activity may provide a natural strategy to guard against chronic illnesses and boost general health and well-being. To discover the ideal amount and type of fenugreek for therapeutic usage, further study is required.

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